Anurag Engineering College

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Ananthagiri (V&M), Kodad, Suryapet (Dt). Pin 508 206

B.TECH.

CIVIL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PROGRAM OUTCOMES [PO]

PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	To provide knowledge in mathematics, science and engineering principles for a successful career in sectors of civil engineering and allied industry and/or higher education.
PEO II	:	To develop an ability to identify, formulate, solve problems along with adequate analysis, design, synthesizing and interpretation skills in civil engineering systems.
PEO III	:	To exhibit professionalism, ethics, communication skills and team work in their profession and engaged in lifelong Learning of contemporary civil engineering trends

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	Ability to use knowledge in allied trend aspects of civil engineering along with good basics in mathematics and engineering sciences.
PSO 2	:	Ability to develop solutions for problems in multidisciplinary areas by applying practical engineering principles.
PSO 3	:	Acquire knowledge in professional and management skills for successful career, higher studies and entrepreneurship.

PROGRAM OUTCOMES		
PO 1:	:	An ability to apply knowledge of mathematics, science, and engineering.
PO 2	:	An ability to design and conduct experiments, as well as to analyze and interpret data.

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PO 3	:	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability.
PO 4	:	An ability to function on multidisciplinary teams.
PO 5	:	An ability to identify, formulates, and solves engineering problems.
PO 6	:	An understanding of professional and ethical responsibility.
PO 7	:	An ability to communicate effectively.
PO 8	:	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
PO 9	:	A recognition of the need for, and an ability to engage in lifelong learning.
PO 10	:	A knowledge of contemporary issues.
PO 11	:	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
PO 12	:	An ability to carry out research in different areas of Civil Engineering including latest technology like GIS/Remote Sensing resulting in design, development, analyze and journal publications and technology development.

C. Mruddy

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ANURAG

ENGINEERING ENGINEERS

B.TECH.

CIVIL ENGINEERING

R18 REGULATION

COURSE STRUCTURE

I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA101BS	Mathematics - I	BS	3	1	0	4	25	75	100
2	CH102BS	Engineering Chemistry	BS	3	1	0	4	25	75	100
3	EN103HS	English	HS	2	0	0	2	25	75	100
4	CS104ES	Programming for Problem Solving - I	ES	2	0	0	2	25	75	100
5	CH105BS	Engineering Chemistry Lab	BS	0	0	3	1.5	25	75	100
6	EN106HS	English Language Communication Skills Lab – I	HS	0	0	2	1	25	75	100
7	CS107ES	Programming for Problem Solving - I Lab	ES	0	0	2	1	25	75	100
8	ME108ES	Engineering Workshop	ES	0	0	3	1.5	25	75	100
Total				**10**	**2**	**10**	**17**	**200**	**600**	**800**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA201BS	Mathematics - II	BS	3	1	0	4	25	75	100
2	PH202BS	Engineering Physics	BS	3	1	0	4	25	75	100
3	ME203ES	Engineering Mechanics	ES	3	1	0	4	25	75	100
4	CS204ES	Programming for Problem Solving - II	ES	2	0	0	2	25	75	100
5	ME205ES	Engineering Graphics	ES	1	0	4	3	25	75	100
6	PH206BS	Engineering Physics Lab	BS	0	0	3	1.5	25	75	100
7	CS207ES	Programming for Problem Solving - II Lab	ES	0	0	3	1.5	25	75	100
8	EN208HS	English Language Communication Skills Lab - II	HS	0	0	2	1	25	75	100
Total				**12**	**3**	**12**	**21**	**200**	**600**	**800**

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II YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA301BS	Probability and Statistics	BS	3	0	0	3	25	75	100
2	CE302PC	Building Material & Construction Planning	PC	3	0	0	3	25	75	100
3	CE303PC	Strength of Material - I	PC	3	1	0	4	25	75	100
4	CE304PC	Fluid Mechanics	PC	3	1	0	4	25	75	100
5	CE305PC	Engineering Geology	PC	2	0	0	2	25	75	100
6	CE306PC	Surveying & Geometrics	PC	3	0	0	3	25	75	100
7	CE307PC	Surveying Lab	PC	0	0	2	1	25	75	100
8	CE308PC	Engineering Geology Lab	PC	0	0	2	1	25	75	100
9	HS309MC	Gender Sensitization	MC	0	0	2	0	25	75	100
Total				**17**	**2**	**6**	**21**	**225**	**675**	**900**

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II YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	EE401ES	Basic Electrical &Electronics Engineering	ES	3	0	0	3	25	75	100
2	CE402PC	Strength of Materials-II	PC	3	0	0	3	25	75	100
3	CE403PC	Hydraulics and Hydraulic Machines	PC	3	0	0	3	25	75	100
4	CE404PC	Structural Analysis-I	PC	3	1	0	4	25	75	100
5	CE405PC	Concrete Technology	PC	3	0	0	3	25	75	100
6	CE406PC	Computer Aided Civil Engineering Drawing Lab	PC	0	0	3	1.5	25	75	100
7	CE407PC	Strength of Materials Lab	PC	0	0	2	1	25	75	100
8	CE408PC	Fluid Mechanics & Hydraulic Machines Lab	PC	0	0	3	1.5	25	75	100
9	HS409MC	Human Values And Professional Ethics	MC	0	0	2	0	25	75	100
Total				**15**	**1**	**10**	**20**	**225**	**675**	**900**

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III YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	AE501HS	Managerial Economics and Financial Analysis	HS	3	0	0	3	25	75	100
2	CE502PC	Structural Analysis-II	PC	3	0	0	3	25	75	100
3	CE503PC	Geotechnical Engineering	PC	3	0	0	3	25	75	100
4	CE504PC	Transportation Engineering	PC	3	0	0	3	25	75	100
5	CE505PC	Structural Engineering – I (DRCS)	PC	3	1	0	4	25	75	100
6	PROFESSIONAL ELECTIVE-I		PE	3	0	0	3	25	75	100
7	CE506PC	Highway &Concrete Materials Lab	PC	0	0	2	1	25	75	100
8	CE507PC	Geotechnical Engineering Lab	PC	0	0	2	1	25	75	100
9	HS508MC	Constitution of India	MC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

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III YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	CE601PC	Foundation Engineering	PC	3	0	0	3	25	75	100
2	CE602PC	Structural Engineering – II (Steel Structures)	PC	3	1	0	4	25	75	100
3	CE603PC	Environmental Engineering	PC	3	0	0	3	25	75	100
4	CE604PC	Water Resource Engineering	PC	3	0	0	3	25	75	100
5	PROFESSIONAL ELECTIVE - II		PE	3	0	0	3	25	75	100
6	OPEN ELECTIVE-I		OE	3	0	0	3	25	75	100
7	CE605PC	Structural Analysis and Design lab	PC	0	0	2	1	25	75	100
8	CE606PC	Environmental Engineering Lab	PC	0	0	2	1	25	75	100
9	HS607MC	Intellectual Property Rights	MC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

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IV YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MS701HS	Management Science	PC	3	0	0	3	25	75	100
2	CE702PC	Estimating and Costing	PC	3	0	0	3	25	75	100
3	PROFESSIONAL ELECTIVE - III		PE	3	0	0	3	25	75	100
4	PROFESSIONAL ELECTIVE - IV		PE	3	0	0	3	25	75	100
5	OPEN ELECTIVE - II		OE	3	0	0	3	25	75	100
6	EN703HS	Advanced English Communication Skills Lab	PC	0	0	2	1	25	75	100
7	CE704PW	MINIPROJECT EVALUATION	PW	0	0	4	2	25	75	100
8	CE705PW	PROJECT STAGE-I	PW	0	0	8	4	100	0	100
Total				**15**	**0**	**14**	**22**	**275**	**525**	**800**

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IV YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	PROFESSIONAL ELECTIVE - V		PE	3	0	0	3	25	75	100
2	PROFESSIONAL ELECTIVE - VI		PE	3	0	0	3	25	75	100
3	OPEN ELECTIVE - III		OE	3	0	0	3	25	75	100
4	CE801PW	SEMINAR	PW	0	0	4	2	100	0	100
5	CE802PW	PROJECT STAGE-II	PW	0	0	12	6	25	75	100
Total				**9**	**0**	**16**	**17**	**200**	**300**	**500**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

Professional Elective-I

1. **CE511PE**-Remote sensing and Geographical Information System
2. **CE512PE**-Green Building Materials and Technologies
3. **CE513PE**-Advanced Mechanics of materials

Professional Elective-II

1. **CE621PE**-Pre-stressed Concrete
2. **CE622PE**-Highway Construction & Management
3. **CE623PE**-Ground Water Hydrology

Professional Elective-III

1. **CE731PE**-Irrigation and Hydraulic Structures
2. **CE732PE**- Pavement Design
3. **CE733PE**- Elements of Earthquake Engineering

Professional Elective-IV

1. **CE741PE**- Airport and Railway Engineering
2. **CE742PE**- Solid Waste Management
3. **CE743PE**- Construction Technology and Project Management

Professional Elective-V

1. **CE851PE**- Repair and Rehabilitation of Structures
2. **CE852PE**- Finite Element Methods
3. **CE853PE**- Intelligent Transportation System

Professional Elective-VI

1. **CE861PE**- Ground Improvement Techniques
2. **CE862PE**- Disaster Management and Mitigation
3. **CE863PE**- Advanced Reinforced Concrete Structures Design & Detailing

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE611OE	Construction Materials	Civil Engineering
2	CE612OE	Waste Management	
3	EE611OE	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	EE612OE	Electrical Power Generation Systems	
5	ME611OE	Advanced Engineering Materials	Mechanical Engineering
6	ME612OE	Introduction to Automobile Engineering	
7	EC611OE	Principles of Communications	Electronics & Communication Engineering
8	EC612OE	Basic Electronic Circuits Simulation & Design	
9	CS611OE	Software Engineering	Computer Science & Engineering
10	CS612OE	Database Management Systems	

OPEN ELECTIVE- II			
S. No.	**Course Code**	**Name of the Course**	**Offering Department**
1	CE721OE	Disaster Management	Civil Engineering
2	CE722OE	Remote Sensing and Geographic Information System	
3	EE721OE	Maintenance of Electrical Systems	Electrical & Electronics Engineering
4	EE722OE	Renewable Energy Sources	
5	ME721OE	Fundamentals of Refrigeration & Air Conditioning	Mechanical Engineering
6	ME722OE	Industrial Robotics	
7	EC721OE	Principles of Signal Processing	Electronics & Communication Engineering
8	EC722OE	Nano Materials and Technology	
9	CS721OE	Object Oriented Analysis and Design	Computer Science & Engineering
10	CS722OE	Cyber Forensics	

OPEN ELECTIVE- III			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE831OE	Project Management	Civil Engineering
2	CE832OE	Safety Engineering	
3	EE831OE	Electrical Engineering Materials	Electrical & Electronics Engineering
4	EE832OE	Fuzzy Logic and its Applications	
5	ME831OE	Power Plant Engineering	Mechanical Engineering
6	ME832OE	Nano Technology	
7	EC831OE	Fundamentals of Embedded Systems	Electronics & Communication Engineering
8	EC832OE	Biometric Systems	
9	CS831OE	Software Project Management	Computer Science & Engineering
10	CS832OE	Human Computer Interaction	

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COURSE OUTCOMES

I YEAR I SEMESTER

(MA101BS) MATHEMATICS-I

CO 1: Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
CO 2: Find the Eigenvalues and Eigenvectors of the matrix and discuss the nature of the quadratic form.
CO 3: Analyse the convergence of sequences and series.
CO 4: Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
CO 5: Find the extreme values of functions of two variables with / without constraints.

(CH102BS) ENGINEERING CHEMISTRY

CO 1: Apply the knowledge of atomic, molecular and electronic changes related to conductivity.
CO 2: Analyze the troubles caused by impure water and method of purification of water.
CO 3: Apply the knowledge of electrode potentials for the protection of metals from corrosion.
CO 4: Explain the concept of configurational and conformational analysis of molecules and reaction mechanism.
CO 5: Apply the knowledge of polymers in everyday's life.

(EN103HS) ENGLISH

On successful completion of this course, it is expected that the students will be able to,

CO 1: Get inspiration and motivation from Dr. C.V. Raman.
CO 2: Understand ancient architecture of India.
CO 3: Know about invention of Blue Jean
CO 4: Learn what type of diet to take and maintain good health.
CO 5: Understand the result of hard work and confidence.

(CS104ES)PROGRAMMING FOR PROBLEM SOLVING - I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Design algorithms and flowcharts for real world applications
CO 2: Know the usage of various operators in Program development
CO 3: Design programs involving decision and iteration structures.
CO 4: Apply the concepts code reusability using Functions.
CO 5: Analyse the concepts of Arrays and Strings for real world problems.

(CH105ES)ENGINEERING CHEMISTRY LAB

On successful completion of this course, it is expected that the students will be able to

CO 1: Determination of parameters like hardness and alkalinity of water.
CO 2: Estimation of rate constant of a reaction from concentration – time relationships.

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CO 3: Determination of physical properties like surface tension and viscosity.
CO 4: Calculation of strength of compound using instrumentation techniques.
CO 5: To impart fundamental knowledge in handling the equipment /glassware and chemicals in the chemistry laboratory.

(EN106HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the importance of phonetics.
CO 2: Understand the variants in Pronunciation.
CO 3: Differentiate formal and informal English in different situations.
CO 4: Understand the Intonation of English Language in the global world.
CO 5: Participate in Mock Interviews.

(CS107ES)PROGRAMMING FOR PROBLEM SOLVING LAB- I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Formulate the algorithms and flowcharts for simple problems
CO 2: Apply fundamental programming concepts, to solve simple problems
CO 3: Enhance debugging skills
CO 4: Exercise conditional and iterative statements to rite C programs
CO 5: Modularize the code with functions so that they can be reused
CO 6: Represent and manipulate data with arrays and strings

(ME108ES)ENGINEERING WORKSHOP

On successful completion of this course, it is expected that the students will be able to,

CO 1: Practice on manufacturing of components using workshop trades including Carpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring and Black Smithy.
CO 2: Apply basic electrical engineering knowledge for house wiring practice.
CO 3: Identify and apply suitable tools for different trades of Engineering processes including Material removing, measuring And Chiseling.
CO 4: Study and practice on Plumbing, Machine tools, Power tools, Wood working, Plastic Molding and their operations

(MA201BS) MATHEMATICS – II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
CO 2: Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
CO 3: Evaluate the multiple integrals.
CO 4: Evaluate vector differentiation and identify the vector differential operators physically in engineering problems.
CO 5: Evaluate the line, surface and volume integrals and converting them from

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one to another by using vector integral theorems.

(PH202BS) ENGINEERING PHYSICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Solve engineering problems using the concepts of wave and oscillations.
CO 2: Analyze the intensity variation of light due to interference, diffraction and polarization. Understand their applications in the field of engineering.
CO 3: Use the fundamental knowledge of crystallography to identify the crystal structure and defects in crystal.
CO 4: Understand the propagation of light through fiber optics in various communication fields and use of lasers as light sources for low and high energy applications.
CO 5: Classify magnetic and dielectric behavior of solids and test these materials for various applications.

(ME203ES) ENGINEERING MECHANICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Solve the resultant of forces which are acting on the systems and also the systems and able to apply the equilibrium conditions on a body.
CO 2: Solve the problems based on friction.
CO 3: Calculate the centroid and centre of gravity of composite sections.
CO 4: Solve the area and mass moment of inertia of simple and composite sections.
CO 5: Calculate the distance travelled and time required for the practice in case of connected systems.

I YEAR II SEMESTER

(CS204ES) PROGRAMMING FOR PROBLEM SOLVING - II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Use dynamic memory allocation functions with pointers
CO 2: Apply various file handling techniques for better data management
CO 3: Distinguish between stacks and queues
CO 4: Analyze various dynamic data structures

(ME205ES)ENGINEERING GRAPHICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand engineering drawing and its place in society.
CO 2: Visualize the different aspects of Points, Lines and Planes.
CO 3: Acquire knowledge on projections of solids.
CO 4: Draw sections of solids and plan the drawing for development of surfaces.
CO 5: Understand the isometric views and projections. Exposure to computer-aided geometric design and creating working drawings

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(PH206BS) ENGINEERING PHYSICS LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply the various procedures and techniques for the experiments.
CO 2: Use the different measuring devices and meters to record the data with precision.
CO 3: Test optical components using principles of interference and diffraction of light.
CO 4: Apply the mathematical concepts/equations to obtain quantitative results.
CO 5:Develop the basic communication through working in the groups and performing the laboratory experiments and by interpreting the results.

(CS207ES)PROGRAMMING FOR PROBLEM SOLVING LAB – II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Develop applications on user defined data types
CO 2: Apply dynamic memory allocation through pointers
CO 3: Use different data structures for create/update basic data files
CO 4: Implement linear data structures through stacks and queues
CO 5: Implement various searching and sorting techniques, Linked lists.

(EN208HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB - II

On successful completion of this course, it is expected that the students will be able to

CO 1: Understand the variants in Pronunciation.
CO 2: Differentiate Spoken and Written English in formal and informal situations
CO 3: Understand the emphasis on Pronunciation of English Language in the global world.
CO 4: Apply strategies for Effective Communication in different situations.
CO 5: Participate in conversation, Public Speaking and Group Discussion.

II YEAR I SEMESTER

(MA301BS) PROBABILITY AND STATISTICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand a random variable that describes randomness or uncertainty in certain realistic situation. It can be of either discrete or continuous type.
CO 2: Understand the definition of the sampling distribution of x-bar, and identify the mean, variance, and shape of the sampling distribution given the population information Compute probabilities for the normal distribution.
CO 3: Utilize curve fitting techniques for data representations and computation in engineering analysis.
CO 4: Accept or reject the population based on the sample.
CO 5: Test the significance difference between the sample means when more than two samples.

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(CE302PC) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Have the knowledge of construction methodology, materials and its planning
CO 2: Know the functional design of various elements such as arches, lintels, floors, stairs, doors & windows
CO 3: Have complete knowledge of farm work and plastering.
CO 4: Get the innovative methods of construction by using the latest technology.
CO 5: Getting the knowledge about building bye laws

(CE303PC) STRENGTH OF MATERIALS-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
CO 2: Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
CO 3: To evaluate the flexural and simple stresses developed in different types of beams different types of load condition
CO 4: Analyze Slope and deflection structural members subjected to different load condition with different cross sections.
CO 5: Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress and Frame an idea to design a system, component.

(CE304PC) FLUID MECHANICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Determine the properties of fluid and pressure and their measurement
CO 2: Compute forces on immersed plane and curved plates
CO 3: Apply continuity equation and energy equation in solving problems on flow conduits
CO 4: Analyze flow between laminar and turbulent flows
CO 5: Compute frictional losses in pipes

(CE305PC) ENGINEERING GEOLOGY

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the process of weathering and identify the minerals by their physical properties
CO 2: Identify the type of rock by their physical properties
CO 3: Understand the geological structures and their behavior.
CO 4: Identify the subsurface formations through different geo-physical investigations
CO 5: Apply the geological principles in identifying the suitable sites for

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engineering constructions to avoid the natural hazards or to withstand the disturbances that are created by the nature.

(CE306PC) SURVEYING & GEOMATICS

On successful completion of this course, it is expected that the students will be able to

CO 1: Gain the knowledge in measurement of distance and directions.
CO 2: Know the measurement of areas and volumes of contours.
CO 3: Have the knowledge of theodolite surveying & traversing.
CO 4: Have the knowledge on curves tachometric and modern surveying.
CO 5: Gain the knowledge of photogrammetry survey.

(CE307PC) SURVEYING LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Conduct survey and collect field data for measuring areas and volumes.
CO 2: Conduct survey and collect field data for measuring bearings.
CO 3: Conduct survey and collect field data for measuring levels.
CO 4: Conduct survey and collect field data for preparing contours.
CO 5: Gain the knowledge on Total Station

(CE308PC) ENGINEERING GEOLOGY LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Identify the important minerals based upon their physical and optical properties.
CO 2: Identify the important rocks based upon their megascopic and microscopic properties.
CO 3: Identify the rocks and minerals by the study of their physical properties.
CO 4: Interpret and draw the sections for geological maps showing tilted beds, faults, uniformities etc.
CO 5: Students can unravel the surface and subsurface geological structures for taking appropriate decision to either construct or to strengthen the existing geological structures for raising civil structures.

(HS309MC) GENDER SENSITIZATION (MANDATORY COURSE)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials from research, facts, everyday life, literature and film.
CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.

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CO 5: Men and women students and professions will be better equipped to work and live together as equals.

II YEAR II SEMESTER

(EE401ES) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Introduction of Electrical Elements, Electrical circuits and applications of KVL, KCL, and Ohm's Law
CO 2: DC machines and their applications
CO 3: AC machines and their applications.
CO 4: Electronic devices like Diode, Transistors and their applications.
CO 5: Working principle of CRO and its internal parts.

(CE402PC) STRENGTH OF MATERIALS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: the concepts of Torsion in Circular Shafts and Types of springs, deflection of springs.
CO 2: Understand and evaluate various the stresses Developed in Columns and Struts
CO 3: Analyze strength and stability of structural members subjected to Direct, and bending stresses.
CO 4: Student will able to understand how to design thin cylinders and thick cylinders
CO 5: Understand and evaluate the unsymmetrical bending and shear center of channel, I, T and L sections

(CE403PC) HYDRAULICS AND HYDRAULIC MACHINES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply dimensional analysis in different models and prototypes
CO 2: Calculate forces and work done by a jet on fixed or moving and curved plates and also apply the working principles of turbines including designs
CO 3: Determine the characteristics of a centrifugal pump and hydro power plant.
CO 4: Design open channels for most economical sections like rectangular, trapezoidal and circular sections.
CO 5: Analyze fluid flow on non- uniform open channel hydraulics

(CE404PC) STRUCTURAL ANALYSIS-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the statically determinate and indeterminate structures and the nature of stresses developed in perfect frames.
CO 2: To apply energy methods for structural members and analyze three hinged arches for various types of simple loads
CO 3: Analyze the statically indeterminate members such as propped cantilever

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and fixed beams and draw shear force and bending moment diagrams.

CO 4: Analyze the statically indeterminate members such as continuous beams and for various types of loading and also used to derive the equations to solve engineering problems

CO 5: Analyze the Influence on a beam for different static & moving loading positions.

(CE405PC) CONCRETE TECHNOLOGY

On successful completion of this course, it is expected that the students will be able to,

CO 1: Have complete knowledge of types and properties of materials require for making concrete

CO 2: Know the properties of the green and hardened concrete

CO 3: Know the methods of finding the properties of materials and concrete

CO 4: Know the IS codal specifications of concrete and its materials.

CO 5: Have the knowledge of special concretes.

(CE406PC) COMPUTER AIDED CIVIL ENGINEERING DRAWING LAB

CO 1: Use the AutoCAD commands for drawing 2D & 3D building drawings required for different civil engineering applications.

CO 2: Plan and draw Civil Engineering Buildings as per aspect and orientation.

CO 3: Presenting drawings as per user requirements and preparation of technical report

CO 4: Developing sections & Elevation in buildings

CO 5: Applications in Surveying etc.

(CE407PC) STRENGTH OF MATERIALS LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the behavior of twisting moment of materials and bending stress of wood/steel cantilever and simply supported beams

CO 2: Understand the properties of Hardness, Tensile and shear stress of materials.

CO 3: Understand about the properties of helical spring and strain energy of materials.

CO 4: Know the estimate the compressive strength of wood and concrete materials

CO 5: Get the knowledge on Verification of Maxwell's reciprocal theorem, usage of electrical resistance gauges and also deflection of cantilever beam.

(CE408PC) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Measure discharge in pipes

CO 2: Determine the energy loss in conduits

CO 3: Determine the characteristics curves of jets

CO 4: Determine the characteristics curves of turbines

CO 5: Determine the characteristics curves of pumps

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(HS409MC) HUMAN VALUES AND PROFESSIONAL ETHICS (MANDATORY COURSE)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students will learn basic guide lines, content and process for value Education

CO 2: Students will learn human being as co-existence of the sentient I and the material body

CO 3: Students will understand harmony in the family and society will lead affection towards in the family and as well as in the society.

CO 4: Students will acquire the knowledge about existing nature and their role in protecting of nature.

CO 5: Students will learn competence in professional ethics.

III YEAR I SEMESTER

(AE501HS) MANAGERIAL ECONOMICS FINANCIAL ANALYSIS

On successful completion of this course, it is expected that the students will be able to,

CO 1: The market dynamics namely demand, demand forecasting, elasticity of demand.

CO 2: Game an insect in to how production function is carried out to achieve least cost combination of inputs and cost analysis.

CO 3: Know the types of markets and pricing methods and strategies.

CO 4: Analyse how capital budgeting decisions are carried out.

CO 5: The importance of accounting and known how to analyse and interpret the financial statements through ratio analysis.

(CE502PC) STRUCTURAL ANALYSIS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Analyzing the indeterminacy in structures like trusses and arches.

CO 2: Analyzing the structures using moment distribution method.

CO 3: Analyzing the structures using Kani's method and also able to draw SFD and BMD.

CO 4: Analyzing the structures using Matrix methods and also able to draw SFD and BMD.

CO 5: Analyzing the structures using approximate methods and also able to draw SFD and BMD.

(CE503PC) GEOTECHNICAL ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the soil formation and mass volume relationship

CO 2: Know the effect of permeability and seepage on soils and concept of effective stress in soils.

CO 3: Understand the concept of stress distribution and mechanism of compaction in soils.

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CO 4: To understand the clear concept of consolidation.
CO 5: Know the importance of shear strength and understand various theories.

(CE504PC) TRANSPORTATION ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the highway development, planning and highway alignment.
CO 2: Know the highway geometry & other elements of highway & their application in the design of highway
CO 3: Understand the parameters of traffic & preventive measures.
CO 4: Know the traffic regulation & its management
CO 5: Understand the intersection, highway maintenance & its construction procedure

(CE505PC) STRUCTURAL ENGINEERING-I (DRCS)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the basic concepts of reinforced concrete designs
CO 2: Understand the design of beams and IS codal provisions
CO 3: Understand the design of slabs and staircase
CO 4: Understand the design of short and long columns
CO 5: Know the knowledge of design of footings

PROFESSIONAL ELECTIVE - I
(CE511PE) REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEM

On successful completion of this course, it is expected that the students will be able to,

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(CE512PE) GREEN BUILDING MATERIALS AND TECHNOLOGIES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Be able to identify the fundamentals of energy use and energy processes in building.
CO 2: Be able to identify the energy requirement and its management.
CO 3: Apply the knowledge about Sun-earth relationship vis-a-visits effect on climate.
CO 4: Be able to deal with the end -use energy requirements.
CO 5: Be familiar with the audit procedures of energy.

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(CE513PE) ADVANCED MECHANICS OF MATERIALS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Appraise importance of Repair, Rehabilitation and Maintenance
CO 2: Develop familiarity with Serviceability evaluation tests
CO 3: List out properties to be considered to choose from available repair materials
CO 4: Develop familiarity with various repair methods and rehabilitation strategies
CO 5: Monitor the health of structures

(CE506PC) HIGHWAY AND CONCRETE MATERIAL LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students gain knowledge on test procedures for characterization cement
CO 2: Students are able test aggregates for its characterization
CO 3: Students are able evaluate properties of fresh concrete
CO 4: Students gain knowledge on characterization of concrete
CO 5: Students are able to understand characterization of bituminous mixes

(CE507PC) GEOTECHNICAL ENGINEERING LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Evaluate the properties of soil
CO 2: Know the calculation of field density by different methods and permeability tests.
CO 3: Know the calculation of OMC by different compaction methods and consolidation test.
CO 4: Evaluate the bearing capacity of soil by using CBR test
CO 5: Evaluate the laboratory shear strength tests.

(HS508MC) CONSTITUTION OF INDIA (MANDATORY COURSE)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO 2: Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
CO 3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
CO 4: Discuss the passage of the Hindu Code Bill of1956.

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III YEAR II SEMESTER

(CE601PC) FOUNDATION ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the knowledge of soil exploration and slope stability.
CO 2: Know the earth pressure theories by using different methods and design of retaining walls
CO 3: Know the various methods of load bearing capacity of soils and settlement of soils
CO 4: Design the shallow foundations
CO 5: Design the pile and well foundations

(CE602PC) STRUCTURAL ENGINEERING-II (Design of Steel Structures)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand limit state method (IS: 800-2007) of design and can also design bolted and welded connections.

CO 2: Design compression and tension members using simple and built-up sections
CO 3: Design columns and column basses using simple and built-up sections
CO 4: Design of beams in eccentric connections–framed, seated and stiffened seated connections
CO 5: Design welded plate girder, connections between web and flange, stiffeners, web splice & flange splice.

(CE603PC) ENVIRONMENTAL ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply procedures to forecast population and compute future water demand
CO 2: Develop on Environmental Management Systems for characteristics of water
CO 3: Explain different methodologies for collection and conveyance systems
CO 4: Examine layout and analyze water distribution systems
CO 5: Analysis and Design the various treatment plant units

(CE604PC) WATER RESOURCES ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: To get the knowledge of hydrology and hydrologic cycle and its applications.
CO 2: To gain the knowledge of rainfall measurement methods and its analysis
CO 3: To understand about groundwater occurrence and aquifer parameters.
CO 4: To understand basic knowledge of the irrigation and Design discharge for water course.
CO 5: To get the knowledge of design of irrigation canals and also Design Discharge.

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PROFESSIONAL ELECTIVE-II
(CE621PE) PRE-STRESSED CONCRETE

On successful completion of this course, it is expected that the students will be able to,

CO 1: Identify classification, properties of pre stressed concrete.
CO 2: Analyze methods of Prestressing
CO 3: Design different sections for flexure and shear strength.
CO 4: Gain knowledge on transfer of prestress in pretension members.
CO 5: Understand the composite beams and deflections.

(CE622PE) HIGHWAY CONSTRUCTION AND MANAGEMENT

On successful completion of this course, it is expected that the students will be able to,

CO 1: Have the knowledge of construction methodology materials and planning
CO 2: Have complete knowledge of types of pavement & their applications.
CO 3: Get the innovative methods of construction by using the latest technology.
CO 4: Able to understand the Hill landslides & causes and control measures.
CO 5: To understand the pavement evaluation & its techniques.

(CE733PE) GROUND WATER HYDROLOGY

On successful completion of this course, it is expected that the students will be able to,

CO 1: Assess groundwater potential and head.
CO 2: Estimate hydraulic conductivity and storage coefficient for time variant flow.
CO 3: Investigate ground water availability for a given area.
CO 4: Plan and design of artificial recharge.
CO 5: Construct model and analyze ground water flow.

(CE605PC) STRUCTURAL ANALYSIS AND DESIGN LAB

On successful completion of this course, it is expected that at the students will be able to,

CO 1: The Student will understand importance in designing
CO 2: Student will be able to generate a mode & can apply the loads & properties of the material
CO 3: Student will be able to analyze & design a portal bay frame.
CO 4: Student will be able to analyze & design a G+3 residential building.
CO 5: Student will be able to analyze & design a concrete structure.

OPEN ELECTIVE-I
(CE611OE) CONSTRUCTION MATERIALS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
CO 3: Students are known About Concrete Ingredients, Manufacturing Process

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and Tests on It.

CO 4: Students are Gain About Basic Knowledge on Timber And Other Materials

CO 5: Students are get knowledge on Modern construction materials.

(CE 612OE) WASTE MANAGEMENT

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of wastewater.

CO 2: Understand the effects of discharging wastewater into streams and the direct and indirect impacts on aquatic animals and humans.

CO 3: Understand the working procedure in various industries, sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.

CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.

CO 5: Understand the waste disposal methods and requirement of treatment plants.

(EE611OE) SOLAR PHOTO VOLTAIC SYSTEMS (EEE)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the basics of solar energy and its geometry.

CO 2: Analyze the various topologies of solar photovoltaic cells.

CO 3: Understand the protection and measurement of solar photovoltaic system.

CO 4: Understand the design considerations of solar photovoltaic system

CO 5: Analyze the various maximum power point tracking techniques.

(EE612OE) ELECTRICAL POWER GENERATION SYSTEMS (EEE)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the electrical power generation process from Thermal and Nuclear power stations.

CO 2: Analyze the electrical power generation from Hydro and Gas power stations.

CO 3: Analyze the electrical power generation by using solar energy.

CO 4: Understand the electrical power generation from wind energy & biomass energy.

CO 5: Know the working of fuel cells and ocean energy conversion.

(ME611OE) ADVANCED ENGINEERING MATERIALS (ME)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Acquire an understanding of the main concepts related to the structure and properties of Advanced materials

CO 2: Understand the basic concepts of ferrous and non ferrous metals and alloys.

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CO 3: Understand the ceramics and composite materials
CO 4: To understand the application of super alloys and intermetallic
CO 5: Understand the basic methods of manufacturing various types of composite materials.

(ME612OE)INTRODUCTION TO AUTOMOBILE ENGINEERING (ME)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Analyze the basic lay-out of automobile, working and other details about I.C Engines used in automobiles.
CO 2: To gain knowledge on working of ignition, Electrical systems.
CO 3: Understand how the transmission system works and the working knowledge of various Components in the transmission system.
CO 4: Students will be able to explain the working principle of various parts of auto mobile such as axles, steering system and Suspension System.
CO 5: Understand the various braking systems and pollution standards and its significance.

(EC611OE)PRINCIPLES OF COMMUNICATIONS (ECE)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various telephone communication systems.
CO 4: Will have a basic understanding of various satellite and optical communication systems
CO 5: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems

(EC612OE) BASIC ELECTRONIC CIRCUITS SIMULATION & DESIGN (ECE)

On successful completion of this course, it is expected that the students will be able to,

CO 1: Describe circuits for PSpice simulation
CO 2: Understand the types of DC circuit their output variables analysis
CO 3: Understand the response of Transient analysis and obtain their output variables.
CO 4: Understand the types of AC circuit their output variables analysis.
CO 5: Students can able to analyze and develop simulation circuit for different applications.

(CS611OE) SOFTWARE ENGINEERING (CSE)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Apply software engineering principles and techniques.
CO 2: Analyze software system requirements.
CO 3: Produce efficient, reliable, robust and cost-effective software solutions.
CO 4: Apply testing strategies.
CO 5: Ensure good quality software.

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(CS612OE) DATABASE MANAGEMENT SYSTEMS (CSE)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Design Entity- Relationship Model for enterprise level databases.
CO 2: Develop the database and provide restricted access to different users of data base and formulate the Complex SQL queries.
CO 3: Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
CO 4: Use of suitable Indices and Hashing mechanisms for real time implementation.
CO 5: Analyze various concurrency control protocols and working principles of recovery algorithms.

(CE605PC) STRUCTURAL ANALYSIS AND DESIGN LAB

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Student will understand importance in designing
CO 2: Student will be able to generate a mode & can apply the loads & properties of the material
CO 3: Student will be able to analyse & design a portal bay frame.
CO 4: Student will be able to analyse & design a G+3 residential building.
CO 5: Student will be able to analyse & design a concrete structure.

(CE606PC) ENVIRONMENTAL ENGINEERING LAB

On successful completion of this course, it is expected that at the students will be able to,

CO 1: To determine P^H, turbidity and conductivity of given water sample.
CO 2: To determine alkalinity, acidity and total dissolved solids for a given water sample. .
CO 3: Estimate the range of chlorides, iron, dissolved oxygen and nitrates in the water sample given.
CO 4: To determine the optimum dose of coagulant, chlorine demands and total phosphorus for a given water sample.
CO 5: To determine the COD and BOD of a given sample.

(HS607MC) INTELLECTUAL PROPERTY RIGHTS (MANDATORY COURSE)

After completion of the course the student will be able to

CO 1: Understand the fundamentals of intellectual properties and its agencies.
CO 2: Know the trade mark registration process and its rights.
CO 3: Understand the fundamentals of copy rights and patent law.
CO 4: Know the trade secret determination and protection.
CO 5: Know the recent developments in protection of intellectual property rights.

IV YEAR I SEMESTER

(MS701HS) MANAGEMENT SCIENCE

On successful completion of this course, it is expected that at the students will be

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able to,

CO 1: About management functions, theories and Organizational structures.
CO 2: About Production methods, Techniques under quality control and inventory control.
CO 3: About functions & importance of HRM, Marketing functions and product life cycle.
CO 4: About techniques in Networking for time required to complete the project.
CO 5: About Corporate strategy implementation methods and other few contemporary management practices.

(CE702PC) ESTIMATING AND COSTING

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Apply different types of estimates in different situations
CO 2: Carryout estimation of quantities for different works
CO 3: Carryout analysis of rates & bill preparation at different locations
CO 4: Demonstrate the concepts of specification writing
CO 5: Apply different types of contracts, tenders and tender forms including projects

PROFESSIONAL ELECTIVE-III
(CE731PE) IRRIGATION AND HYDRAULIC STRUCTURES

On successful completion of this course, it is expected that at the students will be able to,

CO 1: The Student will be able to design hydraulic structures Surplus weir
CO 2: The Student will be able to design hydraulic structures Direct sluice
CO 3: The Student will be able to design hydraulic structures Glacis type canal drop
CO 4: The Student will be able to design hydraulic structures Cross regulator
CO 5: The Student will be able to design hydraulic structures Spillway and energy dissipators.

(CE732PE) PAVEMENT DESIGN

On successful completion of this course, it is expected that at the students will be able to,

CO 1: The Student will be able to get basic knowledge on Types of Pavements and it's factors for design
CO 2: The Student will be able to analyze Stresses in Flexible Pavement
CO 3: The Student will be able to analyze Stresses in Rigid Pavement
CO 4: The Student will be able to design Flexible pavements
CO 5: The Student will be able to design Rigid Pavements.

(CE733PE) ELEMENTS OF EARTHQUAKE ENGINEERING

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Assess the cause of an earthquake , it's magnitude and its effects on structures
CO 2: Apply the concepts of Damped and Undamped Vibrations to single, two and multi-degree systems and deduce a response spectrum

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CO 3: Apply the concepts of Seismic Design Philosophy and Earthquake Resistant Design to Masonry , RC and Steel structures

CO 4: Evaluate the Seismic Performance of Engineered and Non-Engineered Urban and Rural buildings

CO 5: Apply the concepts of Seismic Resistant Construction , Base isolation techniques and other energy dissipating devices and also the concepts of Seismic Retrofitting, use and interpret the knowledge gained from the case studies of performance of buildings during past earthquakes

PROFESSIONAL ELECTIVE-IV
(CE741PE) AIRPORT AND RAILWAY ENGINEERING

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Understand the importance of the airway system and characteristics of aircrafts.

CO 2: Understand the importance of the airway system and involve in planning of airport facilities.

CO 3: The students will be able to understand the facilities at airports and designing of runway systems.

CO 4: Identify different components of the railway track and select right materials for construction.

CO 5: Compute the various geometric features of railways for a given set of requirements.

(CE742PE) SOLID WASTE MANAGEMENT

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Know the various types of solid waste, their properties and treatment

CO 2: Know the various types of solid waste, their properties and treatment

CO 3: Understand the methods of solid and hazardous waste disposal

CO 4: Understand the hazardous waste management practices

CO 5: Aware the site remedial technology.

(CE743PE) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods

CO 2: Use the mechanized construction equipment at different situations or any huge projects

CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.

CO 4: To classify the contact management, estimation and project planning techniques

CO 5: Use the CPM – PERT Problems in project scheduling

OPEN ELECTIVE- II
(CE721OE) DISASTER MANAGEMENT

On successful completion of this course, it is expected that the students will be able

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to,

CO 1: Application of different approaches, human ecology in geographical research
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(CE722OE) REMOTE SENSING & GIS

On successful completion of this course, it is expected that the students will be able to,

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(EE721OE) MAINTENANCE OF ELECTRICAL SYSTEMS (EEE)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Identify the Engineering materials, properties and applications.
CO 2: Test the domestic appliances.
CO 3: Know the use of UPS and SMPS and maintenance of power devices.
CO 4: Understand the maintenance of batteries, ups/inverter, motors and starters.
CO 5: Rescue a person met with Electric shock.

(EE722OE/ EE511PE) RENEWABLE ENERGY SOURCES (EEE)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Learn the principles of solar radiation and collection of solar energy.
CO 2: Understand the various solar energy storage methods and solar applications.
CO 3: Analyze the Wind energy conversion and Biomass energy conversion.
CO 4: Analyze the geothermal energy conversion and ocean energy conversion.
CO 5: Analyze the various direct energy conversion devices.

(ME721OE) FUNDAMENTALS OF REFRIGERATION & AIR CONDITIONING (ME)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Ability to understand various refrigeration systems.
CO 2: Ability to understand the operation of various devices of VCR system.
CO 3: Ability to demonstrate the working of refrigeration equipment.

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CO 4: Ability to understand various psychrometric processes. .
CO 5: Ability to explain the air-conditioning equipment.

(ME722OE)INDUSTRIAL ROBOTICS (ME)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: At the end of the course, the student will be able to understand the basic components of Robots and differentiate types of robots and robot grippers.
CO 2: Model forward and inverse kinematics of robot manipulators.
CO 3: Analyze forces in links and joints of a robot.
CO 4: Programme a robot to perform tasks in industrial applications.
CO 5: Design intelligent robots using sensors.

(EC721OE) PRINCIPLES OF SIGNAL PROCESSING (ECE)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Perform Fourier transform and Z transform analysis on signals and systems
CO 2: Understanding the inter-relationship between DFT and various transforms
CO 3: Understand the Discrete Fourier series and various transforms
CO 4: Ability to design various IIR digital filter structures
CO 5: Ability to design a digital FIR filter for a given specification.

(EC623PE/ EC722OE) NANO MATERIALS AND TECHNOLOGY (ECE)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Understand the basic concepts of Nanotechnology.
CO 2: Understand the basic concepts of Nanomaterials
CO 3: Familiar with the fabrication process of NanoTechnology.
CO 4: Known the scaling and role of electrons in solids and Nanostructures.
CO 5: Known structures of Nano Devices.

(CS721OE) OBJECT ORIENTED ANALYSIS AND DESIGN (CSE)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Demonstrate the concepts and principles of object oriented programming.
CO 2: Understand the purposes, major components and key mechanisms of Class and Object Diagram.
CO 3: Describe the basic resource management responsibilities of Interaction Diagram.
CO 4: Knowledge on State-chart Diagram.
CO 5: Applying the techniques for Component and Deployment Diagrams.

(CS722OE) CYBER FORENSICS (CSE)

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.

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CO 2: It gives an opportunity to students to continue their zeal in research in computer forensics.
CO 3: Apply methods for preservation of digital evidence.
CO 4: Learning in depth about Computer Networks and internet.
CO 5: Learning in depth about various operating systems.

(EN703HS) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Understand the importance of vocabulary and using in real life situations.
CO 2: Apply reading strategies to enhance reading comprehension skills
CO 3: Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.
CO 4: Develop presentation skills to apply in professional life.
CO 5: Apply Techniques to clear group discussions and Interviews.

IV YEAR II SEMESTER

PROFESSIONAL ELECTIVE-V
(CE851PE) REPAIR AND REHABILITATION OF STRUCTURES

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Understand the behavior of existing structures.
CO 2: Understand the main causes for structural failure and will be able to give the guidelines to their repairs and retrofitting of masonry and concrete structures.
CO 3: Understand the main causes for structural failure and will be able to give the guidelines to their repairs and retrofitting of steel structures.
CO 4: Understand the repairing of complicated and special structures using the new technologies available.
CO 5: Give the guidelines and retrofitting procedures required for seismic prone structures.

(CE852PE) FINITE ELEMENT METHODS

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Understand the Finite element method (FEM) and derive elasticity matrices for 2-D, 3- D and axisymmetric elasticity problems.
CO 2: Understand the basic principles of minimum potential energy methods, Principle of virtual work and various coordinate system.
CO 3: Understand the FEM formulation using bar, truss elements and analyze simple problems with kinematic indeterminacy not greater than three.
CO 4: Understand the FEM formulation for beam element and rigid jointed plane frame element and analyze simple problems with kinematic indeterminacy not greater than three.
CO 5: Give the guidelines about familiarized with displacement models, Iso-parametric elements, 2D CST elements and rectangular elements and

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know the formulation of global stiffness matrices and load matrices and Gauss Quadrature rule

(CE853PE) INTELLIGENT TRANSPORTATION SYSTEM

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Students able to identify differentiate dissimilar ITS user services.
CO 2: Students able to select appropriate ITS technology depending upon site specific conditions.
CO 3: Students able to understand design and implement ITS components.
CO 4: Students gain knowledge on appropriate systems in various functional areas.
CO 5: Students are able to understand the Advantages of IT'S &suggest the technologies for field conditions.

PROFESSIONAL ELECTIVE-VI

(CE861PE) GROUND IMPROVEMENT TECHNIQUES

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Well aware about the different kinds of problems on expansive soils.
CO 2: The process of stabilization from the different soils layers
CO 3: The densification methods in cohesive and cohesive less soil
CO 4: All methods of dewatering in various soils and also known about grouting system
CO 5: The functions and applications of geo-synthetics and geo-textiles

(CE862PE) DISASTER MANAGEMENT AND MITIGATION

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Understand the need of disaster management system in India.
CO 2: Have the thorough knowledge of environmental hazards and disasters.
CO 3: Get the complete concept of endogenous hazards and their mitigation measures.
CO 4: Know the principles and measures to control exogenous hazards.
CO 5: Have the in depth knowledge of emerging approaches in disaster management.

(CE863PE) ADVANCED REINFORCED CONCRETE STRUCTURES DESIGN & DETAILING

On successful completion of this course, it is expected that at the students will be able to,

CO 1: Design and detail continuous beams & frames.
CO 2: Design and detail different types of slabs & rectangular and trapezoidal combined footings.
CO 3: Design and detail cantilever and counter for retaining walls.
CO 4: Design and detail circular and rectangular water tanks
CO 5: Design and detail the various components of Solid slab &T-Beam bridges.

OPEN ELECTIVE-III

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(CE831OE) PROJECT MANAGEMENT

After successfully completion of this course, the student will be able to

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods

CO 2: Use the mechanized construction equipment at different situations or any huge projects

CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.

CO 4: To classify the contact management, estimation and project planning techniques

CO 5: Use the CPM – PERT Problems in project scheduling

(CE831OE) SAFETY ENGINEERING

After successfully completion of this course, the student will be able to

CO 1: Know how to Handle and Protect the Machine and himself while working on it

CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment

CO 3: Understand the knowledge of safety rules and regulations of working at construction industry

CO 4: Understand the knowledge about working at all stages in different heights at construction site

CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(EE831OE) ELECTRICAL ENGINEERING MATERIALS (EEE)

After successfully completion of this course, the student will be able to

CO 1: Understand various types of dielectric materials, their properties in various conditions.

CO 2: Understand the properties and importance of insulating and dielectric medium.

CO 3: Evaluate magnetic materials and their behavior.

CO 4: Evaluate semiconductor materials and technologies

CO 5: Know the materials used in electrical engineering and applications.

(EE832OE) FUZZY LOGIC AND ITS APPLICATIONS (EEE)

After successfully completion of this course, the student will be able to

CO 1: Operation and properties of crisp and fuzzy logic.

CO 2: Operation and properties of crisp relations and fuzzy relations.

CO 3: Laws and inference of classical propositional, predicate and fuzzy propositional logic.

CO 4: Membership value assignment.

CO 5: Methods of defuzzification and fuzzy rule based system.

(ME831OE) POWER PLANT ENGINEERING (ME)

After successfully completion of this course, the student will be able to

CO 1: Understand the principle of various sources of energy, resources and development of power.

CO 2: To know the concept of internal combustion engine and gas turbine

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power plant.

CO 3: To know the concept of hydroelectric power plant.

CO 4: To know the concept of nuclear power stations and non-conventional power sources.

CO 5: Understand the power plant economics and environmental considerations.

(ME832OE) NANOTECHNOLOGY (ME)

After successfully completion of this course, the student will be able to

CO 1: Apply engineering and physics concepts to the Nano-scale and non-continuum domain.

CO 2: Understand Carbon Nano Tubes structures and manufacturing process.

CO 3: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of nano materials.

CO 4: Understand the principles and microelectronics fabrication.

CO 5: Understand the concept of Convective Heat Transfer in Nano fluids.

(EC733PE/EC832OE) BIOMETRIC SYSTEMS (ECE)

: After successfully completion of this course, the student will be able to

CO 1: Understand the differences between a biometric method and a biometric system

CO 2: Organize and conduct biometric data collection processes.

CO 3: Understand the concepts of IRIS recognition.

CO 4: Understand the concepts of FACE recognition.

CO 5: Understand how to use biometric databases in system evaluation.

(EC831OE) FUNDAMENTALS OF EMBEDDED SYSTEMS (ECE)

After successfully completion of this course, the student will be able to

CO 1: Summarize the different development tool for embedded system, features of advanced buses for distributed data transfer in system design.

CO 2: Develop the different processors on hardware and software for the development of embedded system design.

CO 3: Contrast the basics of embedded system Firmware.

CO 4: Implement the concepts of RTOS in real time programming

CO 5: Understand the development of distributed embedded system design.

(CS831OE) SOFTWARE PROJECT MANAGEMENT (CSE)

After successfully completion of this course, the student will be able to

CO 1: Apply the practice of project management in delivering of projects.

CO 2: Evaluate the project against strategic, technical and economic criteria.

CO 3: Identify effort estimation and activity plan of a project.

CO 4: Categorize and prioritize actions for risk management.

CO 5: Evaluate the characteristics of various team structures

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B.TECH.

CIVIL ENGINEERING

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COURSE STRUCTURE

I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A51001	English-I	HS	2	0	2	25	75	100
2	A51002	Mathematics-I	BS	3	1	3	25	75	100
3	A51003	Engineering Physics-I	BS	2	1	2	25	75	100
4	A51004	Applied Chemistry-I	BS	2	1	2	25	75	100
5	A51005	Computer Programming- I	ES	3	1	3	25	75	100
6	A51006	Engineering Graphics-I	ES	0	4	2	25	75	100
7	A51007	Engineering Mechanics-I	ES	2	1	2	25	75	100
8	A51209	Computer Programming Lab-I	ES	0	3	2	25	75	100
9	A51210	English Language Communication Skills Lab-I	HS	0	3	2	25	75	100
10	A51211	Engineering Physics and Applied Chemistry Lab-I	BS	0	3	2	25	75	100
11	A51212	Engineering Workshop-I	ES	0	3	2	25	75	100
Total				**14**	**21**	**24**	**275**	**825**	**1100**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A52001	English-II	HS	2	0	2	25	75	100
2	A52002	Mathematics-II	BS	3	1	3	25	75	100
3	A52003	Engineering Physics-II	BS	2	1	2	25	75	100
4	A52004	Applied Chemistry-II	BS	2	1	2	25	75	100
5	A52005	Computer Programming- II	ES	3	1	3	25	75	100
6	A52006	Engineering Graphics-II	ES	0	4	2	25	75	100
7	A52007	Engineering Mechanics- II	ES	2	1	2	25	75	100
8	A52209	Computer Programming Lab-II	ES	0	3	2	25	75	100
9	A52210	English Language Communication Skills Lab-II	HS	0	3	2	25	75	100
10	A52211	Engineering Physics and Applied Chemistry Lab-II	BS	0	3	2	25	75	100
11	A52212	Engineering Workshop- II & IT Workshop	ES	0	3	2	25	75	100
Total				**14**	**21**	**24**	**275**	**825**	**1100**

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II YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A55001	Mathematics-III	BS	4	1	4	25	75	100
2	A55002	Building Materials, Construction and Planning	PC	3	0	3	25	75	100
3	A55003	Strength of Materials-I	ES	3	1	3	25	75	100
4	A55004	Fluid Mechanics	ES	3	1	3	25	75	100
5	A55005	Surveying	PC	4	1	4	25	75	100
6	A55006	Engineering Geology	PC	3	0	3	25	75	100
7	A55201	Surveying Lab	PC	0	3	2	25	75	100
8	A55202	Engineering Geology Lab	PC	0	3	2	25	75	100
9	A55203	Gender Sensitization	MC	2	0	0	25	75	100
Total				**22**	**10**	**24**	**225**	**675**	**900**

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II YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A56001	Probability and Statistics	BS	3	1	3	25	75	100
2	A56002	Elements of Electrical Engineering	ES	3	1	3	25	75	100
3	A56003	Strength of Materials-II	ES	4	1	4	25	75	100
4	A56004	Hydraulics & Hydraulic Machinery	PC	4	1	4	25	75	100
5	A56005	Concrete Technology	PC	3	0	3	25	75	100
6	A56006	Environmental Studies	HS	3	0	3	25	75	100
7	A56201	Strength of Materials Lab	PC	0	3	2	25	75	100
8	A56202	Fluid Mechanics & Hydraulic Machinery Lab	PC	0	3	2	25	75	100
9	A56203	Human Values & Professional Ethics	MC	0	2	0	25	75	100
Total				**20**	**12**	**24**	**225**	**675**	**900**

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III YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A55001	Structural Analysis	PC	4	1	4	25	75	100
2	A55002	Design of RC Structures	PC	4	1	4	25	75	100
3	A55003	Environmental Engineering	PC	3	0	3	25	75	100
4	A55004	Soil Mechanics	PC	3	1	3	25	75	100
5	A55005	Water Resource Engineering	PC	4	1	4	25	75	100
6	PROFESSIONAL ELECTIVE - I								
	A55006	Elements of Earthquake Engineering	PE	3	0	3	25	75	100
	A55007	Water shed Management	PE						
	A55008	Disaster Management	PE						
7	A55201	Soil mechanics lab	PC	0	3	2	25	75	100
8	A55202	Computer Aided Drafting lab	PC	0	3	2	25	75	100
Total				**21**	**10**	**25**	**200**	**600**	**800**

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III YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A56001	Design of steel structures	PC	4	1	4	25	75	100
2	A56002	Foundation Engineering	PC	4	1	4	25	75	100
3	A56003	Transportation Engineering	PC	4	0	4	25	75	100
4	A56004	Irrigation Engineering	PC	3	1	3	25	75	100
5	PROFESSIONAL ELECTIVE - II								
	A56005	Construction technology & Project management	PE	3	0	3	25	75	100
	A56006	Environmental impact Assessment	PE						
	A56007	Advanced Structural Analysis	PE						
6	OPEN ELECTIVE-I		OE	3	0	3	25	75	100
7	A56201	Concrete technology lab	PC	0	3	2	25	75	100
8	A56202	Advanced communication skills lab	PC	0	3	2	25	75	100
Total				**21**	**9**	**25**	**200**	**600**	**800**

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IV YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A57001	Estimating and Costing	PC	3	1	3	25	75	100
2	A57002	Pavement Design	PC	3	1	3	25	75	100
3	A57003	GIS & Remote sensing	PC	3	0	3	25	75	100
4	PROFESSIONAL ELECTIVE - III								
	A57004	Railways and Airport Engineering	PE	3	0	3	25	75	100
	A57005	Earth Retaining Structures	PE						
	A57006	Advanced Structural Design	PE						
5	PROFESSIONAL ELECTIVE - IV								
	A57007	Ground improvement techniques	PE	3	0	3	25	75	100
	A57008	Finite element methods	PE						
	A57009	Building Services	PE						
6	OPEN ELECTIVE-II		OE	3	0	3	25	75	100
7	A57201	Transportation Engineering lab	PC	0	3	1.5	25	75	100
8	A57202	Environmental Engineering lab	PC	0	3	1.5	25	75	100
9	A57203	Mini Project	PW	0	0	2	--	100	100
Total				**20**	**8**	**23**	**200**	**700**	**900**

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IV YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	PROFESSIONAL ELECTIVE - V								
	A58001	Prestressed Concrete	PE	4	0	3	25	75	100
	A58002	Hazards and solid waste management	PE						
	A58003	Urban planning and development	PE						
2	PROFESSIONAL ELECTIVE - VI								
	A58004	Rehabilitation and Retrofitting of structures	PE	4	0	3	25	75	100
	A58005	Design and drawing of irrigation structures	PE						
	A58006	Geo Environmental Engineering	PE						
3	OPEN ELECTIVE-III		OE	3	0	3	25	75	100
7	A58201	Project work	PW	0	0	10	50	150	200
8	A58202	Technical seminar	PW	0	0	2	100	-	100
9	A58203	Comprehensive viva	PW	0	0	2	100	-	100
Total				**11**	**0**	**23**	**175**	**375**	**700**

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S.No	**Course code**	**Course**	**Offering Department**
1	A56301	Construction Materials	Civil Engineering
2	A56302	Waste Management	
3	A56303	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	A56304	Maintenance of Electrical Systems	
5	A56305	Advanced Engineering Materials	Mechanical Engineering
6	A56306	Mechatronics	
7	A56307	Principles of Communication Systems	Electronics & Communication Engineering
8	A56308	Electronic Measuring Instruments	
9	A56309	Java Programming	Computer Science & Engineering
10	A56310	Computer Networks	

OPEN ELECTIVE- II			
S.No.	**Course code**	**Subject**	**Offering Department**
1	A57301	Disaster Management and Mitigation	Civil Engineering
2	A57003	Geological Information System & Remote Sensing	
3	A57302	Energy Storage Systems	Electrical & Electronics Engineering
4	A57303	Electrical Engineering Materials	
5	A57022	Power Plant Engineering	Mechanical Engineering
6	A57304	Industrial Robotics	
7	A57305	Computer Organization	Electronics & Communication Engineering
8	A57306	Principles of Signal Processing	
9	A57307	Database Management Systems	Computer Science & Engineering
10	A57308	Web Technologies	

OPEN ELECTIVE- III			
S.No	**Course code**	**Subject**	**Offering Department**
1	A58301	Construction Technology and Project Management	Civil Engineering
2	A58302	Safety Engineering	
3	A58303	Energy conservation and Audit	Electrical & Electronics Engineering
4	A58304	Artificial Neural Networks	
5	A58305	Renewable Energy Sources	Mechanical Engineering
6	A58306	Automobile Engineering	
7	A58307	Nanotechnology	Electronics & Communication Engineering
8	A58308	Biometric System	
9	A58309	Game Theory with Engineering Applications	Computer Science & Engineering
10	A58310	Software Engineering	

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ANURAG

ENGINEERING ENGINEERS

B.TECH.

CIVIL ENGINEERING

R15 REGULATION

COURSE OUTCOMES

I YEAR I SEMESTER

(A51001) ENGLISH-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Narrate the stories and know the significance of humor.
CO 2: Promote awareness amongst students how Visvesvaraya became a role model to others.
CO 3: Create awareness in students the development & security features of polymer banknotes.
CO 4: How to utilize organs & know the importance of life. Awareness on every day is new day every day is last day.
CO 5: Students know about accidents that often happen because of carelessness. If we take care we can avoid Accidents.

(A51002) MATHEMATICS-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand Rolle's and the Mean value theorems and to verify the Mean value theorems and Apply partial derivatives to study maxima and minima of functions of two variables.
CO 2: Define rank and elementary transformations of a matrix and Discuss Non homogeneous and homogeneous system of equations.
CO 3: Compute eigenvalues and corresponding eigenvectors of a square matrix.
CO 4: Specify standard methods for solving differential equations and their applications in geometrical and physical problems.
CO 5: Identify different types of higher order differential equations and their applications in engineering problem solving.

(A51003) ENGINEERING PHYSICS-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the intensity variation of light due to interference, diffraction and polarization.
CO 2: Employ the knowledge of crystallography and X-Rays to understand the structure-property relationship of materials.
CO 3: Implement the concept of various distributions and statistical mechanics for research applications.
CO 4: Understand the classification of Magnetic materials, Superconductors and their applications in various fields.
CO 5: Acquire basic knowledge of dielectrics and the applications of piezo, pyro and ferro-electric materials.

(A51004) APPLIED CHEMISTRY-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Industrious Students and health conscious ones remain inquisitive on potable water its parameter and usage

CO 2: Dynamic students indeed capable of explaining the various aspects of electrochemistry work out numerical problems
CO 3: Thorough with cells and solar, fuel cells.
CO 4: gets augmented to the caliber in knowing corrosion and causes going around and capable of suggesting periodical maintenance
CO 5: Archetypal students comprehend the applications of colloids in various fields in exhort their immense significance

(A51005) COMPUTER PROGRAMMING- I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Ability to design algorithmic solutions to problem
CO 2: Ability to convert algorithms to C- Programs
CO 3: Ability to write, compile and debug programs in C Language
CO 4: Ability to write Programs using selection and repetition statements
CO 5: Ability to write programs using Arrays and Strings
CO 6: Ability to design structured programming.

(A51006) ENGINEERING GRAPHICS-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: To know the importance of Engineering Graphics and to represent the various Curves, Conic Sections, and Cycloids used in Engineering Graphics.
CO 2: To Draw and understand the Construction of Plane, Diagonal and Vernier Scales used in Engineering Graphics and also represent the Construction of Polygons and Involutes.
CO 3: To Draw and understand the Principles involved in Orthographic Projections and to represent the Principles involved in Points, Lines and Traces.
CO 4: To Draw and understand the construction Principles involved in Planes.
CO 5: To Draw and understand the construction Principles involved in Solids.

(A51007) ENGINEERING MECHANICS-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: To introduce the basic principles of mechanics applicable to rigid bodies in equilibrium.
CO 2: Construct free body diagrams and develop appropriate equilibrium equations.
CO 3: Analyze the systems with friction.
CO 4: Determine the centriod and centre of gravity for composite areas.
CO 5: Determine the moment of inertia for composite areas

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(A51201) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Get familiarity with vowels and consonants and speak with pronunciation. Learn to communicate in individual activates.
CO 2: Learn to reduce mother tongue influence for intelligibility. Gaining confidence using language in conversations and dialogues
CO 3: Better understanding of pronunciation through syllables and clusters. Learning etiquette in different situations make the students more professional.
CO 4: Mastering supra segmental features of phonetics thereby improving correct pronunciation. Improve presentation skill.
CO 5: Neutralization of accent for intelligibility. Improve employability skills of the students.

(A51202) COMPUTER PROGRAMMING LAB-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: To make the student to implement various sorting and searching techniques
CO 2: To introduce the student to structures, unions, and enumeration types and operations on them
CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.
CO 5: To make the student to create various types of files in 'C' Language.

(A51203) ENGINEERING PHYSICS AND APPLIED CHEMISTRY LAB-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply the various procedures and techniques for the experiments Use the different measuring devices and meters to record the data with precision.
CO 2: Apply the mathematical concepts/equations to obtain quantitative results
CO 3: Develop the basic communication through working in the groups and performing the laboratory experiments and by interpreting the results.
CO 4: Determination of parameters like hardness and alkalinity of water
CO 5: Estimation of rate constant of a reaction from concentration time relationships
CO 6: Determination of physical properties like surface tension

(A51204) ENGINEERING WORKSHOP-I

CO 1: To make a lap joint
CO 2: To make a dovetail- joint
CO 3: To make a T-briddle joint
CO 4: To prepare a flat filing
CO 5: To prepare a step cutting
CO 6: To prepare a angular cutting
CO 7: To prepare a open scoop
CO 8: To prepare a rectangular tray

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CO 9: To prepare a square tin
CO 10: To understand and to give the connections for one light point control by one single pole switch.
CO 11: To understand and to give the connections for one light point control by two-two way switches (parallel connections)
CO 12: To understand and to give the connections for to-connect a electrical bell by using bell push
CO 13: To understand and to give the connections for two light point controlled by one single pole switch.
CO 14: To prepair a pipe joint , tap- connections by using pluming
CO 15: To apply different operations to be performed on the lathe machines.

I YEAR II SEMESTER

(A52001) ENGLISH-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the social behavior of the current society.
CO 2: Promote awareness regarding how India achieved success with human values.
CO 3: Create awareness regarding the key for success through Narayana Murthy words.
CO 4: Realize the hardship in the life of Sachin Tendulkar to reach success.
CO 5: Know about the secret of success and happiness in the words of swami vivekananda quoting from the Bhagavath geetha.

(A52002) MATHEMATICS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
CO 2: Apply Laplace transform to solve differential equations which will be converted to algebraic
CO 3: Evaluate double integrals by changing variables , changing order and triple integration Calculate line integrals along piecewise smooth paths, interpret such quantities as work done by a force
CO 4: Apply Green's theorem to evaluate line integrals along simple closed contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and Divergence theorem to give physical interpretation of the divergence of a vector field
CO 5: Develop Fourier series of periodic functions.

(A52003) ENGINEERING PHYSICS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Implement the concepts of Quantum mechanics for research applications.
CO 2: Explain the electrical conductivity of the metals and classification of materials in to conductors, semiconductors and insulators.

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CO 3: Understand the construction and working of semiconducting devices and fiber optics to their applications in various fields.
CO 4: Understand the construction and working of different kinds of Lasers to their applications in various fields.
CO 5: Acquire Basic knowledge of synthesis of non-materials and their applications in the field of medicine, data storage devices and electronics.

(A52004) APPLIED CHEMISTRY-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply the knowledge of polymers in every day's life
CO 2: The student able to apply the knowledge about material chemistry
CO 3: Establishing the conditions for heterogeneous equilibrium between different phases
CO 4: Learn to assess the quality of fuel of fuel to be used in domestic usage
CO 5: Gain knowledge of the properties of engineering use in different industrial applications

(A52005) ENGINEERING MECHANICS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Determine the axial forces in the members of trusses.
CO 2: Determine the kinematic relations of particles & rigid body motion.
CO 3: Apply equations of kinetics motions to particle and rigid body motion.
CO 4: Analyze motion of particles & rigid bodies using the principle of work-energy.
CO 5: Determine the equilibrium conditions(FBD) in terms of virtual work

(A52006) COMPUTER PROGRAMMING-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Upon completion of this course the students will have an:
CO 2: Ability to design various sorting and searching techniques
CO 3: Ability to design user defined data types to solve real world problems
CO 4: Ability to manage heap memory
CO 5: Ability to implement and use data structures like stacks, queues and linked lists
CO 6: Ability to create and use various types of files in 'C' Language.

(A52007) ENGINEERING GRAPHICS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: To Draw and understand about the Sections of Solids, Development of Surfaces and intersections of similar Solids used in Engineering Graphics.
CO 2: To Draw and understand the construction Principles involved in Isometric Projections.

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CO 3: To Draw and understand about Conversion of Orthographic Views to Isometric Views and also represent its Transformation of Projections.
CO 4: To Draw and understand about the construction Principles involved in Perspective Projections.
CO 5: To Draw and understand about the Computer Aided Drafting used in Engineering Graphics

(A52201) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: The students become aware of different pronunciations. Gain confidence in using language in different contexts.
CO 2: Equip with good listening skills Enrichment of fluency there by students becomes confidence.
CO 3: Better understanding of intonation and sentence stress for intelligibility. Mastering functions of language.
CO 4: Familiarize With nuances of pronunciation. Giving speeches make students more confident and get rid of stage fear.
CO 5: Improve analytical thinking and written language. Speaking with clarity and fluency in group activities

(A52202) COMPUTER PROGRAMMING LAB-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: To make the student to implement various sorting and searching techniques
CO 2: To introduce the student to structures, unions, and enumeration types and operations on them
CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.
CO 5: To make the student to create various types of files in 'C' Language.

(A52203) ENGINEERING PHYSICS AND APPLIED CHEMISTRY LAB-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Awareness in obtaining some important products with enough yield.
CO 2: Gets familiar with synthesis of thermosetting plastics.
CO 3: Calculation of strength of compounds using instrumentation techniques
CO 4: Determination of physical properties like viscosity
CO 5: To synthesize of Thiokol rubber and nylon 6,6 polymer

(A52204) ENGINEERING WORKSHOP- II AND IT WORKSHOP

On successful completion of this course, it is expected that the students will be able ,

CO 1: To prepair a various shape of (S-shape, T- shape, Z- shape)
CO 2: To prepare a single piece and double piece pattern by using casting process
CO 3: To make a lap-joint, but-joint and angular joint.
CO 4: To apply different operations to be performed on the lathe machines.

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CO 5: To prepare a switch boards, wood drilling and threading different various sizes.

II YEAR I SEMESTER

(A53001) MATHEMATICS-III

On successful completion of this course, it is expected that the students will be able to,

CO 1: Determination of roots of an equation and calculate some simple methods of obtaining approximate roots of algebraic and transdental equations.
CO 2: Interpolate the values using the techniques of newton's forward and backward, Gauss forward and backward, Lagranges and splines interpolations.
CO 3: Analyze and calculate numerical differentiation and numerical integration methods.
CO 4: Calculate sol of ODE using Taylor's, Euler's, Picard's, Rungi-Kutta and Predictor-Corrector method.
CO 5: Evaluate the sol of PDE and calculate boundary value problems.

(A53002) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students are get knowledge of various materials required in construction, pattern of construction and basic knowledge on different elements of building
CO 2: Students are gain basic knowledge on Arches and lintels, Damp proofing, Floors and Roofs
CO 3: Students know about Stairs, Doors and windows, Building Services: Plumbing services, Ventilations, Air conditioning Acoustics and Fire protection
CO 4: Students gain basic knowledge on Plastering, pointing, Form work and Painting.
CO 5: Students know about building planning and it's by- laws

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(A53003) STRENGTH OF MATERIALS-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the meaning of basic terminology involved in estimation of strength of various materials.
CO 2: Understand the behavior of beams under various loads through the shear force diagram, bending moment diagrams.
CO 3: Understand the behavior of beams under various loads through flexural and shear stress distribution diagrams.
CO 4: Know the methods of estimation of slopes and deflection of beams and their limiting conditions.
CO 5: Understand the torsion of circular sections and deflection of springs under loads

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(A53004) FLUID MECHANICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Determine the properties of fluid and pressure and their measurement.
CO 2: Compute forces on immersed plane and curved plates
CO 3: Apply continuity equation and energy equation in solving problems on flow conduits
CO 4: Analyze flow between laminar and turbulent flows
CO 5: Compute frictional losses in pipes

(A53005) SURVEYING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Carry at preliminary surveying in the field of civil engineering applications such as structural engineering and highway.
CO 2: Plan a survey application such as road alignments and height of buildings.
CO 3: Carry out a geodetic survey taking accurate measurements using instruments and adjusting the traverse.
CO 4: Plan survey for application such as road alignment and height of building.
CO 5: Involve advance surveying technique over conventional methods in the field of civil engineering.

(A53006) ENGINEERING GEOLOGY

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the process of weathering and identify the minerals by their physical properties.
CO 2: Identify the type of rock by their physical properties.
CO 3: Understand the geological structures and their behavior.
CO 4: Identify the subsurface formations through different geo-physical investigations.
CO 5: Apply the geological principles in identifying the suitable sites for engineering constructions to avoid the natural hazards or to withstand the disturbances that are created by the nature.

(A53201) SURVEYING LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Conduct survey and collect field data for measuring areas and volumes.
CO 2: Conduct survey and collect field data for measuring bearings
CO 3: Conduct survey and collect field data for measuring levels
CO 4: Conduct survey and collect field data for preparing contours
CO 5: Gain the knowledge on total station

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(A53202) ENGINEERING GEOLOGY LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Identify the important minerals based upon their physical and optical properties.
CO 2: Identify the important rocks based upon their megascopic and microscopic properties.
CO 3: Identify important rocks and minerals.
CO 4: Interpret and draw the sections for geological maps showing tilted beds, faults, uniformities etc
CO 5: Students can unravel the surface and subsurface geological structures for taking appropriate decision to either construct or to strengthen the existing geological structures for raising civil structures.

(A53203) GENDER SENSITIZATION

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary in India.
CO 2: Students will be sensitized to basic dimensions of Biological, Sociological Psychological and legal aspects of gender.
CO 3: Students will acquire insight into the gendered division of labor and it's relation to politics and economics.
CO 4: Men and Women students and professions will be better equipped to work and live to get her as equals
CO 5: Students will develop a sense of appreciation of women in all walks of life.

II YEAR II SEMESTER

(A54001) PROBABILITY AND STATISTICS

CO 1: Understand Chance causes and random variable that describes randomness or an uncertainty in certain realistic situation. It can be of either discrete or continuous type.
CO 2: In the discrete case, study of the binomial and the Poisson random variables and the Normal random variable for the continuous case predominantly describe important probability distributions. Important statistical properties for these random variables provide very good insight and are essential for industrial applications.
CO 3: The student would be able to calculate mean and proportions (small and large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations. It is mainly useful for non-circuit branches of engineering.
CO 4: The student would be able to calculate the types of sampling, Sampling distribution of means, Sampling distribution of variance.
CO 5: Understanding the Experiment and the design of experiment.

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(A54002) ELEMENTS OF ELECTRICAL ENGINEERING

After going through this course the student gets knowledge on

CO 1: Introduction of Electrical Elements, Electrical circuits and applications of KVL, KCL, and Ohm's Law.
CO 2: DC machines and their applications.
CO 3: AC machines and their applications.
CO 4: Electronic devices like Diode, Transistors and their applications.
CO 5: Working principle of CRO and its internal parts.

(A54003) STRENGTH OF MATERIALS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the Direct and bending stresses, unsymmetrical bending
CO 2: Understand the Principal stresses and strains, concept of thin cylinders.
CO 3: Understand the fixed beams and continuous beams.
CO 4: Understand the columns and struts, beam columns.
CO 5: Understand the strain energy and energy theorems

(A54004) HYDRAULICS AND HYDRAULIC MACHINERY

On successful completion of this course, it is expected that the students will be able to,

CO 1: Design open channels for most economical sections like rectangular, trapezoidal and circular sections
CO 2: Analyze fluid flow on non- uniform open channel hydraulics
CO 3: Apply dimensional analysis in different models and prototypes
CO 4: Calculate forces and work done by a jet on fixed or moving and curved plates and also apply the working principles of turbines including designs
CO 5: Determine the characteristics of centrifugal pump and hydro power plant

(A54005) CONCRETE TECHNOLOGY

On successful completion of this course, it is expected that the students will be able to,

CO 1: Have the complete knowledge of types and properties of materials required for making concrete.
CO 2: Know the workability and manufacturing process of concrete
CO 3: Know the IS codal specifications of concrete and its materials
CO 4: Understand the properties of green and hardened concrete
CO 5: Have the knowledge on special concretes

(A54006) ENVIRONMENTAL STUDIES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the concept of ecosystem and biodiversity and its conservation.
CO 2: Understand the types of natural resources such as soil, water, marine etc.
CO 3: Learnt about the causes of environmental pollutions and their effects and control measures.
CO 4: Understand how to manage the solid waste and waste water treatment.

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CO 5: Get the knowledge about the future sustainable development.

(A54201) STRENGTH OF MATERIALS LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Have the knowledge of torsion and bending in different beams.
CO 2: Know the hardness, tension compression tests.
CO 3: Know the impact and shear tests
CO 4: Understand the verification of Maxwell's reciprocal theorem.
CO 5: Know the deflection test on cantilever beams.

(A54202) FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Measure discharge in pipes
CO 2: Determine the energy loss in conduits
CO 3: Determine the characteristics curves of pumps
CO 4: Determine the characteristics curves of turbines
CO 5: Determine the characteristics curves of jets.

(A54203) HUMAN VALUES AND PROFESSIONAL ETHICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students will learn basic guidelines, content and process for value education and understanding of basic requirements for fulfillments of aspiration of every human being with their correct priority.
CO 2: Students understood that human being as a co-existence of the sentient "I" and material "Body".
CO 3: Students will know understanding harmony in the family as the basic unit of human interaction.
CO 4: Students will understand the harmony in the nature and holistic perception of harmony at all levels of existence.
CO 5: Students will learn Basic for humanistic education, humanistic constitution and humanistic Universal order.

III YEAR I SEMESTER

(A55001) STRUCTURAL ANALYSIS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students are able to analyze the parameters of arches like thrust, bending moment and reactions.
CO 2: Students are get knowledge on analysis of indeterminate beams by using moment distribution method.
CO 3: Students are get knowledge on analysis of indeterminate beams by using slope deflection method.
CO 4: Students are able to analyze and draw ILD for shear force, bending moment and reactions of moving loads.

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CO 5: Students are gain the knowledge on approximate methods of building frames and curved beams.

(A55002) DESIGN OF RC STRUCTURES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the basic concepts of reinforced concrete designs
CO 2: Understand the design of beams and IS codal provisions
CO 3: Understand the design of slabs and staircase
CO 4: Understand the design of short and long columns
CO 5: Know the knowledge of design of footings

(A55003) ENVIRONMENTAL ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the forecast water demand & assess the quality of drinking water
CO 2: Know the different water treatment methods
CO 3: Understand the sewage and storm generation
CO 4: Know the different methods of waste water treatment methods
CO 5: Understand the treatment methods of sewage sludge

(A55004) SOIL MECHANICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the soil formation and mass volume relationship
CO 2: Know the effect of permeability and seepage on soils and concept of effective stress in soils.
CO 3: Understand the laboratory and field tests of compaction and settlement analysis
CO 4: Understand the shear strength of various types of soils.
CO 5: Know the types of failures and stability analysis methods.

(A55005) WATER RESOURCE ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: To get the knowledge of hydrology and hydrologic cycle and its applications.
CO 2: To gain the knowledge of rain fall measurement methods and its analysis
CO 3: To understand about ground water occurrence and aquifer parameters.
CO 4: To understand about basic knowledge of the irrigation and Design discharge for water course.
CO 5: To get the knowledge of design of irrigation canals and also Design Discharge.

(A55006) ELEMENTS OF EARTHQUAKE ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

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CO 1: Know the occurrence of earthquakes and theory of vibrations.
CO 2: Understand the conceptual design and earthquake resistant design.
CO 3: Know the seismic design of Reinforced concrete buildings
CO 4: Know the seismic design of masonry buildings
CO 5: Understand the structural walls and Non-structural elements and its failure mechanism

(A55007) WATER SHED MANAGEMENT

On successful completion of this course, it is expected that the students will be able to,

CO 1: To gain the concept and characteristics of watershed management system
CO 2: Able to understand the principles of soil erosion and it's measures to control the soil erosion
CO 3: To get basic knowledge on Water Harvesting and Land Management
CO 4: Understand importance of Ecosystem Management system
CO 5: Able prepare Planning of watershed management and its administrative requirements

(A55008) DISASTER MANAGEMENT

On successful completion of this course, it is expected that the students will be able to,

CO 1: Application of different approaches , human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(A55201) SOIL MECHANICS LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Evaluate the properties of soil
CO 2: Know the calculation of field density by different methods and permeability tests.
CO 3: Know the calculation of OMC by different compaction methods and consolidation test.
CO 4: Evaluate the bearing capacity of soil by using CBR test
CO 5: Evaluate the laboratory shear strength tests.

(A55202) COMPUTER AIDED DRAFTING LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the introduction about Auto CAD
CO 2: Gain the knowledge about various tools in CAD

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CO 3: Know the Developing plans, sections & elevations of single and multi-storey buildings.
CO 4: Know the detailing of building components (doors, windows, trusses etc.)
CO 5: Know the development of working drawing of buildings.

III YEAR II SEMESTER

(A56001) DESIGN OF STEEL STRUCTURES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply the IS code of practice for the design of steel structural elements
CO 2: Design compression and tension members using simple and built-up sections
CO 3: Calculate forces on the various members of the truss and design them
CO 4: Analyse the behaviour of bolted connections and design them
CO 5: Design welded connections for both axial and eccentric forces

(A56002) FOUNDATION ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the knowledge of stress distribution in soils due to various kinds of loads
CO 2: Know the earth pressure theories by using different methods and design of retaining walls
CO 3: Know the various methods of load bearing capacity of soils and settlement of soils
CO 4: Design the shallow foundations
CO 5: Design the pile and well foundations

(A56003) TRANSPORTATION ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the highway development, planning and highway alignment.
CO 2: Know the highway geometry & other elements of highway & their application in the design of highway
CO 3: Understand the parameters of traffic & preventive measures.
CO 4: Know the traffic regulation & its management
CO 5: Understand the intersection, highway maintenance & its construction procedure

(A56004) IRRIGATION ENGINEERING

On successful completion of this course, it is expected that the students will be able to

CO 1: Carryout various factors affecting the selection of reservoirs and dams.
CO 2: Students are understand the design of gravity dams and stability analysis.
CO 3: Apply design principles of different types of spillways and earth dams.
CO 4: Apply design principles of different types of weirs, barrages and different theories.

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CO 5: Design simple irrigation structure.

(A56005) CONSTRUCTION TECHNOLOGY & PROJECT MANAGEMENT

On successful completion of this course, it is expected that the students will be able to,

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
CO 2: Use the mechanized construction equipment at different situations or any huge projects
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management , estimation and project planning techniques
CO 5: Use the CPM – PERT Problems in project scheduling

(A56006) ENVIRONMENTAL IMPACT ASSESSMENT

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the elements of EIA
CO 2: Know the Criteria for the selection on EIA methodology
CO 3: Know the Procurement of relevant soil quality
CO 4: Know the objectives of environmental audit
CO 5: Know the environmental pollution act

(A56007) ADVANCED STRUCTURAL ANALYSIS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the analysis of structures by flexibility matrix method.
CO 2: Understand the analysis of spring element and bar element by stiffness matrix method.
CO 3: Get the knowledge about analyzing the beam by stiffness method.
CO 4: Get the knowledge about the global local coordinate systems.
CO 5: Analysis of plane frames by stiffness method.

OPEN ELECTIVE - I
(A56301) CONSTRUCTION MATERIALS (CE)

On successful completion of this course, it is expected that

CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
CO 4: Students are Gain About Basic Knowledge on Timber And Other Materials
CO 5: Students are get knowledge on Modern construction materials.

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(A56302) WASTE MANAGEMENT (CE)

At the end of the course student will be able to,

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.

CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.

CO 3: Understand the working procedure in various industries, sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.

CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.

CO 5: Understand the waste disposal methods and requirement of treatment plants.

(A56303) SOLAR PHOTO VOLTAIC SYSTEMS (EEE)

After this course, the student will be able to

CO 1: Identify photovoltaic system components and system types and calculate electrical energy and power

CO 2: Correctly size system components, design considerations of solar equipment

CO 3: Design a basic grid-tied PV system.

(A56304) MAINTAINANCE OF ELECTRICAL SYSTEMS (EEE)

After this course, the student will be able to

CO 1: Identify the Engineering materials and testing of domestic appliances.

CO 2: Know the use of UPS and SMPS and maintenance of power devices.

CO 3: Rescue a person met with Electric shock.

(A56305)ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of advanced materials

CO 2: Understand the basic concepts of ferrous and nonferrous metals and alloys.

CO 3: Understand the ceramics and composite materials

CO 4: To understand the application of super alloys and inter metallic

CO 5: Understand the basic methods of manufacturing various types of composite

(A56306)MECHATRONICS (ME)

At the end of the course, the student will be able to,

CO 1: Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product.

CO 2: Develop PLC programs for a given task.

CO 3: Evaluate the performance of mechatronic systems.

(A56307) PRINCIPLES OF COMMUNICATION SYSTEMS (ECE)

By completing this subject, the student can be able to

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CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems

(A56308) ELECTRONIC MEASURING INSTRUMENTS (ECE)

By completing this subject, the student can be able to
CO 1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
CO 2: Measure various physical parameters by appropriately selecting the transducers
CO 3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals

(A56309) JAVA PROGRAMMING (CSE)

CO 1: Understanding of OOP concepts and basics of Java programming (Console and GUI based).
CO 2: The skills to apply OOP and Java programming in problem solving.
CO 3: Should have the ability to extend his/her knowledge of Java programming further on his/her own.

(A56310) COMPUTER NETWORKS (CSE)

CO 1: Analyze TCP/IP and OSI models and various protocols
CO 2: Identify suitable multiple access protocol for different networks
CO 3: Analyze various error handling mechanisms
CO 4: Use of various devices in connecting different types of LANs
CO 5: Compare and contrast ipv4 and ipv6

(A56201) CONCRETE TECHNOLOGY LAB

On successful completion of this course, it is expected that the students will be able to,
CO 1: Understand conducting the test on cement
CO 2: Understand conducting the test on aggregate
CO 3: Understand conducting the test on concrete
CO 4: Do the consultancy work on concrete materials
CO 5: Understand conducting tests on various materials used in making the concrete

(A56202) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

On successful completion of this course, it is expected that the students will be able to,
CO 1: Get familiarity with vowels and consonants and speak with pronunciation. Learn to communicate in individual activates.
CO 2: Better understanding of pronunciation through syllables and clusters. Learning etiquette in different situations make the students more professional.

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CO 3: Neutralization of accent for intelligibility. Improve employability skills of the students.
CO 4: Improve to speak and write correct English. Enrichment of fluency there by students becomes confidence.
CO 5: Learn to reduce mother tongue influence for intelligibility. Gaining confidence using language in conversations and dialogues

IV YEAR I SEMESTER

(A57001) ESTIMATING AND COSTING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply different types of estimates in different situations
CO 2: Carryout estimation of quantities for different works
CO 3: Carryout analysis of rates & bill preparation at different locations
CO 4: Demonstrate the concepts of specification writing
CO 5: Apply different types of contracts, tenders and tender forms including projects

(A57002) PAVEMENT DESIGN

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the types of pavements and materials used in pavements
CO 2: Know the stresses in rigid and flexible pavements
CO 3: Know the various types of pavement design like rigid and flexible
CO 4: Gave an idea to explore various highway construction materials and techniques
CO 5: Understand the highway maintenance of different pavements

(A57003) GIS & REMOTE SENSING

On successful completion of this course, it is expected that the students will be able to,

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(A57004) RAILWAYS AND AIRPORT ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: The students will be able to understand the facilities at airports construct the same.
CO 2: Identify different components of railway track and select right materials for construction.

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CO 3: Compute the various geometric features of railways for a given set of requirements.
CO 4: Understand the importance of airway system and characteristics of aircrafts.
CO 5: Understand the importance of airway system and involve in planning of airport facilities.

(A57005) EARTH RETAINING STRUCTURES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Application of earth pressure theories by mohr's circle method
CO 2: Application of lateral earth pressure theory to design for various factors
CO 3: Analyze and design of different types of retaining walls like gravity and sheet piles
CO 4: Carryout stability analysis for reinforced steep slopes
CO 5: Carryout stability analysis for reinforced steep slopes

(A57006) ADVANCED STRUCTURAL DESIGN

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the theory and design of retaining walls,
CO 2: Design the combined footings
CO 3: Design the RCC water tanks by using IS code method
CO 4: Design a long span roof trusses by applying various loads
CO 5: Know the plastic behaviour of steel structures

(A57007) GROUND IMPROVEMENT TECHNIQUES

On successful completion of this course, it is expected that the students will be able to,

CO 1: All methods of de-watering in various soils.
CO 2: The densification methods in cohesive and cohesive less soil.
CO 3: The process of stabilization from the different soils layers.
CO 4: The functions and applications of geo-synthetics and geo-textiles.
CO 5: Well aware about the different kinds of problems on expansive soils.

(A57008) FINITE ELEMENT METHODS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand finite element analysis fundamentals and understand 1-D problems in FEM.
CO 2: Formulate the design of 2-D problems in FEM.
CO 3: Analyse shape functions of two noded and three noded elements.
CO 4: Gain knowledge on isoparametric elements and numerical integrations.
CO 5: Formulate the design of Rayleigh-Ritz method and axi symmetric analysis.

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(A57009) BUILDING SERVICES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the various essential requirements of a building and their installations.
CO 2: Know the design a building with sound proof
CO 3: Understand the electrical and allied installations
CO 4: Know the requirement of firefighting and safety measures of a building
CO 5: Understand the mechanical instruments requirement and their installation in a building.

OPEN ELECTIVE- II

(A57301) DISASTER MANAGEMENT AND MITIGATION (CE)

CO 1: Application of different approaches , human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(A57003) GEOLOGICAL INFORMATION SYSTEM & REMOTE SENSING (CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(A57303) ENERGY STORAGE SYSTEMS (EEE)

After this course, the student

CO 1: Can analyze the characteristics of energy from various sources and need for storage
CO 2: Can classify various types of energy storage and various devices used for the purpose
CO 3: Can apply the same concepts to real time problem.

(A57304) ELECTRICAL ENGINEERING MATERIALS (EEE)

Will be able to

CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Evaluate magnetic materials and their behavior.
CO 3: Evaluate semiconductor materials and technologies.
CO 4: Understand different types of materials used in electrical engineering and applications

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(A57022) POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine power plant.
CO 3: To know the concept of gas turbine power plant.
CO 4: To know the concept of hydroelectric power plant.
CO 5: To know the concept of power from non-conventional sources.
CO 6: To know the concept of nuclear power stations and its types.
CO 7: Understand the power plant economics and environmental considerations.

(A57304) INDUSTRIAL ROBOTICS (ME)

At the end of the course, the student will be able to understand the
CO 1: Basic components of robots.
CO 2: Differentiate types of robots and robot grippers.
CO 3: Model forward and inverse kinematics of robot manipulators.
CO 4: Analyze forces in links and joints of a robot.
CO 5: Programme a robot to perform tasks in industrial applications.
CO 6: Design intelligent robots using sensors.

(A55021)COMPUTER ORGANIZATION (ECE)

At the end of the course, the student will be able to understand the
CO 1: Student will learn the concepts of computer organization for several engineering applications.
CO 2: Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.
CO 3: An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principles

(A57035) PRINCIPLES OF SIGNAL PROCESSING (ECE)

At the end of the course, the student will be able to understand the
CO 1: Apply to current technologies and issues that are specific to image processing systems.
CO 2: Leverage the student's knowledge of image processing to a practical system.
CO 3: Compress the Digital image which is required for storage and transmission of digital images.

(A57307) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Demonstrate the basic elements of a relational database management system.
CO 2: Ability to identify the data models for relevant problems.
CO 3: Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
CO 4: Apply normalization for the development of application soft wares

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(A57308) WEB TECHNOLOGIES (CSE)

CO 1: Design static web pages and provide client side authentication.
CO 2: Prepare Static Web pages With Validations.
CO 3: Develop new tag sets using XML mechanism.
CO 4: Design and develop web applications using JSP and MVC architecture
CO 5: Understand database connectivity and retrieving data using client/server database

(A57201) TRANSPORTATION ENGINEERING LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the tests of aggregates.
CO 2: Gain the knowledge of tests on water absorption of aggregates.
CO 3: Gain the knowledge of tests on bitumen.
CO 4: Know the traffic volume studies and spot speed studies.
CO 5: Know the parking studies.

(A57202) ENVIRONMENTAL ENGINEERING LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Determination of the standard limits of water by various experiments like alkalinity, acidity, PH etc.
CO 2: Determination of properties of water by conduction chlorides, nitrate etc.
CO 3: Determination of properties of sewage water by DO, Optimum dose of coagulant etc.
CO 4: Application of conductivity and total dissolved solids
CO 5: Determination of BOD, COD for different types of sewage water.

IV YEAR II SEMESTER

(A58001) PRESTRESSED CONCRETE

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students able to identify classification, properties and losses of prestressed concrete.
CO 2: Students are analyze different load condition concepts and draw the stress diagrams for different load conditions.
CO 3: Students are design different sections for flexure strength.
CO 4: Students gain knowledge on shear design and different types of shear failures.
CO 5: Students are able to do deflections of PSC members like SSB with two different loads and also understand design of end blocks by Guyon's method.

(A58002) HAZARDS AND SOLID WASTE MANAGEMENT

On successful completion of this course, it is expected that the students will be able to:

CO 1: Know the various types of solid waste, their properties and treatment

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CO 2: Know the types of hazardous waste and their disposal
CO 3: Understand the methods of solid and hazardous waste disposal
CO 4: Understand the hazardous waste management practices
CO 5: Aware the site remedial technology

(A58003) URBAN PLANNING AND DEVELOPMENT

On successful completion of this course, it is expected that the students will be able to,

CO 1: Classify the areas.
CO 2: Understand the levels and types of planning.
CO 3: Understand the Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules.
CO 4: Aware the legislation, development and management of urban systems.
CO 5: Understand different acts, standards and regulations

(A58004) REHABILITATION AND RETROFITTING OF STRUCTURES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the behavior of existing structures.
CO 2: Understand the main causes for structural failure and will be able to give the guidelines to their repairs and retrofitting of masonry and concrete structures.
CO 3: Understand the main causes for structural failure and will be able to give the guidelines to their repairs and retrofitting of steel structures.
CO 4: Understand the repairing of complicated and special structures using the new technologies available.
CO 5: Give the guidelines and retrofitting procedures required for seismic prone structures.

(A58005) DESIGN AND DRAWING OF IRRIGATION STRUCTURES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the purpose and functions of all irrigation structures.
CO 2: Provided the knowledge about surplus weir and syphon well drop.
CO 3: Provided the knowledge about trapezoidal notch, tank sluice with tower head.
CO 4: Provided the knowledge about slopping glacis weir and canal regulator.
CO 5: Understanding the knowledge about the under tunnel and type III syphon aqueduct.

(A58006) GEO ENVIRONMENTAL ENGINEERING

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students are get knowledge of Sources and site Characterization
CO 2: Students are gain basic knowledge on Solid and Hazardous waste management
CO 3: Students are understand about Contaminant Transport and Modeling NAPL

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CO 4: Students are gain basic knowledge on site Remediation Techniques
CO 5: Students are understand about Landfills technique

OPEN ELECTIVE-III

(A58301) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT (CE)

After successfully completion of this course, the student will be able to
CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
CO 2: Use the mechanized construction equipment at different situations or any huge projects
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management , estimation and project planning techniques
CO 5: Use the CPM – PERT Problems in project scheduling

(A58302) SAFETY ENGINEERING (CE)

After successfully completion of this course, the student will be able to
CO 1: Know how to Handle and Protect the Machine and himself while working on it
CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment
CO 3: Understand the knowledge of safety rules and regulations of working at construction industry
CO 4: Understand the knowledge about working at all stages in different heights at construction site
CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(A58303) ENERGY CONSERVATION AND AUDIT (EEE)

By the end of this course the students are able to analyze
CO 1: Principles of thermodynamics and heat exchange theory.
CO 2: Energy conservation and energy auditing.
CO 3: Thermal insulation and heat recovery systems.

(A58304) ARTIFICIAL NEURAL NETWORKS (EEE)

After this course, the student will be able to understand the
CO 1: Basics and models of Neural Networks and its architectures.
CO 2: Operation of feed forward and propagation networks.
CO 3: Associative memories and the applications of Neural Networks.

(A58305) RENEWABLE ENERGY SOURCES (ME)

After this course, the student will be able to understand the
CO 1: The student will be able analyze.
CO 2: Solar thermal and photovoltaic systems and related technologies for energy conversion.
CO 3: Wind energy conversion, Biomass conversion, Geo thermal energy conversion and principles and technologies.

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CO 4: Power from oceans and conversion, Fundamentals of direct energy conversion systems.

(A58306)AUTOMOBILE ENGINEERING (ME)

After this course, the student will be able to understand the

CO 1: Understand the basic lay-out of an automobile.
CO 2: Understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.
CO 3: Understand the principles of transmission, suspension, steering and braking systems.
CO 4: Understand automotive electronics. Study latest developments in automobiles

(A56023) NANOTECHNOLOGY (ECE)

After successfully completion of this course, the student will be able to

CO 1: Appreciate the importance of Nano dimensional materials and their applications.
CO 2: Realize and explain that the properties of Nano materials are size dependent and vary from corresponding bulk materials
CO 3: Demonstrate the skills required to prepare some of the Nano materials in the laboratory
CO 4: Characterize and study the properties with respect to their size and shapes.
CO 5: Appreciate the applications of Nano electronic devices and understand their basic principles

(A58308) BIOMETRIC SYSTEM (ECE)

After successfully completion of this course, the student will be able to

CO 1: Describe principles of the selected physical and behavioral biometric methods, and know how to deploy them in authentication scenarios
CO 2: Organize and conduct biometric data collection processes, and understand how to use biometric databases in system evaluation
CO 3: Understand differences between a biometric method and a biometric system
CO 4: Itemize the most up-to-date examples of real biometric applications in human authentication

(A58309) GAME THEORY WITH ENGINEERING APPLICATIONS (CSE)

CO 1: Students should able to understand the Equilibrium and Non-Equilibrium strategies in gaming.
CO 2: Students should able to learn mixed strategies and rationalizability in gaming domain.
CO 3: Students should able to develop knowledge on Electronic mail game
CO 4: Students should able to develop the idea of repeated games

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(A58310) SOFTWARE ENGINEERING (CSE)

After successfully completion of this course, the student will be able to

CO 1: Ability to identify the minimum requirements for the development of application.

CO 2: Ability to develop, maintain, efficient, reliable and cost effective software solutions.

CO 3: Ability to critically thinking and evaluate assumptions and arguments.

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ANURAG
ENGINEERING ENGINEERS

M.TECH.

STRUCTURAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	To provide knowledge in mathematics and engineering principles for a Successful career in sectors of Structural engineering and allied industry and/or higher education.
PEO II	:	To develop an ability to identify, formulate, solve problems along with adequate analysis, design, synthesizing and interpretation skills in structural engineering systems.
PEO III	:	To exhibit professionalism, ethics, communication skills and team work in their profession and engaged in lifelong Learning of contemporary structural engineering trends

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	Ability to use the knowledge of core and allied aspects of Structural Engineering along with engineering skills.
PSO 2	:	Ability to contribute for the solutions of multidisciplinary problems by applying theory and principles of structural engineering.
PSO 3	:	Knowledge in innovation and research in the field of structural engineering

PROGRAM OUTCOMES		
PO 1:	:	An ability to apply knowledge of mathematics, engineering sciences & an engineering specialization for solution of structural problems.
PO 2	:	An ability to identify, formulate, research, literature and analyse structural engineering problems reaching sustained conclusion by using engineering skills.

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PO 3	:	An ability to design solution for structural engineering problems and design system, components or processes that need the specified needs with appropriate considerations for safety.
PO 4	:	An ability to use research based knowledge on research methods including design of experiments, analysis and interpretation of data synthesis or the information to provide valid conclusion.
PO 5	:	An ability to create, select and apply appropriate techniques resources and modern engineering and it tools including and modelling to structural engineering activities with an understanding of the limitation.
PO 6	:	An ability to apply researching information by the contextual knowledge to assess health, safety, legal and the consequent responsibilities relevant to the structural engineering practice.
PO 7	:	Understanding the impact of the professional engineering.
PO 8	:	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
PO 9	:	Ability to work effectively as an individual and in a team.
PO 10	:	Ability to communicate effectively through oral, written with engineering community and the society at large.
PO 11	:	An ability to use the techniques, management skills, and modern engineering principles necessary for structural engineering practice.
PO 12	:	An ability to carry out research in different areas of structural Engineering including latest technologies resulting in design, development, analyse and journal publications and technology development.

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ANURAG

ENGINEERING ENGINEERS

M.TECH.

STRUCTURAL ENGINEERING

R15 REGULATION

COURSE STRUCTURE

I YEAR I SEMESTER

Course Code	Category	Course Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A31012	Core Course I	Theory of Elasticity and plasticity	4	0	4	25	75	100
A31013	Core Course II	Advanced structural analysis	4	0	4	25	75	100
A31014	Core Course III	Advanced Reinforced Concrete Design	4	0	4	25	75	100
A31015	Core Elective-I	Concrete Technology	4	0	4	25	75	100
A31016	Core Elective-I	Experimental Stress Analysis						
A31017	Core Elective-I	Optimization Techniques in Structural Engineering						
A31018	Core Elective-II	Theory and Analysis of plates	4	0	4	25	75	100
A31019	Core Elective-II	Soil dynamics and foundation Engineering						
A31020	Core Elective-II	composite materials						
A31021	Open Elective I	Computer Oriented Numerical Methods	4	0	4	25	75	100
A31202	Open Elective I	Reliability Engineering Experimental Stress Analysis						
A31203	Lab	Advanced Concrete Laboratory	0	4	2	25	75	100
A31204	Seminar	Seminar-I	--	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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I YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A32012	Core Course V	Finite Element Methods	4	0	4	25	75	100
A32013	Core Course VI	Structural Dynamics	4	0	4	25	75	100
A32014	Core Course VII	Earthquake Resistant Design of Buildings	4	0	4	25	75	100
A32015	Core Elective-III	Pre stressed concrete	4	0	4	25	75	100
A32016	Core Elective-III	Advanced Foundation Engineering						
A32017	Core Elective-III	Computer Aided Design in Structural Engineering (CAD).						
A32018	Core Elective-IV	Principles of Bridge Engineering	4	0	4	25	75	100
A32019	Core Elective-IV	Analysis and Design of Shells and Folded plates						
A32020	Core Elective-IV	Advanced. Steel Design						
A32021	Open Elective I	Plastic Analysis and Design	4	0	4	25	75	100
A32022	Open Elective I	Stability of Structures						
A32203	Lab	CAD Laboratory	0	4	2	25	75	100
A32204	Seminar	Seminar-II	-	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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II YEAR I SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A33203		Comprehensive Viva-Voce	--	--	4	--	100	100
A33204		Project work Review I	--	24	12	50	--	50
Total			**--**	**24**	**16**	**50**	**100**	**150**

II YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A34203		Project work Review II	--	8	4	50	--	50
A34204		Project Evaluation (Viva-Voce)	--	16	12	--	150	150
Total			**--**	**24**	**16**	**50**	**150**	**200**

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ANURAG

ENGINEERING ENGINEERS

M.TECH.

STRUCTURAL ENGINEERING

R15 REGULATION

COURSE OUTCOMES

I YEAR I SEMESTER

(A31012)THEORY OF ELASTICITY AND PLASTICITY

CO 1: Demonstrate the application of plane stress and strains, equilibrium and compatibility
CO 2: To derive the governing equations and their solutions for application to problems in plane stress plate, symmetrical and unsymmetrical problems
CO 3: Demonstrate the application of principal stresses and general theorems as reciprocal theorem
CO 4: To derive the governing equations and their solutions for application to problems in plane stress plate, torsion and bending
CO 5: Demonstrate the concept of plasticity and engineering application of plasticity

(A31013)ADVANCED STRUCTURAL ANALYSIS

CO 1: Understand the matrix methods of analysis
CO 2: Know the direct stiffness matrix method
CO 3: Know the boring analysis of plane truss, plane frame, continuous beam and grids by flexibility methods
CO 4: Understand the analysis of plane truss, plane frame, continuous beam and grids by stiffness methods
CO 5: Understand the shear approximate methods of analysis of shear walls

(A31014)ADVANCED REINFORCED CONCRETE DESIGN

CO 1: Calculate short term and long term deflection for RCC elements
CO 2: Analyse the flexural and shear capacity of existing RCC elements
CO 3: Calculate ductility of reinforced concrete sections
CO 4: Design for shear of RCC elements
CO 5: Understanding engineering practices of physical and mechanical properties of concrete influence design methods and construction processes

ELECTIVE – I
(A31015)CONCRETE TECHNOLOGY

CO 1: Understand the concrete making materials
CO 2: Know about the fresh and hardened concrete
CO 3: Understanding High strength and High Performance concrete
CO 4: Knot about special concrete and Mix design Concept
CO 5: Understanding the formwork

(A31016)EXPERIMENTAL STRESS ANALYSIS

CO 1: Explain the measurement of strain under static and dynamic loads.
CO 2: Describe the mechanical, optical, pneumatic and electrical strain gauges for strain measurement.

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CO 3: Create awareness about the fixing of gauges and temperature effects in bonded gauges and measure of stress in stress gauges.
CO 4: Analysis of measuring circuits and strains of different strain gauge rosettes.
CO 5: Describe the measurements by using transducers and exciters.

(A31017)OPTIMIZATION TECHNIQUES IN STRUCTURAL ENGINEERING

CO 1: Understand the knowledge about application of optimization, optimization techniques and optimization problems.
CO 2: Understand the knowledge about the Linear programming methods.
CO 3: Understand the knowledge about dynamic programming processes, applications.
CO 4: Knows the knowledge about network variables and problems.
CO 5: Understand knowledge about the application of optimization techniques to trusses, beams and frames.

ELECTIVE – II

(A31018)THEORY AND ANALYSIS OF PLATES

CO 1: To enable the student to derive differential equation for cylindrical bending of plates with uniform loads
CO 2: Application of Levy's solutions for various boundary conditions subject to uniform and hydrostatic pressure.
CO 3: Application of bending, shear forces of uniform distributed loads for circular and orthotropic plates.
CO 4: Apply Navier and Levy types solutions for problems on plates on elastic foundation.
CO 5: Analyze the bucking of plates by compressive forces and finite difference methods.

(A31019)SOIL DYNAMICS AND FOUNDATION ENGINEERING

CO 1: Understand the mechanism of machine foundations with different techniques
CO 2: Understand the mechanism of natural frequency of foundation with different methods of soil system
CO 3: Know the elastic properties and wave theory of soil dynamics
CO 4: Understand the vertical vibration of soil system with different methods
CO 5: Know the design of foundations for using various of machines with different type of methods

(A31020)COMPOSITE MATERIALS

CO 1: Understanding the Requirements of structural materials
CO 2: Macro mechanical Properties of composite Laminate
CO 3: Behaviour of Glass Fibre-Reinforced laminates
CO 4: GRP properties relevant to structural Design
CO 5: Design of GRP Box Beams

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OPEN ELECTIVE - I

(A31021)COMPUTER ORIENTED NUMERICAL METHODS

CO 1: Evaluate the solutions of linear equations.
CO 2: Interpolate the values using different techniques.
CO 3: Calculate Numerical differentiation and numerical integration
CO 4: Fit polynomials and find the the values of the function.
CO 5: Solve ordinary differential equations.

(A31202)RELIABILITY ENGINEERING EXPERIMENTAL STRESS ANALYSIS

CO 1: Know the Basic Concepts of Reliability
CO 2: Understand the Design for Reliability:
CO 3: Understand the Discrete Distributions
CO 4: Know the Maintainability and Availability Concepts
CO 5: Understand the Hierarchical Systems

(A31203)ADVANCED CONCRETE LABORATORY

CO 1: Understand Tests on cement
CO 2: Understand Tests on aggregates
CO 3: Understand Tests on fresh concrete
CO 4: Understand Non destructive Tests on concrete
CO 5: Understand Tests on concrete added chemical admixture

I YEAR II SEMESTER

(A32012)FINITE ELEMENT METHODS

CO 1: Students are able to understand classification, properties and losses of prestressed concrete.
CO 2: Students are able to design different sections for flexure strength and shear failures .
CO 3: Students are able to understand deflections of PSC members like SSB with two different loads and also understand design of end blocks by Guyon's method.
CO 4: Students are able to understand transfer of prestress in pretension members and anchorage zone stresses.
CO 5: Students are able to analyze statically indeterminate structures of prestressed members.

(A32013)STRUCTURAL DYNAMICS

CO 1: Understand the mechanism of theory of vibrations for all the systems
CO 2: Understand the fundamentals, methods and various loads of structural dynamics and single degree of freedom system
CO 3: Know the multi degree freedom of structural dynamics
CO 4: Understand the practical vibration analysis with different methods and continuous system
CO 5: Know the knowledge on earthquake analysis of different systems with methods

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(A32014)EARTHQUAKE RESISTANT DESIGN OF BUILDINGS

CO 1: Know the occurrence of earthquakes and earthquake measuring instruments and seismic zones in India
CO 2: Understand the conceptual design and earthquake resistant design.
CO 3: Know the seismic design of Reinforced concrete buildings and masonry buildings
CO 4: Understand the structural walls and Non-structural elements and its failure mechanism
CO 5: Know the Ductility considerations in earthquake resistant design of RC buildings.

ELECTIVE – III

(A32015)PRE-STRESSED CONCRETE

CO 1: Students able to identify classification ,properties and losses of prestressed concrete.
CO 2: Students analyze different load condition concepts and draw the stress diagrams for different load conditions.
CO 3: Students are designing different sections for flexure strength.
CO 4: Students gain knowledge on shear design and different types of shear failures.
CO 5: Students are able to do deflections of PSC members like SSB with two different loads and also understand the design of end blocks by Guyon's method.

(A32016)ADVANCED FOUNDATION ENGINEERING

CO 1: Understand the matrix bearing capacity of footings subjected to eccentric and inclined loading
CO 2: Know the pile foundations and carrying capacity in sands and clays
CO 3: Know the caissons & well foundation and its design criteria
CO 4: Understand the cantilever sheet piles and determination of depth of embedment in sand and clays
CO 5: Understand the foundations in expansive soils.

(A32017)COMPUTER AIDED DESIGN IN STRUCTURAL ENGINEERING

CO 1: Write programs using C language
CO 2: Write programs using C graphics and generate display of geometries
CO 3: Analyze problems of structural analysis using C and C graphics
CO 4: Work with the operations of DBMS
CO 5: Represent development of Knowledge based expert system

ELECTIVE – IV

(A32018)PRINCIPLES OF BRIDGE ENGINEERING

CO 1: Know the types of bridges, and the stress that occur due to different loading conditions.
CO 2: Design and analysis the solid slab bridges.
CO 3: Design and analysis the girder bridges.
CO 4: Know the design requirements of pre-stressed concrete and able to design the propped composite section and un-propped composite section.
CO 5: Design and analysis the bridge deck, abutments, piers.

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(A32019)ANALYSIS AND DESIGN OF SHELLS AND FOLDED PLATES

CO 1: Use appropriate theory to analyze the shells and shell structure
CO 2: To derive the governing equations for bending theory and application to the analysis and design of short and long columns
CO 3: Application of double curvature concept to different types of shells
CO 4: Apply general equation to spherical shells and hyperboloid of revolution cooling towers
CO 5: Analyze structural behaviour of folded plates

(A32020)ADVANCED STEEL DESIGN

CO 1: Apply the IS code of practice for the design of steel structural elements.
CO 2: Design compression and tension members using simple and built-up sections.
CO 3: Calculate forces on the various members of the truss and design them.
CO 4: Calculate the forces in various members of the steel truss girder bridge and design the components of the bridge.
CO 5: Compute collapse loads plastic moment capacities of continuous beams

OPEN ELECTIVE - II
(A32021)PLASTIC ANALYSIS AND DESIGN

CO 1: Applications of mechanism method of analysis, moment balancing methods of structure for ultimate load.
CO 2: Design of continuous beams with different loadings and with different cross sections.
CO 3: Use the local buckling and flanges, Influence of shear force and axial force for solving secondary design problems.
CO 4: To analyze design of different connections.
CO 5: Analyze the deflection problems of frames and beams with different connections.

(A32022)STABILITY OF STRUCTURES

CO 1: Understand the knowledge about analysis of beam columns.
CO 2: Understand the knowledge about the elastic buckling of straight columns, buckling line of bar and build up columns.
CO 3: Understand the knowledge about the analysis of straight bar, experiments on columns etc.
CO 4: Understand the knowledge about the analysis of Torsion buckling, buckling by torsion and flexure.
CO 5: Understand the knowledge about the lateral buckling of simply supported beams and rectangular plates.

(A32203) CAD LAB

CO 1: Matrix manipulation and bending moment and shear force diagrams using graphics in C.
CO 2: Design of slabs and beams Using Excel.
CO 3: Design of column and footing using excel.

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CO 4: Analysis of truss and multi-storeyed space frame using STAAD Pro.
CO 5: Analysis of Bridge deck slab

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ANURAG
ENGINEERING ENGINEERS

B.TECH.

ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	To prepare students to excel in technical profession/industry and/or higher education by acquiring knowledge in mathematics, science and engineering principles.
PEO II	:	Able to formulate, analyze, design and create novel products and solutions to electrical and electronics engineering problems those are economically feasible and socially acceptable.
PEO III	:	Able to adopt multi-disciplinary environments, leadership qualities, effective communication, professional ethics and lifelong learning process.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	An ability to demonstrate the knowledge, skill to analyze the cause and effects on electrical system, processes and systems.
PSO 2	:	Apply the appropriate techniques and modern engineering hardware and software tools in electrical engineering to engage in life-long learning and to successfully adapt in multi-disciplinary environments.
PSO 3	:	Aware of the impact of professional engineering solutions in societal, environmental context, professional ethics and be able to communicate effectively.

PROGRAM OUTCOMES		
PO 1:	:	An ability to apply the knowledge of mathematics, science and engineering fundamentals.
PO 2	:	An ability to conduct Investigations using design of experiments, analysis and interpretation of data to arrive at valid conclusions.

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PO 3	:	An ability to design Electrical and Electronics Engineering components and processes within economic, environmental, ethical and manufacturability constraints.
PO 4	:	An ability to function effectively in multidisciplinary teams.
PO 5	:	An ability to identify, formulate, analyze and solve Electrical and Electronics Engineering problems.
PO 6	:	An ability to understand professional, ethical and social responsibility.
PO 7	:	An ability to communicate effectively through written reports or oral presentations.
PO 8	:	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
PO 9	:	An ability to recognize the need and to engage in independent and life-long learning.
PO 10	:	Knowledge on contemporary issues.
PO 11	:	An ability to use the appropriate techniques and modern engineering tools necessary for engineering practice.

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ENGINEERING ENGINEERS

B.TECH.

ELECTRICAL AND ELECTRONICS ENGINEERING

R18 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA101BS	Mathematics - I	BS	3	1	0	4	25	75	100
2	CH102BS	Engineering Chemistry	BS	3	1	0	4	25	75	100
3	EN103HS	English	HS	2	0	0	2	25	75	100
4	CS104ES	Programming for Problem Solving - I	ES	2	0	0	2	25	75	100
5	CH105BS	Engineering Chemistry Lab	BS	0	0	3	1.5	25	75	100
6	EN106HS	English Language Communication Skills Lab - I	HS	0	0	2	1	25	75	100
7	CS107ES	Programming for Problem Solving - I Lab	ES	0	0	2	1	25	75	100
8	ME108ES	Engineering Workshop	ES	0	0	3	1.5	25	75	100
Total				**10**	**2**	**10**	**17**	**200**	**600**	**800**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA201BS	Mathematics - II	BS	3	1	0	4	25	75	100
2	PH202BS	Engineering Physics	BS	3	1	0	4	25	75	100
3	EE203ES	Basic Electrical Engineering	ES	3	0	0	3	25	75	100
4	CS204ES	Programming for Problem Solving - II	ES	2	0	0	2	25	75	100
5	ME205ES	Engineering Graphics	ES	1	0	4	3	25	75	100
6	PH206BS	Engineering Physics Lab	BS	0	0	3	1.5	25	75	100
7	CS207ES	Programming for Problem Solving - II Lab	ES	0	0	3	1.5	25	75	100
8	EN208HS	English Language Communication Skills Lab - II	HS	0	0	2	1	25	75	100
9	EE209ES	Basic Electrical Engineering Lab	ES	0	0	2	1	25	75	100
Total				**12**	**2**	**14**	**21**	**225**	**675**	**900**

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II YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA301BS	Mathematics - III	BS	3	0	0	3	25	75	100
2	EE302PC	Power Systems-I	PC	3	0	0	3	25	75	100
3	EC303ES	Electronic Devices and Circuits	ES	3	0	0	3	25	75	100
4	EE304PC	Electromagnetic Fields	PC	3	1	0	4	25	75	100
5	EE305PC	Electrical Circuit Analysis	PC	3	0	0	3	25	75	100
6	EE306PC	Control Systems	PC	3	0	0	3	25	75	100
7	EC307ES	Electronic Devices and Circuits Lab	ES	0	0	2	1	25	75	100
8	EE308PC	Electrical Circuits & Simulation Lab	PC	0	0	2	1	25	75	100
9	ES309MC	Environmental studies	MC	0	0	2	0	25	75	100
Total				**18**	1	**6**	**21**	**225**	**675**	**900**

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II YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA401BS	Mathematics-IV	BS	3	0	0	3	25	75	100
2	EC402ES	Analog Electronic Circuits	ES	3	0	0	3	25	75	100
3	EE403PC	Power Electronics	PC	3	0	0	3	25	75	100
4	EE404PC	Electrical Machines-I	PC	3	0	0	3	25	75	100
5	EE405PC	Power Systems-II	PC	3	0	0	3	25	75	100
6	EE406PC	Switching Theory and Logic Design	PC	3	0	0	3	25	75	100
7	EE407PC	Control Systems & Simulation Lab	PC	0	0	2	1	25	75	100
8	EE408PC	DC Machines Lab	PC	0	0	2	1	25	75	100
9	HS409MC	Human Values and Professional Ethics	MC	0	0	2	0	25	75	100
Total				**18**	**0**	**6**	**20**	**225**	**675**	**900**

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III YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	AE501HS	Managerial Economics and Financial Analysis	PC	3	0	0	3	25	75	100
2	EE502PC	Switchgear and Protection	PC	3	0	0	3	25	75	100
3	EC503PC	Linear and Digital IC Applications	PC	3	0	0	3	25	75	100
4	EE504PC	Electrical Machines-II	PC	3	1	0	4	25	75	100
5	EE505PC	Electrical Measurements	PC	3	0	0	3	25	75	100
6	PROFESSIONAL ELECTIVE - I		PE	3	0	0	3	25	75	100
7	EE506PC	Power Electronics & Simulation Lab	PC	0	0	2	1	25	75	100
8	EE507PC	AC Machines Lab	PC	0	0	2	1	25	75	100
9	HS508MC	Constitution of India	PC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

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III YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MS601HS	Management Science	HS	3	0	0	3	25	75	100
2	EE602PC	Power Semiconductor Drives	PC	3	1	0	4	25	75	100
3	EE603PC	Microprocessors and Microcontrollers	PC	3	0	0	3	25	75	100
4	EE604PC	Power System Analysis	PC	3	0	0	3	25	75	100
5	PROFESSIONAL ELECTIVE - II		PE	PE	0	0	3	25	75	100
6	OPEN ELECTIVE - I		OE	OE	0	0	3	25	75	100
7	EN605HS	Advanced English Communication Skills Lab	HS	0	0	2	1	25	75	100
8	EE606PC	Electrical Measurements Lab	PC	0	0	2	1	25	75	100
9	GS607MC	Gender Sensitization	MC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

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IV YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	EE701PC	HVDC Transmission	PC	3	0	0	3	25	75	100
2	EE702PC	Power System Operation and Control	PC	3	0	0	3	25	75	100
3	PROFESSIONAL ELECTIVE - III		PE	3	0	0	3	25	75	100
4	PROFESSIONAL ELECTIVE - IV		PE	3	0	0	3	25	75	100
5	OPEN ELECTIVE - II		OE	3	0	0	3	25	75	100
6	EE703PC	Microprocessors and Microcontrollers Lab	PC	0	0	2	1	25	75	100
7	EE704PW	MINIPROJECT EVALUATION	PW	0	0	4	2	25	75	100
8	EE705PW	PROJECT STAGE-I	PW	0	0	8	4	100	0	100
Total				**15**	**0**	**14**	**22**	**275**	**525**	**800**

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C- Credits

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IV YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	PROFESSIONAL ELECTIVE - V		PE	3	0	0	3	25	75	100
2	PROFESSIONAL ELECTIVE - VI		PE	3	0	0	3	25	75	100
3	OPEN ELECTIVE - III		OE	3	0	0	3	25	75	100
4	EE801PW	Seminar	PW	0	0	4	2	100	0	100
5	EE802PW	Project Stage-II	PW	0	0	12	6	25	75	100
Total				**9**	**0**	**16**	**17**	**200**	**300**	**500**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

Professional Electives	Course Code	Course Name
Professional Elective -I	EE511PE	Renewable Energy Sources
	EE512PE	Computer Organization
	EE513PE	Optimization Techniques
Professional Elective -II	EE621PE	Special Electrical Machines
	EE622PE	Signals & Systems
	EE623PE	Electrical Distribution Systems
Professional Elective -III	EE731PE	Instrumentation
	EE732PE	High Voltage Engineering
	EE733PE	Advanced Power Electronics
Professional Elective -IV	EE741PE	Advanced Control Systems
	EE742PE	Neural Networks and Fuzzy Logic
	EE743PE	Linear system Analysis
Professional Elective -V	EE851PE	Flexible ACTransmission Systems
	EE852PE	Smart Electric Grid
	EE853PE	Power Quality
Professional Elective -VI	EE861PE	EHV AC Transmission
	EE862PE	Power System Reliability
	EE863PE	Digital Signal Processing

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE611OE	Construction Materials	Civil Engineering
2	CE612OE	Waste Management	
3	EE611OE	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	EE612OE	Electrical Power Generation Systems	
5	ME611OE	Advanced Engineering Materials	Mechanical Engineering
6	ME612OE	Introduction to Automobile Engineering	
7	EC611OE	Principles of Communications	Electronics & Communication Engineering
8	EC612OE	Basic Electronic Circuits Simulation & Design	
9	CS611OE	Software Engineering	Computer Science & Engineering
10	CS612OE	Database Management Systems	

OPEN ELECTIVE- II			
S. No.	**Course Code**	**Name of the Course**	**Offering Department**
1	CE721OE	Disaster Management	Civil Engineering
2	CE722OE	Remote Sensing and Geographic Information System	
3	EE721OE	Maintenance of Electrical Systems	Electrical & Electronics Engineering
4	EE722OE	Renewable Energy Sources	
5	ME721OE	Fundamentals of Refrigeration & Air Conditioning	Mechanical Engineering
6	ME722OE	Industrial Robotics	
7	EC721OE	Principles of Signal Processing	Electronics & Communication Engineering
8	EC722OE	Nano Materials and Technology	
9	CS721OE	Object Oriented Analysis and Design	Computer Science & Engineering
10	CS722OE	Cyber Forensics	

OPEN ELECTIVE- III			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE831OE	Project Management	Civil Engineering
2	CE832OE	Safety Engineering	
3	EE831OE	Electrical Engineering Materials	Electrical & Electronics Engineering
4	EE832OE	Fuzzy Logic and its Applications	
5	ME831OE	Power Plant Engineering	Mechanical Engineering
6	ME832OE	Nano Technology	
7	EC831OE	Fundamentals of Embedded Systems	Electronics & Communication Engineering
8	EC832OE	Biometric Systems	
9	CS831OE	Software Project Management	Computer Science & Engineering
10	CS832OE	Human Computer Interaction	

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ANURAG
ENGINEERING ENGINEERS

B.TECH.

ELECTRICAL AND ELECTRONICS ENGINEERING

R18 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(MA101BS) MATHEMATICS-I

CO 1: Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
CO 2: Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
CO 3: Analyze the convergence of sequence and series.
CO 4: Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
CO 5: Find the extreme values of functions of two variables with / without constraints.

(CH102BS) ENGINEERING CHEMISTRY

CO 1: Apply the knowledge of atomic, molecular and electronic changes related to conductivity.
CO 2: Analyze the troubles caused by impure water and method of purification of water.
CO 3: Apply the knowledge of electrode potentials for the protection of metals from corrosion.
CO 4: Explain the concept of configurational and conformational analysis of molecules and reaction mechanism.
CO 5: Apply the knowledge of polymers in everyday's life.

(EN103HS) ENGLISH

CO 1: Get inspiration and motivation from Dr. C.V. Raman.
CO 2: Understand ancient architecture of India.
CO 3: Know about invention of Blue Jeans.
CO 4: Learn what type of diet to take and maintain good health.
CO 5: Understand the result of hard work and confidence

(CS104ES) PROGRAMMING FOR PROBLEM SOLVING - I

CO 1: Design algorithms and flowcharts for real world applications
CO 2: Know the usage of various operators in Program development
CO 3: Design programs involving decision and iteration structures.
CO 4: Apply the concepts code reusability using Functions
CO 5: Analyze the concepts of Arrays and Strings for real world problems.

(CH105BS) ENGINEERING CHEMISTRY LAB

CO 1: Determination of parameters like hardness and alkalinity of water.
CO 2: Estimation of rate constant of a reaction from concentration – time relationships.
CO 3: Determination of physical properties like surface tension and viscosity.
CO 4: Calculation of strength of compound using instrumentation techniques.
CO 5: To impart fundamental knowledge in handling the equipment /glassware and chemicals in the chemistry laboratory.

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(EN106HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

CO 1: Understand the importance of phonetics.
CO 2: Understand the variants in Pronunciation.
CO 3: Differentiate formal and informal English in different situations.
CO 4: Understand the Intonation of English Language in the global world.
CO 5: Participate in Mock Interviews.

(CS107ES) PROGRAMMING FOR PROBLEM SOLVING-I LAB

CO 1: Formulate the algorithms and flowcharts for simple problems
CO 2: Apply fundamental programming concepts, to solve simple problems
CO 3: Enhance debugging skills
CO 4: Exercise conditional and iterative statements to Write C programs
CO 5: Modularize the code with functions so that they can be reused
CO 6: Represent and manipulate data with arrays and strings

(ME108ES) ENGINEERING WORKSHOP

CO 1: Practice on manufacturing of components using workshop trades including Carpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring and Black Smithy.
CO 2: Apply basic electrical engineering knowledge for house wiring practice.
CO 3: Identify and apply suitable tools for different trades of Engineering processes including Material removing, measuring And Chiseling.
CO 4: Study and practice on Plumbing, Machine tools, Power tools, Wood working, Plastic Molding and their operations
CO 5: Learn how to analyze products and be able to improve their manufacture ability and make the cost effectively

I YEAR II SEMESTER

(MA201BS) MATHEMATICS – II

CO 1: Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
CO 1: Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
CO 2: Evaluate the multiple integrals.
CO 3: Evaluate vector differentiation and identify the vector differential operators physically in engineering problems
CO 4: Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

(PH202BS) ENGINEERING PHYSICS

CO 1: Solve engineering problems using the concepts of wave and oscillations.
CO 2: Analyze the intensity variation of light due to interference, diffraction and polarization. Understand their applications in the field of engineering.
CO 3: Use the fundamental knowledge of crystallography to identify the crystal structure and defects in crystal.
CO 4: Understand the propagation of light through fiber optics in various

communication fields and use of lasers as light sources for low and high energy applications.

CO 5: Classify magnetic and dielectric behavior of solids and test these materials for various applications.

(EE103ES/EE203ES) BASIC ELECTRICAL ENGINEERING

CO 1: Understand the importance of DC circuits and analyze theorems.
CO 2: Understand the concept of AC circuits and resonance.
CO 3: Concept of Magnetic Circuits and Determine the losses and efficiency of single phase transformers.
CO 4: Analyze the performance of DC machines and Induction motors.
CO 5: Demonstrate the principle of operation of Synchronous generator and importance of electrical installations

(CS204ES) PROGRAMMING FOR PROBLEM SOLVING – II

CO 1: Develop programs with user defined data types.
CO 2: Use dynamic memory allocation functions with pointers.
CO 3: Apply various file handling techniques for better data management
CO 4: Distinguish between stacks and queues.
CO 5: Analyze various dynamic data structures.

(ME205ES) ENGINEERING GRAPHICS

CO 1: Understand engineering drawing and its place in society.
CO 2: Visualize the different aspects of Points, Lines and Planes.
CO 3: Acquire knowledge on projections of solids.
CO 4: Draw sections of solids and plan the drawing for development of surfaces.
CO 5: Understand the isometric views and projections. Exposure to computer-aided geometric design and creating working drawings.

(PH206BS) ENGINEERING PHYSICS LAB

CO 1: Apply the various procedures and techniques for the experiments.
CO 2: Use the different measuring devices and meters to record the data with precision.
CO 3: Test optical components using principles of interference and diffraction of light.
CO 4: Apply the mathematical concepts/equations to obtain quantitative results.
CO 5: Develop the basic communication through working in the groups and performing the laboratory experiments and by interpreting the results

(CS207ES) PROGRAMMING FOR PROBLEM SOLVING – II LAB

CO 1: Develop applications on user defined data types
CO 2: Apply dynamic memory allocation through pointers
CO 3: Use different data structures for create/update basic data files
CO 4: Implement linear data structures through stacks and queues
CO 5: Implement various searching and sorting techniques, Linked lists.

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(EN208HS)ENGLISH LANGUAGE COMMUNICATION SKILLS LAB – II

CO 1: Understand the variants in Pronunciation.
CO 2: Differentiate Spoken and Written English in formal and informal situations
CO 3: Understand the emphasis on Pronunciation of English Language in the global world.
CO 4: Apply strategies for Effective Communication in different situations.
CO 5: Participate in conversation, Public Speaking and Group Discussion.

(EE109ES/EE209ES) BASIC ELECTRICAL ENGINEERING LAB

CO 1: Verify the various electrical laws and theorems with DC Excitation.
CO 2: Determine the losses, efficiency and regulation of single phase transformer.
CO 3: Obtain the performance of induction motors.
CO 4: Control the speed of DC shunt motor.
CO 5: Obtain the OC & SC characteristics of Synchronous generator.

II YEAR ISEMESTER

(MA301BS) MATHEMATICS-III

CO 1: Use Laplace transforms techniques for solving DE's.
CO 2: Expand given function as a Fourier series.
CO 3: Apply Fourier transforms.
CO 4: Evaluate the solution of Algebraic and Transcendental Equations and apply the concept of interpolation to find the values of the function.
CO 5: Evaluate numerical integrals and evaluate Numerical solution of Ordinary Differential Equations.

(EE302PC) POWER SYSTEMS - I

CO 1: How the electrical power will be generated from coal, nuclear fuels.
CO 2: Generation of power from water & gas.
CO 3: Layout of substations, their Equipments functioning.
CO 4: Concepts of AC & DC distribution systems.
CO 5: Concepts of economical aspects of power generation and different types of tariffs.

(EC303ES) ELECTRONIC DEVICES AND CIRCUITS

CO 1: Recognize the transport phenomena of charge carriers in a semiconductor.
CO 2: Analyze the different types of diodes, operation and its characteristics.
CO 3: Describe Bipolar Junction Transistors and Field Effect Transistors.
CO 4: Analyze the different biasing techniques used in BJTs and FETs.
CO 5: Understand the concept of feedback amplifiers and types feedback.

(EE304PC) ELECTROMAGNETIC FIELDS

CO 1: Ability to apply vector mathematics and physics to calculate parameters electromagnetic problems,
CO 2: Properties and behavior of conductors, dielectrics & Capacitance.
CO 3: Magneto statics and Physical laws of electro magnetism,
CO 4: Force in magnetic fields, Magnetic potential and its properties.

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CO 5: Calculation of inductance, basic concepts on time varying fields in point form and Integral form.

(EE305PC) ELECTRICAL CIRCUIT ANALYSIS

CO 1: Able to analyse the basic concepts of electrical components, various types of network reduction techniques and network theorem of ac and dc circuits.
CO 2: Able to understand the transient analysis of electrical circuits in both AC and DC.
CO 3: Able to understand and draw the locus diagrams and to analyze resonance concepts.
CO 4: Able to analyze various types of network parameters and their solutions, designing of filters.
CO 5: Able to understand graph theory and three phase circuits.

(EE306PC/EE402PC)CONTROL SYSTEMS

CO 1: Develop the mathematical model of physical systems.
CO 2: Analyze the response of closed and open loop system.
CO 3: Analyze the stability of the closed and open loop system.
CO 4: Design the various kinds of compensators.
CO 5: Develop and analyze state space model.

(EC307ES) ELECTRONIC DEVICES AND CIRCUITS LAB

CO 1: Analyze the characteristics of different electronic devices such as Diodes, transistors etc.
CO 2: Operate simple circuits like Rectifiers.
CO 3: Understand the Input and output characteristics of the BJT and FET transistor configurations.
CO 4: Understand frequency response of amplifiers.
CO 5: Understand the characteristics of the SCR and UJT.

(EE308PC) ELECTRICAL CIRCUITS & SIMULATION LAB

CO 1: To get the practical exposure on electrical circuits
CO 2: To get the practical exposure on electrical networks.
CO 3: To obtain the practical knowledge on application of electrical Circuits.
CO 4: To obtain the practical knowledge on measurement of powers and locus diagrams
CO 5: To compare theoretical results with practical results.

(ES309MC)ENVIRONMENTAL STUDIES

CO 1: The Multidisciplinary nature of environment, essence of ecosystem, biodiversity and its conservation.
CO 2: About the natural resources and their protection.
CO 3: About the causes and effects of environmental pollution as well the environmental issues.
CO 4: About the rules, regulations for the protection of environment.
CO 5: About the steps towards Sustainable Development

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II YEAR IISEMESTER

(MA401BS) MATHEMATICS-IV

After learning the contents of this course the student must be able to:

CO 1: Analyze the complex functions with reference to their analyticity.

CO 2: Evaluate integration using Cauchy's integral theorem

CO 3: Find the Taylor's and Laurent's series expansion of complex functions.

CO 4: Evaluation of integrals using Residue theorem.

CO 5: Identify the transformations like translation, magnification, rotation and reflection and inversion. Transform a given function from z - plane to w – plane.

(EC402ES) ANALOG ELECTRONIC CIRCUITS

CO 1: Design the single stage amplifiers.

CO 2: Design the Large signal amplifiers.

CO 3: Understand the applications of diode as clipper and clamper circuits.

CO 4: Learn various switching devices such as diode, transistor.

CO 5: Design of triggering circuit for specific application

(EE403PC) POWER ELECTRONICS

CO 1: Understand the operation and characteristics of various types of semiconductor devices

CO 2: Analysis of single-phase converters.

CO 3: Analyze the operation and characteristics of three-phase converters and dual converters.

CO 4: Analyze the operation and performance of AC voltage controllers, Cyclo-converters.

CO 5: Analyze the operation and characteristics of choppers and inverters.

(EE404PC) ELECTRICAL MACHINES – I

After going through this course the student will be able to understand

CO 1: Construction of DC machine, different types of DC generators.

CO 2: Characteristics and industrial applications of DC Generators.

CO 3: The principle of DC motor, electrical characteristics, testing and industrial applications.

CO 4: The principle & testing of single phase transformers.

CO 5: The operation of three phase transformers and auto transformers.

(EE405PC) POWER SYSTEMS-II

CO 1: Able to do calculation of R,L and C of transmission lines.

CO 2: Able to understand performance of transmission lines.

CO 3: Able to do calculation of power system transients.

CO 4: Able to understand concept of corona & working of insulators.

CO 5: Knowledge on calculation of sag and tension & underground cables,

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(EC306PC/EE406PC) SWITCHING THEORY AND LOGIC DESIGN

CO 1: Understand numeric information in different forms, e.g. different bases, signed integers, various course such as ASCII, gray and BCD.
CO 2: Postulates of Boolean algebra and to minimize combinational functions.
CO 3: Design and analyze combinational and sequential circuits.
CO 4: Design and application of synchronous state machines using flip-flops.
CO 5: Understand the concepts of FSM and ASM charts.

(EE407PC) CONTROL SYSTEMS & SIMULATION LAB

CO 1: Able to analyze the physical systems represented in transfer function
CO 2: Apply the control components like ac servo motor, synchro's and magnetic amplifier.
CO 3: Able to understand the stability of an Electrical, mechanical
CO 4: Able to understand the other physical systems.
CO 5: Able to simulate and analyze the performance of control system circuits.

(EE408PC) DC MACHINES LAB

After going through this course the student will be able to
CO 1: Interpret the constructional details of the DC machine.
CO 2: Test the performance of the DC generator.
CO 3: Analyze the performance of the DC generator.
CO 4: Test the performance of the DC motor.
CO 5: Analyze the performance of the DC motor.

(HS409MC) HUMAN VALUES AND PROFESSIONAL ETHICS

After completion of the course the student is able to:
CO 1: Understood the core values that shape the ethical behavior of an Engineer.
CO 2: Exposed awareness on professional ethics and human values.
CO 3: An ability to communicate effectively.
CO 4: Known their role in technological development.
CO 5: An understanding of professional and ethical responsibility.

III YEAR I SEMESTER

(AE501HS) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

CO 1: The market dynamics namely demand, demand forecasting, elasticity of demand.
CO 2: Gain an insight in to how production function is carried out to achieve least cost combination of inputs and cost analysis.
CO 3: Know the types of markets and pricing methods and Strategies.
CO 4: Analyze how capital budgeting decisions are carried out.
CO 5: The importance of Accounting and know How to analyze and Interpret the Financial statements through Ratio Analysis

(EE502PC) SWITCHGEAR AND PROTECTION

CO 1: Develop the knowledge on various types of circuit breakers.
CO 2: Acquire the knowledge on various types of relays.

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CO 3: Analyze the various types of protection methods of generators and transformers.
CO 4: Analyze the various types of protection methods of feeders and bus-bars.
CO 5: Understand the functioning of various types of neutral grounding methods and different types of protective devices against overvoltage & lightening.

(EC503PC) LINEAR AND DIGITAL IC APPLICATIONS

CO 1: To summarize the basics of linear integrated circuits and explain operational amplifiers with applications.
CO 2: Able to explain the comparator circuits like Schmitt trigger, astable multivibrator etc.
CO 3: To describe analog to digital converters (ADC), and digital to analog converters (DAC) with its Specifications.
CO 4: To construct and explain the timer circuits.
CO 5: To interpret the applications of PLL and special ICs like 565,566.

(EE504PC) ELECTRICAL MACHINES – II

CO 1: Detailed working, torque equation and equivalent circuit of three phase induction motor.
CO 2: Performance, speed control methods and industrial applications of three phase induction motor.
CO 3: Working of synchronous generator and its phasor representation.
CO 4: Voltage regulation and parallel operation of synchronous generator.
CO 5: Performance and working of synchronous motor.

(EE505PC)ELECTRICAL MEASUREMENTS

CO 1: Understand the working of different types of ammeter and voltmeter, their construction, operation, errors and compensation.
CO 2: Analyze the instrument transformers, testing, errors and design considerations.
CO 3: Develop detailed knowledge on LPF&UPF wattmeter and their extension, working of energy meters.
CO 4: Understand the construction and operation of DC & AC potentiometers.
CO 5: Acquire the knowledge on measuring of R,L,C parameters and turns ratio.

PROFESSIONAL ELECTIVE - I
(EE511PE)RENEWABLE ENERGY SOURCES

CO 1: Learn the principles of solar radiation and collection of solar energy.
CO 2: Understand the various solar energy storage methods and solar applications.
CO 3: Analyze the Wind energy conversion and Biomass energy conversion.
CO 4: Analyze the geothermal energy conversion and ocean energy conversion.
CO 5: Analyze the various direct energy conversion devices.

(CS403PC/EE512PE)COMPUTER ORGANIZATION

CO 1: Understand the basic organization of computer and different instruction formats and addressingmodes.
CO 2: Analyze the concept of pipelining.

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CO 3: Understand and analyze various issues related to memory hierarchy.
CO 4: Evaluate various modes of data transfer between CPU and I/Odevices.
CO 5: Examine various inter connection structures of multiprocessors.

(EE513PE)OPTIMIZATION TECHNIQUES

CO 1: Know the basic theoretical principles in optimization.
CO 2: Apply the linear programming, transportation problem for engineering techniques.
CO 3: Acquire knowledge on unconstrained non-linear programming and optimization techniques.
CO 4: Analyze the basic approach of penalty function method and convex programming problem.
CO 5: Apply the dynamic programming multistage decision processes, computational procedures for optimization in engineering problems.

(EE506PC) POWER ELECTRONICS & SIMULATION LAB

CO 1: Analyze the operation of various gate firing circuits.
CO 2: Analyze the operation of single phase half controlled and fully controlled converters.
CO 3: Understand the working of forced commutation circuits.
CO 4: Analyze the operation of dual converter & three phase converter.
CO 5: Simulate the operation of converters.

(EE507PC) AC MACHINES LAB

CO 1: Test the performance of transformer.
CO 2: Analyze the performance of transformer.
CO 3: Test and analyze the performance of induction motor.
CO 4: Test and analyze the performance of alternator.
CO 5: Test and analyze the performance of synchronous motor.

(HS508MC) CONSTITUTION OF INDIA

CO 1: Understand the meaning and historical perspective of constitution of India.
CO 2: Knows fundamental rights of Indian citizen.
CO 3: Know structure, rights of federal and legislative bodies.
CO 4: President and parliament powers given by constitution.
CO 5: Know the local bodies rights and limitations.

III YEAR II SEMESTER

(MS601HS)MANAGEMENT SCIENCE

CO 1: About management functions, theories and Organizational structures.
CO 2: About Production methods, Techniques under quality control and inventory control.
CO 3: About functions & importance of HRM, Marketing functions and product life cycle.
CO 4: About techniques in Networking for time required to complete the project.
CO 5: About Corporate strategy implementation methods and other few contemporary management practices.

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(EE602PC) POWER SEMICONDUCTOR DRIVES

CO 1: Analyze DC motors speed control through single phase line commutated converters.
CO 2: Analyze DC motors speed control through three phase line commutated converters
CO 3: Analyze four quadrant operations of DC motors through choppers and dual converters.
CO 4: Analyze the operation of induction motor fed drives.
CO 5: Analyze the operation of synchronous motor fed drives.

(EC505PC/EE603PC) MICROPROCESSORS AND MICROCONTROLLERS

Upon the successful completion of this course, the student will be able to:
CO 1: In depth Architectural Knowledge of microprocessor and Fundamental programming using 8086.
CO 2: Various signals and interrupts of 8086 and their usage and Interfacing Various Devices and Working.
CO 3: In depth Architectural Knowledge of microcontroller
CO 4: Working and programming of microcontroller.
CO 5: Practical Programming application.

(EE604PC)POWER SYSTEM ANALYSIS

CO 1: Acquire the knowledge on incidence matrices and addition elements to the network.
CO 2: Develop the knowledge about power flow studies of different buses.
CO 3: Analyze the symmetrical faults and unsymmetrical faults.
CO 4: Develop the knowledge about power system steady state stability analysis.
CO 5: Acquire the knowledge about power system transient stability analysis.

PROFESSIONAL ELECTIVE-II
(EE621PE)SPECIAL ELECTRICAL MACHINES

CO 1: Principles and working of special electrical DC machines.
CO 2: Working of various types of stepper motors.
CO 3: Design and working of switched reluctance motor.
CO 4: Working and performance of BLDC motors.
CO 5: Performance of linear induction motor.

(EC305PC/EE622PE)SIGNALS AND SYSTEMS

CO 1: Distinguish different signals, systems and their time and frequency domain analysis.
CO 2: Understand the significance of FT and sampling types.
CO 3: Identify the conditions for transmission of signals through systems and physical realization of systems.
CO 4: Identify the significance of convolution & correlation functions and their relation
CO 5: Identify the significance of LT, ZT and their relation.

(EE623PE) ELECTRICAL DISTRIBUTION SYSTEMS

CO 1: Analyze the distribution system planning, load modelling characteristics.

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CO 2: Understand the optimal location of substations and design considerations.
CO 3: Understand the procedure for fault calculations and Co-ordination.
CO 4: Evaluate power factor correction in Distribution Systems.
CO 5: Evaluate voltage drop and power loss calculations

OPEN ELECTIVE-I

(CE611OE) CONSTRUCTION MATERIALS (CE)

CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
CO 4: Students are Gain About Basic Knowledge on Timber and Other Materials
CO 5: Students are get knowledge on Modern construction materials.

(CE612OE) WASTE MANAGEMENT (CE)

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.
CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.
CO 3: Understand the working procedure in various industries sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.
CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.
CO 5: Understand the waste disposal methods and requirement of treatment plants.

(EE611OE)SOLAR PHOTOVOLTAIC SYSTEMS (EEE)

CO 1: Understand the basics of solar energy and its geometry.
CO 2: Analyze the various topologies of solar photovoltaic cells.
CO 3: Understand the protection and measurement of solar photovoltaic system.
CO 4: Understand the design considerations of solar photovoltaic system.
CO 5: Analyze the various maximum power point tracking techniques.

(EE612OE) ELECTRICAL POWER GENERATION SYSTEMS (EEE)

CO 1: Understand the electrical power generation process from Thermal and Nuclear power stations.
CO 2: Analyze the electrical power generation from Hydro and Gas power stations.
CO 3: Analyze the electrical power generation by using solar energy.
CO 4: Understand the electrical power generation from wind energy & biomass energy.
CO 5: Know the working of fuel cells and ocean energy conversion.

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(ME611OE) ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of Advanced materials
CO 2: Understand the basic concepts of ferrous and nonferrous metals and alloys.
CO 3: Understand the ceramics and composite materials
CO 4: To understand the application of super alloys and intermetallic
CO 5: Understand the basic methods of manufacturing various types of composite materials.

(ME612OE) INTRODUCTION TO AUTOMOBILE ENGINEERING (ME)

CO 1: Analyze the basic lay-out of automobile, working and other details about I.C Engines used in automobiles.
CO 2: To gain the knowledge on working of ignition, Electrical systems.
CO 3: Understand how the transmission system works and the working knowledge of various Components in transmission system.
CO 4: Students will able to explain working principle of various parts of automobile such as axles, steering system and Suspension System.
CO 5: Understand the various braking systems and pollution standards and its significance.

(EC611OE) PRINCIPLES OF COMMUNICATIONS (ECE)

CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.
CO 4: Will have a basic understanding of various satellite and optical communication systems.
CO 5: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.

(EC612OE) BASIC ELECTRONC CIRCUITS SIMULATION & DESIGN (ECE)

CO 1: Describe circuits for PSpice simulation.
CO 2: Understand the types of dc - ac and their output variables analysis
CO 3: Understand the response of Transient analysis and obtain their output variables.
CO 4: Understand the types of AC circuit their output variables analysis.
CO 5: Students can able to analyze and develop simulation circuit for different applications.

(CS504PC/CS611OE) SOFTWARE ENGINEERING (CSE)

CO 1: Apply software engineering principles and techniques.
CO 2: Analyze software system requirements.
CO 3: Produce efficient, reliable, robust and cost-effective software solutions.
CO 4: Apply testing strategies.
CO 5: Ensure good quality software.

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(CS406PC/CS612OE) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Design Entity- Relationship Model for enterprise level databases.
CO 2: Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
CO 3: Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
CO 4: Use of suitable Indices and Hashing mechanisms for real time implementation.
CO 5: Analyze various concurrency control protocols and working principles of recovery algorithms.

(EN605HS)ADVANCED ENGLISH COMMUNICATION SKILLS LAB

CO 1: Understand the importance of vocabulary and using in real life situations.
CO 2: Apply reading strategies to enhance reading comprehension skills.
CO 3: Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.
CO 4: Develop presentation skills to apply in professional life.
CO 5: Apply Techniques to clear group discussions and Interviews.

(EE606PC)ELECTRICAL MEASUREMENTS LAB

CO 1: Calibrate and test single phase energy meter and calibrate LPF wattmeter.
CO 2: Apply the suitable method for measurement of inductance and capacitance.
CO 3: Measure 3-Φ active power and reactive power.
CO 4: Test dielectric strength of oil and calibrate LVDT.
CO 5: Test the instrument transformers.

(HS309MC/GS607MC) GENDER SENSITIZATION (MANDATORY COURSE)

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economy.
CO 5: Men and women students and professionals will be better equipped to work and live together as equals.

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IV YEAR I SEMESTER

(EE701PC) HVDC TRANSMISSION

CO 1: Modelling aspects of dc transmission.
CO 2: Control strategies of converters
CO 3: Power flow analysis with various compensating devices.
CO 4: Converter topologies with faults, protection.
CO 5: Generating, mitigating harmonics and filter analysis.

EE702PC) POWER SYSTEM OPERATION AND CONTROL

CO 1: Economic operation of power systems.
CO 2: Economic operation of hydrothermal systems.
CO 3: Importance of modeling of power system components.
CO 4: Detailed analysis of load frequency control.
CO 5: Importance of reactive power control.

PROFESSIONAL ELECTIVE - III
(EE731PE) INSTRUMENTATION

CO 1: Know the different types of errors in measurement.
CO 2: Learn about different types of components used in CRO & performance of CRO.
CO 3: Analyze the operation of different types of voltmeters & frequency meters.
CO 4: Understand the different types of transducers &it's working applications.
CO 5: Learn about non-electrical quantities like velocity, angular velocity, pressure, torque, displacement.

(EE732PE) HIGH VOLTAGE ENGINEERING

CO 1: About the dielectrics how to evaluate electric field streams and applications of insulating materials and breakdown of dielectric quire the knowledge.
CO 2: On dielectric breakdown methods.
CO 3: About generation of high voltages and insulating coordination.
CO 4: About over voltages and insulation coordination.
CO 5: About the testing of electric equipments.

(EE733PE) ADVANCED POWER ELECTRONICS

CO 1: Analyze the classification and operation of dc-dc converters.
CO 2: Acquire the detail knowledge on ac-ac converters.
CO 3: Analyze the classification and operation of dc-ac converters.
CO 4: Know the operation of different types of power supplies.
CO 5: Illustrate the applications of power electronic devices.

PROFESSIONAL ELECTIVE - IV
(EE741PE) ADVANCED CONTROL SYSTEMS

CO 1: Be able to analyze state space representation and solution of state equation state transition matrix.
CO 2: Analyze the stability of Non Linear and Linear systems

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CO 3: Understand the concepts of controllability and observability for controlling the system.
CO 4: Analyze the describing functions, phase plane and stability analysis.
CO 5: Understand the concepts of Formulation of optimal control problem.

(EE742PE)NEURAL NETWORKS AND FUZZY LOGIC

CO 1: Artificial neural network models and learning rules.
CO 2: Training algorithm of single and multi layer neural networks
CO 3: Associative memories and Hopfield network.
CO 4: The concept of fuzzy logic system components, fuzzification and defuzzification
CO 5: Applications of neural networks and fuzzylogic to real-world problems.

(EE743PE) LINEAR SYSTEM ANALYSIS

CO 1: Know and be able to apply state space analysis to networks.
CO 2: Represent periodic waveforms by Fourier series.
CO 3: Solve differential equations using Laplace Transforms and Analyze systems using Laplace and Fourier Transform techniques.
CO 4: Able to signal reconstruction using sampling theorem, energy density spectrum, power density
CO 5: Able to determine z-transform for given discrete signal, determination of inverse z-transform..

(EC507PC/EE703PC) MICROPROCESSORS AND MICROCONTROLLERS LAB

After completing this course, the student will be able to:
CO 1: Apply the fundamentals of assembly level programming of microprocessors.
CO 2: Build a program on a microprocessor using instruction set of 8086.
CO 3: Understand the interfacing LCD, Keyboard ,SRAM/DRAM to 8086.
CO 4: Design and implement 8051 microcontroller based systems.
CO 5: Contrast how different I/O devices can be interfaced to processor and will explore several techniques of interfacing.

OPEN ELECTIVE-II

(CE721OE) DISASTER MANAGEMENT (CE)

CO 1: Application of different approaches, human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(CE511PE/CE722OE) REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM (CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.

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CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(EE721OE) MAINTAINANCE OF ELECTRICAL SYSTEMS (EEE)

CO 1: Identify the Engineering materials, properties and applications.
CO 2: Test the domestic appliances.
CO 3: Know the use of UPS and SMPS and maintenance of power devices.
CO 4: Understand the maintenance of batteries, ups/inverter, motors and starters.
CO 5: Rescue a person met with Electric shock.

(EE511PE/EE722OE) RENEWABLE ENERGY SOURCES (EEE)

CO 1: Learn the principles of solar radiation and collection of solar energy.
CO 2: Understand the various solar energy storage methods and solar applications.
CO 3: Analyze the Wind energy conversion and Biomass energy conversion.
CO 4: Analyze the geothermal energy conversion and ocean energy conversion.
CO 5: Analyze the various direct energy conversion devices.

(ME721OE) FUNDAMENTALS OF REFRIGERATION & AIR CONDITIOING (ME)

CO 1: Ability to understand various refrigeration systems.
CO 2: Ability to understand the operation of various devices of VCR system.
CO 3: Ability to demonstrate the working of refrigeration equipments.
CO 4: Ability to understand various psychometric processes.
CO 5: Ability to explain the air-conditioning equipment.

(ME722OE/ME851PE) INDUSTRIAL ROBOTICS (ME)

CO 1: Understand the basic components of Robots and differentiate types of robots and robot grippers.
CO 2: Model forward and inverse kinematics of robot manipulators.
CO 3: Analyze forces in links and joints of a robot.
CO 4: Programme a robot to perform tasks in industrial applications.
CO 5: Design intelligent robots using sensors.

(EC721OE) PRINCIPLES OF SIGNAL PROCESSING (ECE)

CO 1: Perform Fourier transform and Z transform analysis on signals and systems
CO 2: Understanding the inter-relationship between DFT and various transforms
CO 3: Understand the Discrete Fourier series and various transforms
CO 4: Ability to design various IIR digital filter structures
CO 5: Ability to design a digital FIR filter for a given specification.

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(EC623PE/EC722OE) NANO MATERIALS AND TECHNOLOGY (ECE)

After completion of the course the student will be able to

CO 1: Understand the basic concepts of Nano technology.
CO 2: Understand the basic concepts of Nano materials
CO 3: Familiar with fabrication process of Nano Technology.
CO 4: Known the scaling and role of electrons in solids and Nanostructures.
CO 5: Understand the structures of Nan devices.

(CS603PC/CS721OE)OBJECT ORIENTED ANALYSIS AND DESIGN (CSE)

CO 1: Demonstrate the concepts and principles of object oriented programming.
CO 2: Understand the purposes, major components and key mechanisms of Class and Object Diagram.
CO 3: Describe the basic resource management responsibilities of Interaction Diagram.
CO 4: Knowledge on State-chart Diagram.
CO 5: Applying the techniques for Component and Deployment Diagrams.

(CS722OE/CS862PE) CYBER FORENSICS (CSE)

Upon the successful completion of this course, the student will be able to:

CO 1: Understand the fundamentals of computer forensics and various forensic technologies used for a wide variety of investigations.
CO 2: Apply digital evidence controls.
CO 3: Identify current practices for processing crime and incident scenes.
CO 4: Apply various computer forensics tools to solve the computer forensic cases.
CO 5: Understand whole disk encryption, windows registry and virtual systems.

IV YEAR II SEMESTER

PROFESSIONAL ELECTIVE-V
(EE851PE) FLEXIBLE AC TRANSMISSION SYSTEMS

CO 1: Choose proper controller for the specific application based on system requirements.
CO 2: Understand various systems thoroughly and their requirements.
CO 3: Analyze the control circuits of Shunt Controllers for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping.
CO 4: Control STATCOM and SVC and their comparison and the regulation of STATCOM.
CO 5: Understand the Power and control circuits of Series Controllers.

(EE852PE)SMART ELECTRIC GRID

CO 1: Understand the concept of smart grid electric power systems.
CO 2: Analyze the DC distribution and intelligrid architecture for the smart grid.
CO 3: Analyze the dynamic energy management system.
CO 4: Understand the concept of energy port, policies & programs and market implementation of smart grid.

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CO 5: Analyze the efficient electric end-use technology alternatives.

(EE853PE)POWER QUALITY

CO 1: Learn to distinguish between the various categories of power quality problems.
CO 2: Understand the concept of various interruptions.
CO 3: Understand the voltage sag calculations.
CO 4: Understand the impact on equipment performance and economics under power quality problems.
CO 5: Learn to apply appropriate solution techniques for power quality mitigation based on the type of problem.

PROFESSIONAL ELECTIVE - VI
(EE861PE) EHVAC TRANSMISSION

CO 1: Evaluating the loss coefficients, capacitances and inductances.
CO 2: Voltage gradient relations for various conductors.
CO 3: Corona formulations and its remedies.
CO 4: Electrostatic field computations.
CO 5: Compensating methods, power circle diagram approach.

(EE862PE) POWER SYSTEM RELIABILITY

CO 1: Model various systems applying reliability networks.
CO 2: Evaluate the reliability of simple and complex systems
CO 3: Apply various mathematical models
CO 4: Limiting state probabilities of repairable system models
CO 5: Know the performance of reliability networks.

(EC604PC/EE863PE) DIGITAL SIGNAL PROCESSING

CO 1: Perform time frequency and Z transform analysis on signals and systems
CO 2: Understanding the inter-relationship between DFT and various transforms
CO 3: Understand the significance of various filter structures
CO 4: Design a digital filter for a given specification.
CO 5: Understand multirate Digital signal processing

OPEN ELECTIVE - III
(CE831OE) PROJECT MANAGEMENT (CE)

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
CO 2: Use the mechanized construction equipments at different situations or any huge projects
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management, estimation and project planning techniques
CO 5: Use the CPM – PERT Problems in project scheduling

(CE831OE) SAFETY ENGINEERING (CE)

CO 1: Know how to Handle and Protect the Machine and himself while working on it

CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment
CO 3: Understand the knowledge of safety rules and regulations of working at construction industry
CO 4: Understand the knowledge about working at all stages in different heights at construction site
CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(EE831OE) ELECTRICAL ENGINEERING MATERIALS (EEE)

CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Understand the properties and importance of insulating and dielectric medium.
CO 3: Evaluate magnetic materials and their behavior.
CO 4: Evaluate semiconductor materials and technologies.
CO 5: Know the materials used in electrical engineering and applications.

(EE832OE) FUZZY LOGIC AND ITS APPLICATIONS (EEE)

CO 1: Operation and properties of crisp and fuzzy logic.
CO 2: Operation and properties of crisp relations and fuzzy relations.
CO 3: Laws and inference of classical propositional, predicate and fuzzy propositional logic.
CO 4: Membership value assignment.
CO 5: Methods of defuzzification and fuzzy rule based system.

(ME731PE/ME831OE) POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine and gas turbine power plant.
CO 3: To know the concept of hydroelectric power plant.
CO 4: To know the concept of nuclear power stations and non-conventional power sources.
CO 5: Understand the power plant economics and environmental considerations.

(ME622PE/ME832OE) NANO TECHNOLOGY (ME)

CO 1: Apply engineering and physics concepts to the Nano-scale and non-continuum domain.
CO 2: Understand Carbon Nano Tubes structures and manufacturing process.
CO 3: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of Nano materials.
CO 4: Understand the principles and microelectronics fabrication.
CO 5: Understand the concept of Convective Heat Transfer in Nano fluids.

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(EC831OE) FUNDAMENTALS OF EMBEDDED SYSTEMS (ECE)

CO 1: Summarize the different development tool for embedded system, features of advanced buses for distributed data transfer in system design.
CO 2: Develop the different processors on hardware and software for the development of embedded system design.
CO 3: Contrast the basics of embedded system Firmware.
CO 4: Implement the concepts of RTOS in real time programming
CO 5: Understand the development of distributed embedded system design.

(EC733PE/EC832OE) BIOMETRIC SYSTEMS (ECE)

CO 1: Understand differences between a biometric method and a biometric system.
CO 2: Organize and conduct biometric data collection processes.
CO 3: Understand the concepts of IRIS recognition.
CO 4: Understand the concepts of FACE recognition.
CO 5: Understand how to use biometric databases in system evaluation.

(CS853PE/CS831OE) SOFTWARE PROJECT MANAGEMENT (CSE)

CO 1: Apply the practice of project management in delivering of projects.
CO 2: Evaluate the project against strategic, technical and economic criteria.
CO 3: Identify effort estimation and activity plan of a project.
CO 4: Categorize and prioritize actions for risk management.
CO 5: Evaluate the characteristics of various team structures.

(CS511PE/CS832OE) HUMAN COMPUTER INTERACTION (CSE)

Upon the successful completion of this course, the student will be able to:
CO 1: Identify and formulate characteristics and components of graphical user interface.
CO 2: Apply an interactive design process and universal design principles to designing HCI systems
CO 3: Analyze & implement various design paradigms for human computer interaction.
CO 4: Apply the navigation schemes through window, device and screen based controls
CO 5: Use HCI in the software process.

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ENGINEERING ENGINEERS

B.TECH.

ELECTRICAL AND ELECTRONICS ENGINEERING

R15 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A51001	English-I	HS	2	0	2	25	75	100
2	A51002	Mathematics-I	BS	3	1	3	25	75	100
3	A51003	Engineering Physics-I	BS	2	1	2	25	75	100
4	A51005	Computer Programming-I	ES	3	1	3	25	75	100
5	A51008	Electrical Circuits	ES	3	1	3	25	75	100
6	A51009	Engineering Graphics	ES	0	6	3	25	75	100
7	A51201	English Language Communication Skills Lab-I	HS	0	3	2	25	75	100
8	A51202	Computer Programming Lab - I	ES	0	3	2	25	75	100
9	A51205	Engineering Physics Lab	BS	0	3	2	25	75	100
10	A51206	Engineering Workshop	ES	0	3	2	25	75	100
Total				**13**	**22**	**24**	**250**	**750**	**1000**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A52001	English-II	HS	2	0	2	25	75	100
2	A52002	Mathematics-II	BS	3	1	3	25	75	100
3	A52003	Engineering Physics-II	BS	2	1	2	25	75	100
4	A52006	Computer Programming-II	ES	3	1	3	25	75	100
5	A52008	Mathematics-III	BS	3	1	3	25	75	100
6	A52009	Engineering Chemistry	BS	3	1	3	25	75	100
7	A52201	English Language Communication Skills Lab-II	HS	0	3	2	25	75	100
8	A52202	Computer Programming Lab - II	ES	0	3	2	25	75	100
9	A52205	Engineering Chemistry Lab	BS	0	3	2	25	75	100
10	A52206	IT Workshop	ES	0	3	2	25	75	100
Total				**16**	**17**	**24**	**250**	**750**	**1000**

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IIYEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A53007	Mathematics-IV	BS	4	1	4	25	75	100
2	A53008	Switching Theory & Logic Design	ES	3	1	3	25	75	100
3	A53009	Electronic Devices & Circuits	PC	3	1	3	25	75	100
4	A53010	Network Theory	PC	3	1	3	25	75	100
5	A53011	Electromagnetic Fields	PC	3	1	3	25	75	100
6	A53012	Electrical Machines-I	PC	4	1	4	25	75	100
7	A53204	Electrical Circuits Lab	ES	0	3	2	25	75	100
8	A53205	Electronic Devices & Circuits Lab	PC	0	3	2	25	75	100
9	A53206	Gender Sensitization	MC	0	3	0	25	75	100
Total				**20**	**15**	**24**	**225**	**675**	**900**

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IIYEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A54007	Electronic Circuits	ES	3	1	3	25	75	100
2	A54008	Managerial Economics and Financial Analysis	HS	3	1	3	25	75	100
3	A54009	Power Systems-I	PC	3	1	3	25	75	100
4	A54010	Control Systems	PC	4	1	4	25	75	100
5	A54011	Electrical Machines-II	PC	4	1	4	25	75	100
6	A54006	Environmental Studies	HS	3	1	3	25	75	100
7	A54204	Electrical Machines-I Lab	PC	0	3	2	25	75	100
8	A54205	Control Systems Lab	PC	0	3	2	25	75	100
9	A54206	Human Values and Professional Ethics	MC	0	3	0	25	75	100
Total				**20**	**15**	**24**	**225**	**675**	**900**

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IIIYEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A55009	Linear IC Applications	PC	3	1	3	25	75	100
2	A55010	Management Science	HS	3	0	3	25	75	100
3	A55011	Power Electronics	PC	4	1	4	25	75	100
4	A55012	Power Systems-II	PC	3	1	3	25	75	100
5	A55013	Electrical Machines-III	PC	4	1	4	25	75	100
6	PROFESSIONAL ELECTIVE - I								
	A55014	Renewable Energy Sources	PE	3	0	3	25	75	100
	A55015	Computer Organization							
	A55016	Signals & Systems							
7	A55203	Power Electronics Lab	PC	0	3	2	25	75	100
8	A55204	Electrical Machines-II Lab	PC	0	3	2	25	75	100
Total				**20**	**10**	**24**	**200**	**600**	**800**

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IIIYEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A56008	Switchgear and Protection	PC	4	1	4	25	75	100
2	A56009	Computer Methods in Power Systems	PC	3	1	3	25	75	100
3	A56010	Electrical Measurements	PC	4	1	4	25	75	100
4	A56011	Power Semiconductor Drives	PC	3	1	3	25	75	100
5	PROFESSIONAL ELECTIVE - II								
	A56012	Special Electrical Machines	PE	3	1	3	25	75	100
	A56013	Advanced Power Electronics							
	A56014	Electrical Distribution Systems							
6	OPEN ELECTIVE-I		OE	3	1	3	25	75	100
7	A56203	Electrical Measurements Lab	PC	-	3	2	25	75	100
8	A56204	Advanced English Communication Skills Lab	HS	-	3	2	25	75	100
Total				**20**	**12**	**24**	**200**	**600**	**800**

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IVYEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A57010	Micro Processors and Micro Controllers	PC	3	1	3	25	75	100
2	A57011	Power System Operation and Control	PC	4	1	4	25	75	100
3	A57012	Utilization Of Electrical Energy	PC	3	1	3	25	75	100
4	PROFESSIONAL ELECTIVE - III								
	A57013	Instrumentation	PE	3	1	3	25	75	100
	A57014	High Voltage Engineering							
	A57015	Optimization Techniques							
5	PROFESSIONAL ELECTIVE - IV								
	A57016	Advanced Control Systems	PE	3	1	3	25	75	100
	A57017	Neural Networks and Fuzzy Logic							
	A57018	Linear system Analysis							
6	OPEN ELECTIVE-II		OE	3	1	3	25	75	100
7	A57204	Electrical Simulation Lab	PC	0	3	2	25	75	100
8	A57205	Micro Processors and Micro Controllers Lab	PC	0	3	2	25	75	100
9	A57206	Mini Project	PW	-	-	2	-	100	100
Total				**19**	**12**	**25**	**200**	**700**	**900**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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IVYEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	PROFESSIONAL ELECTIVE - V								
	A58007	HVDC Transmission& FACTS	PE	3	1	3	25	75	100
	A58008	Smart Grid							
	A58009	Power Quality							
2	PROFESSIONAL ELECTIVE - VI								
	A58010	EHV AC Transmission	PE	3	1	3	25	75	100
	A58011	Power System Reliability							
	A58012	Digital Signal Processing							
3	OPEN ELECTIVE-III		OE	3	1	3	25	75	100
7	A58204	Seminar	PW	–	6	2	100	–	100
8	A58205	Project Work	PW	–	15	10	50	150	200
9	A58206	Comprehensive Viva-Voce	PW	–	–	2	100	–	100
Total				**9**	**24**	**23**	**325**	**375**	**700**

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S.No	**Course Code**	**Course**	**Offering Department**
1	A56301	Construction Materials	Civil Engineering
2	A56302	Waste Management	
3	A56303	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	A56304	Maintenance of Electrical Systems	
5	A56305	Advanced Engineering Materials	Mechanical Engineering
6	A56306	Mechatronics	
7	A56307	Principles of Communication Systems	Electronics & Communication Engineering
8	A56308	Electronic Measuring Instruments	
9	A56309	Java Programming	Computer Science & Engineering
10	A56310	Computer Networks	

OPEN ELECTIVE- II			
S.No.	**Course Code**	**Subject**	**Offering Department**
1	A57301	Disaster Management and Mitigation	Civil Engineering
2	A57003	Geological Information System & Remote Sensing	
3	A57302	Energy Storage Systems	Electrical & Electronics Engineering
4	A57303	Electrical Engineering Materials	
5	A57022	Power Plant Engineering	Mechanical Engineering
6	A57304	Industrial Robotics	
7	A57305	Computer Organization	Electronics & Communication Engineering
8	A57306	Principles of Signal Processing	
9	A57307	Database Management Systems	Computer Science & Engineering
10	A57308	Web Technologies	

OPEN ELECTIVE- III			
S.No	**Course Code**	**Subject**	**Offering Department**
1	A58301	Construction Technology and Project Management	Civil Engineering
2	A58302	Safety Engineering	
3	A58303	Energy conservation and Audit	Electrical & Electronics Engineering
4	A58304	Artificial Neural Networks	
5	A58305	Renewable Energy Sources	Mechanical Engineering
6	A58306	Automobile Engineering	
7	A58307	Nanotechnology	Electronics & Communication Engineering
8	A58308	Biometric System	
9	A58309	Game Theory with EngineeringApplications	Computer Science & Engineering
10	A58310	Software Engineering	

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ANURAG
ENGINEERING ENGINEERS

B.TECH.

ELECTRICAL AND ELECTRONICS ENGINEERING

R15 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(A51001) ENGLISH-I

At the end of the course the students will be able to

CO 1: Narrate the stories and know the significance of humor.
CO 2: Promote awareness amongst students how visvesvaraya became a role model to others.
CO 3: Create awareness in students the development & security features of polymer banknotes.
CO 4: How to utilize organs know the importance of life. Awareness on every day is a new day
CO 5: Students know about accidents often happen because of carelessness. If we take care can avoid Accidents.

(A51002) MATHEMATICS-I

At the end of the course the students will be able to

CO 1: Understand Rolle's and the Mean value theorems and to verify the Mean value theorems and Apply partial derivatives to study maxima and minima of functions of two variables.
CO 2: Define rank and elementary transformations of a matrix and Discuss Non homogeneous and homogeneous system of equations.
CO 3: Compute Eigen values and corresponding Eigen vectors of a square matrix.
CO 4: Specify standard methods for solving differential equations and their applications in geometrical and physical problems.
CO 5: Identify different types of higher order differential equations and their applications in engineering problem solving.

(A51003)ENGINEERING PHYSICS-1

CO 1: Understand the intensity variation of light due to interference, diffraction and polarization.
CO 2: Employ the knowledge of crystallography and X-Rays to understand the structure-property relationship of materials.
CO 3: Implement the concept of various distributions and statistical mechanics for research applications.
CO 4: Understand the classification of Magnetic materials, Superconductors and their applications in various fields.
CO 5: Acquire basic knowledge of dielectrics and the applications of piezo, pyro and Ferro electric materials.

(A51005) COMPUTER PROGRAMMING – I

At the end of the course the students will be able to

CO 1: Ability to design algorithmic solutions to problems.
CO 2: Ability to convert algorithms to C-Programs
CO 3: to write, compile and debug programs in C Language
CO 4: Ability to write Programs using selection and repetition statements
CO 5: Ability to write programs using Arrays and Strings
CO 6: Ability to design structured programming.

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(A51008) ELECTRICAL CIRCUITS

At the end of the course the students will be able to

CO 1: To develop a basic concepts of electrical components, energy sources, their various types of connections and solutions of D.C circuits.

CO 2: To develop basic concepts of magnetic circuits, Faraday's Laws and analysis of series and parallel magnetic circuits.

CO 3: To develop a basic concept of different periodic waveforms, complex power, J-notation.

CO 4: To develop basic concepts of various types of connections of R-L, R-C, R-L-C and their solutions, concept of resonance of A.C circuits.

CO 5: To develop solutions of various complex circuit connections by using different theorems of D.C & A.C excitations.

(A51009) ENGINEERING GRAPHICS

At the end of the course the students will be able to

CO 1: To Know the importance of Engineering Graphics and to represent the various Polygons, Curves, Conic Sections, Cycloids and Involutes used in Engineering Graphics.

CO 2: To Draw and understand the Principles involved in Orthographic Projections and to represent the Principles involved in Points, Lines and Traces.

CO 3: To Draw and understand the construction Principles involved in Planes and Solids.

CO 4: To Draw and understand the construction Principles involved in Isometric Projections.

CO 5: To Draw and understand about Conversion of Orthographic Views to Isometric Views and also represent its Transformation of Projections.

(A51201) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

At the end of the course the students will be able to

CO 1: Get familiarity with vowels and consonants and speak with pronunciation. Learn to communicate in individual activates.

CO 2: Learn to reduce mother tongue influence for intelligibility. Gaining confidence using language in conversations and dialogues

CO 3: Better understanding of pronunciation through syllables and clusters. Learning etiquette in different situations make the students more professional.

CO 4: Mastering supra segmental features of phonetics thereby improving correct pronunciation. Improve presentation skill.

CO 5: Neutralization of accent for intelligibility. Improve employability skills of the students.

(A51202) COMPUTER PROGRAMMING LAB - I

At the end of the course the students will be able to

CO 1: To make the student to implement various sorting and searching techniques

CO 2: To introduce the student to structures, unions, and enumeration types and operations on them

CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.
CO 5: To make the student to create various types of files in 'C' Language.

(A51205)ENGINEERING PHYSICS LAB

At the end of the course the students will be able to
CO 1: Elucidate the concepts of physics through involvement in the experiment by applying theoretical knowledge.
CO 2: Illustrate the basics of electromagnetism, optics, mechanics, semiconductors & quantum theory.
CO 3: Develop an ability to apply the knowledge of physics experiments in the later studies.

(A51206)ENGINEERING WORKSHOP

At the end of the course the students will be able to
CO 1: To make a lap joint.
CO 2: To make a dovetail- joint.
CO 3: To make a T-bridle joint.
CO 4: To prepare a flat filing.
CO 5: To prepare a step cutting.
CO 6: To prepare an angular cutting.
CO 7: To prepare an open scoop.
CO 8: To prepare a rectangular tray.
CO 9: To prepare a square tin.
CO 10: To understand and to give the connections for one light point control by one single pole switch.
CO 11: To understand and to give the connections for one light point control by two-two way switches (parallel connections).
CO 12: To understand and to give the connections for to-connect an electrical bell by using bell- push.
CO 13: To understand and to give the connections for two light points controlled by one single pole switch.
CO 14: To prepare a pipe joint,tap and pressing- connections by using plumbing.
CO 15: To apply different operations to be performed on the lathe machines.
CO 16: To prepare a switch boards, wood drilling and threading different various sizes.

I YEAR II SEMESTER

(A52001)ENGLISH – II

At the end of the course the students will be able to
CO 1: Understand the social behavior of the current society.
CO 2: Promote awareness regarding how India achieved success with human values.
CO 3: Create awareness regarding the key for success through Narayana Murthy words.
CO 4: Realize the hardship in the life of Sachin Tendulkar to reach success.
CO 5: Know about the secret of success and happiness in the words of swami Vivekananda quoting from the Bhagavath Geetha.

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(A52002)MATHEMATICS – II

CO 1: Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
CO 2: Apply Laplace transform to solve differential equations which will be converted to algebraic
CO 3: Evaluate double integrals by changing variables, changing order and triple integrationCalculate line integrals along piecewise smooth paths, interpret such quantities as work done by a force
CO 4: Apply Green's theorem to evaluate line integrals along simple closed contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and Divergence theorem to give physical interpretation of the divergence of a vector field
CO 5: Develop Fourier series of periodic functions.

(A52003)ENGINEERING PHYSICS – II

CO 1: Implement the concepts of Quantum mechanics for research applications.
CO 2: Explain the electrical conductivity of the metals and classification of materials in to conductors, semiconductors and insulators.
CO 3: Understand the construction and working of semiconducting devices and fiber optics to their applications in various fields.
CO 4: Understand the construction and working of different kinds of Lasers to their applications in various fields.
CO 5: Acquire Basic knowledge of synthesis of non-materials and their applications in the field of medicine, data storage devices and electronics.

(A52006)COMPUTER PROGRAMMING – II

Upon completion of this course the students will have an
CO 1: Ability to design various sorting and searching techniques
CO 2: Ability to design user defined data types to solve real world problems
CO 3: Ability to manage heap memory
CO 4: Ability to implement and use data structures like stacks, queues and linked lists.
CO 5: Ability to create and use various types of files in 'C' Language.

(A52008)MATHEMATICS- III

CO 1: Determination of roots of an equation and calculate some simple methods of obtaining approximate roots of algebraic and transdental equations.
CO 2: Interpolate the values using the techniques of newtons forward and backward, Gauss forward and backward, Lagrangesand splines interpolations.
CO 3: Analyze and calculate numerical differentiation and numerical integration methods.
CO 4: Calculate sol of ODE using Taylor's, Euler's, Picard's, Rungi-Kutta and Predictor-Corrector method.
CO 5: Evaluate the sol of PDE and calculate boundary value problems.

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(A52009)ENGINEERING CHEMISTRY

CO 1: Impart the importunate& importance of portable water, Industrial demand and the modern Techniques to upkeep
CO 2: Outline the crisp aspect of ionic's and electrodes, various conductance their units and Drill to work out Problems
CO 3: Outline the crisp aspect of ionic's and electrodes, various conductance their units and Drill to work out Problems
CO 4: Enumerate the magnitude of corrosion, future Drastic Measures to abate Corrosion gingerly Bring forth the top notch necessity of Engineering Materials and their ineluctable position in the present era.
CO 5: Demonstrate immense significance of Engineering Materials technical methods of compounding are reiterated.

(A52201)ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II

CO 1: The students become aware of different pronunciations. Gain confidence in using language in different contexts.
CO 2: Equip with good listening skills Enrichment of fluency there by students becomes confidence.
CO 3: Better understanding of intonation and sentence stress for intelligibility. Mastering functions of language.
CO 4: Familiarize With nuances of pronunciation. Giving speeches make students more confident and get rid of stage fear.
CO 5: Improve analytical thinking and written language. Speaking with clarity and fluency in group activities

(A52202)COMPUTER PROGRAMMING LAB - II

CO 1: To make the student to implement various sorting and searching techniques
CO 2: To introduce the student to structures, unions, and enumeration types and operations on them
CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.
CO 5: To make the student to create various types of files in 'C' Language.

(A52205)ENGINEERING CHEMISTRY LAB

CO 1: As commences with fundamentals which indeed takes the individual students to be more conversant with apparatus and allied.
CO 2: Gets equipped with the technical importance of knowing the extent of hardness and consciousness of units and the adroitness and keep aware of some industrial determination techniques.
CO 3: Students gets augmented as commences with fundamentals which indeed takes the individual students to be more conversant with apparatus and allied.

(A52206) IT WORKSHOP

CO 1: Able to understand &identify the components and peripherals of computer.
CO 2: Gains Knowledge on Assembling and dissembling the PC.

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CO 3: Attains Knowledge on installation of MS Windows & Linux Operating Systems.
CO 4: Gains Knowledge on MS OFFICE-2007.

II YEAR I SEMESTER

(A53007) MATHEMATICS - IV

CO 1: Apply the forbenius method to obtain a series solution for the given linear 2^{nd} ODE.
CO 2: Identify Bessel equation and Legendre equation and solve them under special conditions with the help of series solutions method. Also recurrence relations and orthogonality properties of Bessel and Legendre Polynomials
CO 3: Analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem and Taylor's and Laurent series expansion of complex functions.

(A53008) SWITCHING THEORY & LOGIC DESIGN

After studying this course, student gets knowledge on
CO 1: Basic tools required for design of digital circuits.
CO 2: Number representation in digital electronic circuits.
CO 3: Design & application of combinational logic circuits and Implementation of sequential state machine using flip-flops.

(A53009) ELECTRONIC DEVICES & CIRCUITS

CO 1: Concepts of physical electronics particularly solid state devices and its conductivity.
CO 2: Operation of PN-junction diode, Zener diode and other diodes and interpret its characteristics and Construction of different rectifier circuits with and without filters.
CO 3: Ability to draw characteristics of a transistor in various configurations and interpret its usages in different regions, bias-curve which are used to establish the quiescent operating conditions in a different amplifier circuits

(A53010) NETWORK THEORY

After going through this course the student can able to
CO 1: Independently understand the concepts of packet capturing and it works.
CO 2: Independently install and configure network device for network monitoring tasks.
CO 3: Independently carryout network security tasks at any small, medium of enterprise networks.

(A53011) ELECTRO MAGNETIC FIELDS

After going through this course the student can able to understand
CO 1: Ability to apply vector mathematics and physics to calculate parameters electromagnetic problems, Properties and behavior of conductors, dielectrics & capacitance.
CO 2: Magneto statics and Physical laws of electro magnetism, Force in magnetic fields, Magnetic potential and its properties.

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CO 3: Calculation of inductance, Basic concepts on time varying fields in point form and Integral form.

(A53012) ELECTRICAL MACHINES – I

After going through this course the student can able to understand

CO 1: Construction of D.C machine, different types of DC generators, characteristics and industrial applications,

CO 2: The principle of DC motor, electrical characteristics and industrial application.

CO 3: Various losses, different tests in DC machines.

(A53204)ELECTRICAL CIRCUITS LAB

CO 1: Use basic laboratory equipment and technology to measure electrical quantities using laboratory test equipment.

CO 2: Able to explain the concept of circuit laws and network theorems.

CO 3: Able to explain the concept of resonance, locus diagram.

(A53205) ELECTRONIC DEVICES & CIRCUITS LAB

CO 1: The course intends to provide an overview of the principles, operation and application of the basic electronic components.

CO 2: Understand the Characteristics of the active devices.

CO 3: To understand the frequency response of different amplifiers.

(A53206) GENDER SENSITIZATION (MANDETORY COURSE)

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.

CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials from research, facts, everyday life, literature and film.

CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.

CO 5: Men and women students and professions a will be better equipped to work and live together as equals.

CO 6: Students will develop a sense of appreciation of women in all walks of life.

CO 7: Through providing accounts of studies and movements as well as the now laws that provide protection and relief to women, the textbook will empower students to understand respond to gender violence.

II YEAR II SEMESTER

(A54007)ELECTRONIC CIRCUITS

CO 1: Ability to find out the different parameters of the transistor.

CO 2: Design specifications and circuit construction for Amplifiers & Oscillators, specifications and circuit construction for Clippers& Clampers.

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CO 3: Ability to find out the different parameters of the power amplifiers and to design different types of multi-vibrators.

(A54008)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

By the end of this course the students will be able to

CO 1: Get the knowledge on Nature and scope of Managerial Economics, analysis of demand forecasting and its methods.
CO 2: Assess the costs useful for managerial decision making and determine Break Even Point (BEP) of an enterprise.
CO 3: Get the knowledge on Market structures and Policies of Pricing.
CO 4: Analyze the Capital and its significance and Capital Budgeting.
CO 5: Process the principles of accounting and interpret the financial statements of a business enterprise by using ratios

(A54009)POWER SYSTEMS – I

After going through this course the students can able to understand

CO 1: How the electrical power will be generated from different sources.
CO 2: Layout of substations, their Equipments and distribution systems.
CO 3: The economical aspects of power generation and different types of tariffs.

(A54010)CONTROL SYSTEMS

After going through this course the student can able to understand

CO 1: The basic concepts and applications of control systems in day to day life.
CO 2: The transfer function analysis in mathematical modeling of control system which helps mainly in stability and designing of control systems.
CO 3: Express and solve system equations in state variable form.

(A54011)ELECTRICAL MACHINES – II

After going through this course the student can be able to understand

CO 1: Construction, working principle, operating characteristics of single phase and 3 phase transformers. Able to solve the problems about regulation, efficiency, sharing of load in parallel operation.
CO 2: construction, working principle, speed torque characteristics, able to solve the problems, with different types of motors for efficiency, torque, speed control methods and their industrial applications.
CO 3: Upon completing the course, student should be able to understand double field theory, construction of single phase induction machines and their characteristics and industrial applications.

(A54006)ENVIRONMENTAL STUDIES

After going through this course the student can be able to understand

CO 1: Knowledge of solid, liquid, gaseous fuels and characterization techniques for fuels.
CO 2: Knowledge of energy conservations in various forms.
CO 3: Economical aspects of energy studies and its impact on global environment.

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(A54204)ELECTRICAL MACHINES-I LAB

After going through this course the student will be able to

CO 1: Interpret the constructional details of DC machine.
CO 2: Estimate or test the performance of DC generator.
CO 3: Analyze the performance of DC motors

(A54205)CONTROL SYSTEMS LAB

After going through this course, the student

CO 1: Will able to do various engineering projects.
CO 2: Will be able to formulate transfer functions for given control system problems and finds time response of given control system model.
CO 3: Will be able to design controller and compensator in control system.

(A54206)HUMAN VALUES AND PROFESSIONAL ETHICS

After completion of this course, the student knows

CO 1: Essential complementarities between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity.
CO 2: Theholistic perspective towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence.
CO 3: Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

III YEAR I SEMESTER

(A55009) LINEAR IC APPLICATIONS

CO 1: To Summarize the basics of linear integrated circuits and explain operational amplifiers with applications.
CO 2: Able to explain the comparator circuits like Schmitt trigger, astablemultivibrator and construct filter circuits for particular application.
CO 3: To describe analog to digital converters (ADC), and digital to analog converters (DAC) with its Specifications, explain a stable voltage regulator.

(A55010) MANAGEMENT SCIENCE

On completion of the course, the students will be

CO 1: Able to discuss the main techniques and methods used within management science.
CO 2: Able to critically appraise the strengths and limitations of these techniques and methods, carry out simple exercises using such techniques and methods themselves.
CO 3: Able to making situations can be addressed using standard techniques and methods, managerial decision.

(A55011) POWER ELECTRONICS

After completion of this course, student will be able to

CO 1: Understand the operation and characteristics of various types of semiconductor devices

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CO 2: Analyze the operation and characteristics of various single-phase converters, three-phase converters and choppers
CO 3: Analyze the operation and performance of AC voltage controllers and inverters

(A55012) POWER SYSTEMS-II

After completion of this course, student will be
CO 1: Able to do calculation of R, L and C of transmission lines.
CO 2: Able to do calculation of power system transients.
CO 3: Able to understand transient phenomenon, calculation of sag and tension.

(A55013) ELECTRICAL MACHINES- III

CO 1: Student will able learn about synchronous generator.
CO 2: Getting knowledge about regulation and effect of synchronous machines.
CO 3: Select suitable special motor for domestic applications.

PROFESSIONAL ELECTIVE-I
(A55014) RENEWABLE ENERGY SOURCES

The student will be able analyze
CO 1: Solar thermal and photovoltaic systems and related technologies for energy conversion.
CO 2: Wind energy conversion, Biomass conversion, geothermal energy conversion and principles and technologies.
CO 3: Power from oceans and conversion, Fundamentals of direct energy conversion systems.

(A55015) COMPUTER ORGANIZATION

Students will be able to
CO 1: Understand the basic organization of computer and different instruction formats and addressing modes, the concept of pipelining, segment registers and pin diagram of CPU.
CO 2: Understand and analyze various issues related to memory hierarchy, modes of data transfer between CPU and I/O devices.
CO 3: Examine various inter connection structures of multi processors.

(A55016) SIGNALS AND SYSTEMS

CO 1: Represent any arbitrary signals in terms of complete sets orthogonal functions and understands the principles of impulse function, step function and signum function.
CO 2: Under stands the principle of linear system, filter characteristics of system and its band width, the concept of autocorrelation and cross co relation and power density spectrum.
CO 3: Can design a system for sampling a signal response can be obtained using Laplace transform, properties and ROC of L.T.

(A55203) POWER ELECTRONICS LAB

CO 1: Ability to design and conduct experiments and use the techniques, skills and modern engineering tools necessary for engineering practice.
CO 2: Ability to identify, formulate and solve engineering problems.

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CO 3: Ability to analyze the characteristics of power electronic devices and circuits.

(A55204) ELECTRICAL MACHINES – II LAB

CO 1: Able to predetermine the efficiency and regulation of single-phase transformer at given power factors and determine its equivalent circuit and to obtain the V and Inverted V curves of a three—phase synchronous motor

CO 2: Able to obtain performance characteristics three-phase Induction motor

CO 3: To predetermine the regulation of three–phase alternator by synchronous impedance method and Xd and Xq of a salient pole synchronous machine.

III YEAR II SEMESTER

(A56008) SWITCHGEAR AND PROTECTION

After this course, the student

CO 1: Gets a thorough knowledge on, various types of protective devices (circuit breakers, relays etc.) and their co-ordination in protection of power system.

CO 2: Gets a thorough knowledge on, various types of protection methods of generators, transformers, feeders and bus-bars, through different types of protective devices against overvoltage, lightening, etc.,

CO 3: Applies the above concepts to real-world electrical and electronics problems and applications.

(A56009) COMPUTER METHODS IN POWER SYSTEMS

After this course, the student

CO 1: Acquire the knowledge of about an incidence matrices and addition elements to the network and different types of load flow methods

CO 2: Acquire the knowledge about symmetrical and unsymmetrical fault analysis.

CO 3: Acquire the knowledge about steady state and transient state analysis.

(A56010) ELECTRICAL MEASUREMENTS

After this course, the student

CO 1: Gets a thorough knowledge on, different types of measuring instruments, their construction, operation and characteristics.

CO 2: Gets a thorough knowledge on measurements of electrical quantities through voltmeter, ammeter, wattmeter, energy meters, instrument transformers, potentiometers and bridges.

CO 3: Gets a thorough knowledge on errors and their compensation technique in all measuring instruments.

(A56011) POWER SEMICONDUCTOR DRIVES

After this course, the student will be able to

CO 1: Analyze DC motors speed control through single phase and three phase line commutated converters.

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CO 2: Analyze four quadrant operations of DC motors through choppers and dual converters.
CO 3: Analyze the operation of induction motors and synchronous motors.

PROFESSIONAL ELECTIVE-II
(A56012) SPECIAL ELECTRICAL MACHINES

CO 1: By studying this subject students get knowledge on working of special machines.
CO 2: To know stepper motors, permanent magnet materials and motors and linear induction motor, applications and its characteristics.
CO 3: To know about stepper motors, permanent motors, linear induction motors applications and characteristics, real world electrical problems and applications.

(A56013) ADVANCED POWER ELECTRONICS

CO 1: Students get detail knowledge on dc-dc & ac-ac converters.
CO 2: Students get detail knowledge on dc-ac converters.
CO 3: Able to know its applications in various areas.

(A56014) ELECTRICAL DISTRIBUTION SYSTEMS

After this course, the student will be able to
CO 1: Analyze the distribution system planning, load modelling characteristics.
CO 2: Understand the optimal location of substations and design considerations.
CO 3: Evaluate voltage drop and power loss calculation and design the capacitor and voltage regulating equipment to improve the power factor and voltage profile.

OPEN ELECTIVE - I
(A56301) CONSTRUCTION MATERIALS(CE)

On successful completion of this course, it is expected that
CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
CO 4: Students are Gain About Basic Knowledge on Timber And Other Materials
CO 5: Students are get knowledge on Modern construction materials.

(A56302) WASTE MANAGEMENT (CE)

At the end of the course student will be able to,
CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.
CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.
CO 3: Understand the working procedure in various industries, sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.

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CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.
CO 5: Understand the waste disposal methods and requirement of treatment plants.

(A56303) SOLAR PHOTO VOLTAIC SYSTEMS (EEE)

After this course, the student will be able to
CO 1: Identify photovoltaic system components and system types and calculate electrical energy and power
CO 2: Correctly size system components, design considerations of solar equipment
CO 3: Design a basic grid-tied PV system.

(A56304) MAINTAINANCE OF ELECTRICAL SYSTEMS (EEE)

After this course, the student will be able to
CO 1: Identify the Engineering materials and testing of domestic appliances.
CO 2: Know the use of UPS and SMPS and maintenance of power devices.
CO 3: Rescue a person met with Electric shock.

(A56305)ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of advanced materials
CO 2: Understand the basic concepts of ferrous and non ferrous metals and alloys.
CO 3: Understand the ceramics and composite materials
CO 4: To understand the application of super alloys and inter metallic
CO 5: Understand the basic methods of manufacturing various types of composite

(A56306)MECHATRONICS (ME)

At the end of the course, the student will be able to,
CO 1: Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product.
CO 2: Develop PLC programs for a given task.
CO 3: Evaluate the performance of mechatronic systems.

(A56307) PRINCIPLES OF COMMUNICATION SYSTEMS (ECE)

By completing this subject, the student can be able to
CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems

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(A56308)ELECTRONIC MEASURING INSTRUMENTS (ECE)

By completing this subject, the student can be able to

CO 1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.

CO 2: Measure various physical parameters by appropriately selecting the transducers

CO 3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals

(A56309) JAVA PROGRAMMING (CSE)

CO 1: Understanding of OOP concepts and basics of Java programming (Console and GUI based).

CO 2: The skills to apply OOP and Java programming in problem solving.

CO 3: Should have the ability to extend his/her knowledge of Java programming further on his/her own.

(A56310)COMPUTER NETWORKS (CSE)

CO 1: Analyze TCP/IP and OSI models and variousprotocols

CO 2: Identify suitable multiple access protocol for differentnetworks

CO 3: Analyze various error handlingmechanisms

CO 4: Use of various devices in connecting different types ofLANs

CO 5: Compare and contrast ipv4 andipv6

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(A56203) ELECTRICAL MEASUREMENTS LAB

Upon completion of study of the course, students should be able to

CO 1: Calibrate and test single phase energy meter, calibrate PMMC voltmeter and calibrate LPF wattmeter

CO 2: Measure resistance, inductance, capacitance, 3-Φ active power and reactive power.

CO 3: Test current transformers, dielectric strength of oil, calibrate LVDT and resistance strain gauge.

(A56204)ADVANCED ENGLISH COMMUNICATION SKILLS LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Get familiarity with vowels and consonants and speak with pronunciation. Learn to communicate in individual activates.

CO 2: Better understanding of pronunciation through syllables and clusters. Learning etiquette in different situations make the students more professional.

CO 3: Neutralization of accent for intelligibility. Improve employability skills of the students.

CO 4: Improve to speak and write correct English. Enrichment of fluency there by students becomes confidence.

CO 5: Learn to reduce mother tongue influence for intelligibility. Gaining confidence using language in conversations and dialogues

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IV YEAR I SEMESTER

(A57010)MICROPROCESSORS AND MICROCONTROLLERS

CO 1: Explain the internal Architecture of 8086 microprocessors and evolution of microprocessors, Demonstrate the 8086 microprocessor Maximum mode and Minimum mode systems.

CO 2: Use 8086 Instructions and Assembler directives for developing 8086 assembly programs with an assembler and the 8051Architecture and evolution of microcontrollers.

CO 3: Develop interfacing of 8086 microprocessor with digital peripherals using Programmable parallel port, analog peripherals – ADC and DAC and the internal architecture of AVR RISC MI, the use of Interrupts and Interrupt responses, Demonstrate Direct Memory Access data transfer.

(A57011)POWER SYSTEM OPERATION AND CONTROL

After this course, the student will be able to

CO 1: Know theeconomic operation of power systems and hydrothermal systems.

CO 2: Know the importance modeling of power system components.

CO 3: Understand the importance of load frequency control and reactive power control.

(A57012)UTILIZATION OF ELECTRICAL ENERGY

At the end of this course student will have ability to

CO 1: Express working of electric drives.

CO 2: Articulate different types of heating, welding and illumination.

CO 3: Ability to understand concepts used in design electric traction

PROFESSIONAL ELECTIVE-III
(A57013)INSTRUMENTATION

At the end of this course, student will have ability to

CO 1: Know the different types of errors in measurement & performance of CRO.

CO 2: Understand the different types of voltmeters, transducers &its working applications.

CO 3: Learn non electrical quantities like velocity, angular velocity, pressure, torque, displacement.

(A57014)HIGH VOLTAGE ENGINEERING

After completion of this course, the student will

CO 1: Acquire the knowledge about the dielectrics how to evaluate electric field streams and applications of insulating materials and breakdown of dielectric.

CO 2: Acquire the knowledge about generation of high voltages and insulating coordination.

CO 3: Acquire the knowledge about the testing of electric equipments.

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(A57015)OPTIMIZATION TECHNIQUES

After this course, the student will be able to

CO 1: Explain the need of optimization of engineering systems, optimization of electrical and electronics engineering problems.

CO 2: Apply classical optimization techniques, linear programming, simplex algorithm, transportation problem

CO 3: Apply unconstrained optimization and constrained non-linear programming and dynamic programming and formulate optimization problems

PROFESSIONAL ELECTIVE-IV
(A57016)ADVANCED CONTROL SYSTEMS

CO 1: Able to analyze state space representation and solution of state equation state transition matrix.

CO 2: Understand the concepts of controllability and observability for controlling the system.

CO 3: Analyze the describing functions, phase plane and stability analysis.

(A57017)NEURAL NETWORKS AND FUZZY LOGIC

CO 1: To understand artificial neural network models and their training algorithms

CO 2: To understand the concept of fuzzy logic system components, fuzzification and defuzzification

CO 3: Applies the above concepts to real-world problems and applications.

(A57018)LINEAR SYSTEM ANALYSIS

After completing this course the students should be able to

CO 1: Know and be able to apply properties of linear time-invariant systems.

CO 2: Represent periodic waveforms by Fourier series.

CO 3: Solve differential equations using Laplace Transforms and Analyze systems using Laplace and Fourier Transform techniques

OPEN ELECTIVE- II
(A57301) DISASTER MANAGEMENT AND MITIGATION (CE)

CO 1: Application of different approaches , human ecology in geographical researches

CO 2: Have the knowledge on planetary hazards/disasters

CO 3: Know the principles and measures to control various disasters/exogenous hazards

CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system

CO 5: Apply emerging approaches in different types of disasters

(A57003)GEOLOGICAL INFORMATION SYSTEM & REMOTE SENSING (CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.

CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.

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CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(A57302)ENERGY STORAGE SYSTEMS (EEE)

After this course, the student
CO 1: Can analyze the characteristics of energy from various sources and need for storage
CO 2: Can classify various types of energy storage and various devices used for the purpose
CO 3: Can apply the same concepts to real time problem.

(A57303)ELECTRICAL ENGINEERING MATERIALS (EEE)

Will be able to
CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Evaluate magnetic materials and their behavior.
CO 3: Evaluate semiconductor materials and technologies.
CO 4: Understand different types of materials used in electrical engineering and applications

(A57022)POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine power plant.
CO 3: To know the concept of gas turbine power plant.
CO 4: To know the concept of hydroelectric power plant.
CO 5: To know the concept of power from non-conventional sources.
CO 6: To know the concept of nuclear power stations and its types.
CO 7: Understand the power plant economics and environmental considerations.

(A57304)INDUSTRIAL ROBOTICS (ME)

At the end of the course, the student will be able to understand the
CO 1: Basic components of robots.
CO 2: Differentiate types of robots and robot grippers.
CO 3: Model forward and inverse kinematics of robot manipulators.
CO 4: Analyze forces in links and joints of a robot.
CO 5: Programme a robot to perform tasks in industrial applications.
CO 6: Design intelligent robots using sensors.

(A57305)COMPUTER ORGANIZATION (ECE)

At the end of the course, the student will be able to understand the
CO 1: Student will learn the concepts of computer organization for several engineering applications.
CO 2: Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.

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CO 3: An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principles

(A57306)PRINCIPLES OF SIGNAL PROCESSING (ECE)

At the end of the course, the student will be able to understand the

CO 1: Apply to current technologies and issues that are specific to image processing systems.
CO 2: Leverage the student's knowledge of image processing to a practical system.
CO 3: Compress the Digital image which is required for storage and transmission of digital images.

(A57307) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Demonstrate the basic elements of a relational database management system.
CO 2: Ability to identify the data models for relevant problems.
CO 3: Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
CO 4: Apply normalization for the development of application soft wares

(A57308) WEB TECHNOLOGIES (CSE)

CO 1: Design static webpages and provide clients IDE authentication.
CO 2: Prepare Static Web pages With Validations.
CO 3: Develop new tag sets using XML mechanism.
CO 4: Design and develop web applications using JSP and MVC architecture
CO 5: Understand database connectivity and retrieving data using client/server database

(A57204)ELECTRICAL SIMULATION LAB

Will be able to gain

CO 1: Practical Knowledge on analysis of electrical circuits and power electronic circuits.
CO 2: Practical Knowledge on stability analysis and of linear circuits and modeling of transmission lines.
CO 3: Practical Knowledge on fault analysis, load flow and transient analysis of power system.

(A57205)MICROPROCESSORS AND MICROCONTROLLERS LAB

CO 1: Apprehend the internal architecture of 8086 microprocessor and develop assembly language program for small applications.
CO 2: Conceive SDK architecture of 8086 and use it for required applications.
CO 3: Design & Develop application based programs using digital interfacing. Interpret & design application using DAC & ADC & memory chip interfacing.

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PROFESSIONAL ELECTIVE-V
(A58007)HVDC TRANSMISSION & FACTS

The student will be able to

CO 1: Acquire the knowledge to compare AC and HVDC systems in terms of power transmission and stability.

CO 2: Acquire knowledge on analysis of harmonics, filters, reactive power and power flow in HVDC systems.

CO 3: Acquire knowledge in improving the transmission capability and stability of the power system by applying FACTS controllers.

(A58008)SMART GRID

The student will be able to

CO 1: Understand the concept of smart grid electric power systems and intergrid architecture for the smart grid.

CO 2: Analyze the dynamic energy management system.

CO 3: Analyze the new goals of utilities and consumers in smart grid and market opportunities and potential gains.

(A58009)POWER QUALITY

CO 1: Learn to distinguish between the various categories of power quality problems.

CO 2: Understand the root of the power quality problems in industry and their impact on performance and economics.

CO 3: Learn to apply appropriate solution techniques for power quality mitigation based on the type of problem.

PROFESSIONAL ELECTIVE-VI
(A58010)EHVAC TRANSMISSION

After completion of this course, the student knows

CO 1: thenecessity of EHVAC transmission system and calculation of voltage gradient of conductors in EHVAC transmission system.

CO 2: theeffects ofcorona on EHVAC transmission system.

CO 3: calculation of electro static field of EHVAC lines and voltage control methods.

(A58011)POWER SYSTEM RELIABILITY

After this course, the student will be able to

CO 1: Model various systems applying reliability networks.

CO 2: Evaluate the reliability of simple and complex systems and the limiting state probabilities of repairable systems

CO 3: Apply various mathematical models for evaluating reliability of irreparable systems.

(A58012)DIGITAL SIGNAL PROCESSING

CO 1: Perform time frequency and Z transform analysis on signals and systems

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CO 2: Understanding the inter-relationship between DFT and various transforms and the trade-offs between normal and Multirate DSP techniques and finite length word effects.

CO 3: Design a digital filter for a given specification and fast computation of DFT and appreciate the FFT processing, the significance of various filter structures and effects of round-off errors

OPEN ELECTIVE-III

(A58301) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT (CE)

After successfully completion of this course, the student will be able to

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods

CO 2: Use the mechanized construction equipments at different situations or any huge projects

CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.

CO 4: To classify the contact management , estimation and project planning techniques

CO 5: Use the CPM – PERT Problems in project scheduling

(A58302) SAFETY ENGINEERING (CE)

After successfully completion of this course, the student will be able to

CO 1: Know how to Handle and Protect the Machine and himself while working on it

CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment

CO 3: Understand the knowledge of safety rules and regulations of working at construction industry

CO 4: Understand the knowledge about working at all stages in different heights at construction site

CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(A58303)ENERGY CONSERVATION AND AUDIT (EEE)

By the end of this course the students are able to analyze

CO 1: Principles of thermodynamics and heat exchange theory.

CO 2: Energy conservation and energy auditing.

CO 3: Thermal insulation and heat recovery systems.

(A58304)ARTIFICIAL NEURAL NETWORKS (EEE)

After this course, the student will be able to understand the

CO 1: Basics and models of Neural Networks and its architectures.

CO 2: Operation of feed forward and propagation networks.

CO 3: Associative memories and the applications of Neural Networks.

(A58305) RENEWABLE ENERGY SOURCES (ME)

After this course, the student will be able to understand the

CO 1: The student will be able analyze.

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CO 2: Solar thermal and photovoltaic systems and related technologies for energy conversion.
CO 3: Wind energy conversion, Biomass conversion, Geo thermal energy conversion and principles and technologies.
CO 4: Power from oceans and conversion, Fundamentals of direct energy conversion systems.

(A58306)AUTOMOBILE ENGINEERING(ME)

After this course, the student will be able to understand the
CO 1: Understand the basic lay-out of an automobile.
CO 2: Understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.
CO 3: Understand the principles of transmission, suspension, steering and braking systems.
CO 4: Understand automotive electronics. Study latest developments in automobiles

(A58307)NANOTECHNOLOGY (ECE)

After successfully completion of this course, the student will be able to
CO 1: Appreciate the importance of Nano dimensional materials and their applications.
CO 2: Realize and explain that the properties of Nano materials are size dependent and vary from corresponding bulk materials
CO 3: Demonstrate the skills required to prepare some of the Nano materials in the laboratory
CO 4: Characterize and study the properties with respect to their size and shapes.
CO 5: Appreciate the applications of Nano electronic devices and understand their basic principles

(A58308) BIOMETRIC SYSTEM (ECE)

After successfully completion of this course, the student will be able to
CO 1: Describe principles of the selected physical and behavioral biometric methods, and know how to deploy them in authentication scenarios
CO 2: Organize and conduct biometric data collection processes, and understand how to use biometric databases in system evaluation
CO 3: Understand differences between a biometric method and a biometric system
CO 4: Itemize the most up-to-date examples of real biometric applications in human authentication

(A58309)GAME THEORY WITH ENGINEERING APPLICATIONS (CSE)

CO 1: Students should able to understand the Equilibrium and Non-Equilibrium strategies in gaming.
CO 2: Students should able to learn mixed strategies and rationalizability in gaming domain.
CO 3: Students should able to develop knowledge on Electronic mail game
CO 4: Students should able to develop the idea of repeated games

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(A58310)SOFTWARE ENGINEERING (CSE)

After successfully completion of this course, the student will be able to

CO 1: Ability to identify the minimum requirements for the development of application.

CO 2: Ability to develop, maintain, efficient, reliable and cost effective software solutions.

CO 3: Ability to critically thinking and evaluate assumptions and arguments.

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ANURAG
ENGINEERING ENGINEERS

M.TECH.

POWER ELECTRONICS AND ELECTRICAL DRIVES

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	Acquires technical knowledge in the field of power electronics and electrical drives and its applications in power sectors and core Industries and enhance analytical skills to solve complex problems which are economically feasible and socially acceptable.
PEO II	:	To enhance the student's capacity in pursuing research in emerging areas of power electronics and electrical drives and inculcate the culture of taking up research oriented projects.
PEO III	:	To exhibit professionalism, ethical attitude, communication skills, teamwork in their profession and adopt current trends by engaging in lifelong learning.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	The student gains the specialized knowledge in the operation and control of Power Electronic converters & Drives with an ability to combine existing and recent practices.
PSO 2	:	Able to apply modern tools, latest technologies and resources to provide solutions to complex engineering problems and engage in lifelong learning in the field of Power Electronics & Electrical Drives to meet the needs of industry and society.
PSO 3	:	Able to demonstrate research competence in the field of Power Electronics & Electrical Drives to develop innovative products to meet the industrial and societal needs.

PROGRAM OUTCOMES		
PO 1:	:	Ability to apply knowledge of mathematics, science, and engineering.
PO 2	:	Ability to design and conduct experiments, as well as to analyze and interpret data.

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PO 3	:	Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
PO 4	:	Ability to function on multi-disciplinary teams.
PO 5	:	Ability to identify, formulates and solves engineering problems.
PO 6	:	Understanding of professional and ethical responsibility.
PO 7	:	Ability to communicate effectively.
PO 8	:	Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
PO 9	:	Recognition of the need for, and an ability to engage in life-long learning.
PO 10	:	Knowledge of contemporary issues.
PO 11	:	Ability to utilize experimental, statistical and computational methods and tools necessary for engineering practice.

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ENGINEERING ENGINEERS

M.TECH.

POWER ELECTRONICS AND ELECTRICAL DRIVES

R15 REGULATION

COURSE STRUCTURE

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ENGINEERING ENGINEERS

M.TECH.

POWER ELECTRONICS AND ELECTRICAL DRIVES

R15 REGULATION

COURSE STRUCTURE

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I YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A32023	Core Course V	Power Electronic Converters – II	4	0	4	25	75	100
A32024	Core Course VI	Neural Networks and Fuzzy Systems	4	0	4	25	75	100
A32025	Core Course VII	Power Electronic Control of AC Drives	4	0	4	25	75	100
A32026	Core Elective-III	Power Quality	4	0	4	25	75	100
A32027		Advanced Digital Signal Processing						
A32028	Core Elective-IV	Flexible AC Transmission Systems	4	0	4	25	75	100
A32029		High-Frequency Magnetic Components						
A32030		Dynamics of Electrical Machines						
A32031	Open Elective II	Smart grid technologies	4	0	4	25	75	100
A32032		AI Techniques in Electrical Engineering						
A32033		Reliability Engineering						
A32205	Lab	Electrical Systems Simulation Lab	0	4	2	25	75	100
A32206	Seminar	Seminar-II	-	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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I YEAR I SEMESTER

Course Code	Category	Course Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A31022	Core Course I	Machine Modeling and Analysis	4	0	4	25	75	100
A31023	Core Course II	Modern Control Theory	4	0	4	25	75	100
A31024	Core Course III	Power Electronic Control of DC Drives	4	0	4	25	75	100
A31025	Core Elective-I	Special Machines	4	0	4	25	75	100
A31026		Digital Control Systems						
A31027		Programmable Logic Controllers and their Applications						
A31028	Core Elective-II	Microcontrollers and Applications	4	0	4	25	75	100
A31029		Embedded Systems						
A31030		HVDC Transmission						
A31031	Open Elective I	Optimization Techniques	4	0	4	25	75	100
A31032		Power Electronic Converters-I						
A31033		Renewable energy systems						
A31205	Lab	Power Converters Lab	--	4	2	25	75	100
A31206	Seminar	Seminar-I	--	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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II YEAR I SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A33205		Comprehensive Viva-Voce	--	--	4	--	100	100
A33206		Project work Review I	--	24	12	50	--	50
Total			**--**	**24**	**16**	**50**	**100**	**150**

II YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A34205		Project work Review II	--	8	4	50	--	50
A34206		Project Evaluation (Viva-Voce)	--	16	12	--	150	150
Total			**--**	**24**	**16**	**50**	**150**	**200**

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ANURAG
ENGINEERING ENGINEERS

M.TECH.

POWER ELECTRONICS AND ELECTRICAL DRIVES

R15 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(A31022) MACHINE MODELING AND ANALYSIS

Students will be able to understand

CO 1: Demonstrate an ability to explain two-pole dc machine.
CO 2: Analysis of separately excited dc motor and dc series motor in state variable form.
CO 3: Analysis of linear transformation and circuit model of 3-Ø induction motor.
CO 4: Able to derive the voltage and current equations in a rotor reference frame, synchronously rotating frame.
CO 5: Analysis of 3-Ø synchronous motor and torque equation.

(A31023) MODERN CONTROL THEORY

CO 1: To analyze vector spaces, scalar products, Eigen values, Eigen vectors and the concept of state equations for dynamic systems.
CO 2: To understand state variable analysis for different state time equations and to analyze the concept of controllability and observability.
CO 3: To analyze nonlinear systems
CO 4: To analyze stability analysis in the sense of Lyapunov.
CO 5: To analyze the formulation of optimal control problem, formulations using Hamiltonian method

(A31024) POWER ELECTRONIC CONTROL OF DC DRIVES

CO 1: Analysis of single phase controlled rectifier fed DC motor.
CO 2: Analysis of three phase controlled rectifier fed DC motor.
CO 3: To be able to know the working of phase, current and speed controlled DC drives.
CO 4: To know the operation of chopper controlled DC motor drives.
CO 5: Able to know the dynamic simulation of speed and current controlled DC motor drives.

ELECTIVE – I
(A31025) SPECIAL MACHINES

CO 1: By studying this subject students get knowledge on working of special machines.
CO 2: To know stepper motors, permanent magnet materials and motors.
CO 3: To know about linear induction motor, applications and its characteristics.
CO 4: To know about stepper motors, permanent motors, linear induction motors applications and characteristics.
CO 5: Through which student can be able to apply these things to real world electrical problems and applications.

(A31026) DIGITAL CONTROL SYSTEMS

Upon the completion of the course the student will be able to

CO 1: Understand the concepts of Digital control systems.
CO 2: Analyze and design discrete systems in state variable analysis.
CO 3: Relate the concepts of stability analysis and design discrete time systems.

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(A31027) PROGRAMMABLE LOGIC CONTROLLERS AND THEIR APPLICATIONS

Upon the completion of the course the student will be able to

CO 1: Develop and explain the working of PLC with the help of a block diagram.
CO 2: Execute, debug and test the programs developed for digital and analog operations.
CO 3: Reproduce blocks diagram representation on industrial applications using PLC.

ELECTIVE – II

(A31028) MICROCONTROLLERS AND APPLICATIONS

Upon the completion of the subject, the student will be able to

CO 1: Distinguish Types of computers & microcontrollers,
CO 2: Generalize 8-Bit, 16- Bit & 32 Bit advanced Microcontrollers.
CO 3: Construct Real time Applications of Microcontrollers.
CO 4: Demonstrate RTOS for Microcontrollers.
CO 5: Translate Hardware applications using Microcontrollers

(A31029) EMBEDDED SYSTEMS

CO 1: To analyze and design embedded systems and real-time systems define the unique design problems and challenges of real-time systems
CO 2: Identify the unique characteristics of real-time operating systems and evaluate the need for real-time operating system
CO 3: To explain the general structure of a real-time system and Understand and use RTOS to build an embedded real-time system
CO 4: Gain knowledge and skills necessary to design and develop embedded applications based on real-time operating systems.

(A31030) HVDC TRANSMISSION

CO 1: Through knowledge on general considerations, power handling capabilities of HVDC lines and its basic conversion principles.
CO 2: Working knowledge of three pulse, six pulse and twelve pulse converters, harmonics in HVDC system and its elimination usage of filters.
CO 3: Control of HVDC converters using different technique, control of DC power flow, interaction between HVAC & DC system.
CO 4: Knowledge of operation and control of series, parallel and series parallel systems, disturbances on DC side due to over voltages.
CO 5: Understand the converter faults and protection from over voltages of converters using surge arresters

OPEN ELECTIVE – I

(A31031) OPTIMIZATION TECHNIQUES

After this course, the student will be able to

CO 1: Explain the need of optimization of engineering systems, optimization of electrical and electronics engineering problems.
CO 2: Apply classical optimization techniques, linear programming, simplex algorithm, transportation problem
CO 3: Apply unconstrained optimization and constrained non-linear programming and dynamic programming and formulate optimization problems

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(A31032) POWER ELECTRONIC CONVERTERS-I

CO 1: To know about different types of modern semiconductor devices, and their comparisons.
CO 2: To analyze single phase, three phase ac voltage controllers, and their applications.
CO 3: To analyze single phase to single phase cycloconverters and advantages and applications.
CO 4: To analyze single phase, three phase converters, control techniques, applications.
CO 5: To know about dc-dc converters, advantages, applications.

(A31033) RENEWABLE ENERGY SYSTEMS

CO 1: To develop knowledge about the Role of New and Renewable Source and Environmental Impact of Solar Power.
CO 2: To develop knowledge on Wind Energy conversion and Wave Energy conversion systems.
CO 3: To develop knowledge on Tides and tidal power stations and turbines and generators for tidal power generation
CO 4: To knowing about miscellaneous energy conversion systems and Global energy position and environmental effects.
CO 5: To understand about Types of fuel cells, Batteries, Environmental effects of energy conversion systems, pollution free energy systems.

(A31205) POWER CONVERTERS LAB

At the end of the course, the student should be able to
CO 1: Know the speed control strategies of AC and DC drives.
CO 2: Design speed, current controllers for AC and DC drives.
CO 3: Perform the open loop and closed loop speed control analysis of AC and DC drives.
CO 4: Design the gate driver circuits for converter topologies
CO 5: Know the complete study of advanced converter technologies.

I YEAR II SEMESTER

(A32023) POWER ELECTRONIC CONVERTERS – II

CO 1: To construct the various PWM inverter and their improvements in output waveforms; comparison of PWM techniques, harmonic techniques
CO 2: To know the operation of different resonant pulse inverters frequency response of series and parallel inverters, ZCS, ZVS converters comparisons
CO 3: To analyze the operation of multilevel inverters classifications, applications and their comparisons
CO 4: To know operation of dc power supplies its classifications and their applications
CO 5: To analyze the ac power supplies, their classification, multi stage converter, ups, applications.

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(A32024) NEURAL NETWORKS AND FUZZY SYSTEMS

CO 1: To know about biological neuron, artificial neural networks, type of artificial neurons and learning rules.
CO 2: To know about architecture of artificial neural networks and learning methods of architecture of artificial neural networks.
CO 3: To know about maxnet, Hamming Networks, Hopfield networks, recurrent, bidirectional associative memory, art architecture and fuzzy system, fuzzy and neural estimations.
CO 4: To know about classical measures of uncertainty and knowledge base de fuzzy fications.
CO 5: To know about different applications of neural system and fuzzy system.

(A32025) POWER ELECTRONIC CONTROL OF AC DRIVES

After taking this course, students will be able to
CO 1: Demonstrate an ability to introduce the induction motor characteristics.
CO 2: Develop an ability to apply vector analysis to calculate slip regulation and efficiency of stator side induction motor control.
CO 3: Develop an ability to apply vector analysis of induction motor drives referred to rotor side.
CO 4: Analysis of control strategies of a synchronous motor drives.
CO 5: Analysis of variable reluctance motor drive and BLDC motor drive.

ELECTIVE – III
(A32026) POWER QUALITY

CO 1: By studying this, student gets knowledge on power quality problems.
CO 2: To analyze remedies to improve power quality and voltage sag calculations.
CO 3: To know power quality considerations in power systems.
CO 4: To also get knowledge on mitigation techniques of interruptions.
CO 5: To analyze voltage sag and IEC standards.

(A32027) ADVANCED DIGITAL SIGNAL PROCESSING

CO 1: Analyze and process signals in the discrete domain
CO 2: Design filters to suit specific requirements for specific applications
CO 3: Perform statistical analysis and inferences on various types of signals
CO 4: Design multi rate signal processing of signals through systems.
CO 5: Analyze binary fixed point and floating-point representation of numbers and arithmetic operations

ELECTIVE – IV
(A32028) FLEXIBLE AC TRANSMISSION SYSTEMS

Upon the completion of the subject, the student will be able to
CO 1: To know about the basic concepts of FACTS devices and its types, benefits.
CO 2: To analyze the concept of voltage source converters, current source converters, and their applications.
CO 3: To know the objectives of shunt compensation, power oscillation damping and controllable VAR generation.

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CO 4: Able to know how to improve system performance by using static shunt compensators such as SVS and STATCOM.
CO 5: To know about the improvement in the system performance using static series compensator.

(A32029) HIGH-FREQUENCY MAGNETIC COMPONENTS

CO 1: Design of magnetic components (i.e., inductor and transformer) in a converter, Steady-state analysis of switched mode power supply.
CO 2: Describes core loss in an electromagnetic device and its effect.
CO 3: Describe the engineering uses of electromagnetic waves, by frequency band, and the respective hazards associated with them.

(A32030) DYNAMICS OF ELECTRICAL MACHINES

After taking this course, the student will be able to
CO 1: Understand the basic mathematical analysis of electrical machines and its characteristics.
CO 2: Understand behavior of electrical machines under steady state and transient state.
CO 3: Understand dynamic modeling of electrical machines.

OPEN ELECTIVE – II

(A32031) SMART GRID TECHNOLOGIES

Upon the completion of the subject, the student will be able to
CO 1: Recite the structure of an electricity market in either regulated or deregulated market conditions.
CO 2: Understand the advantages of DC distribution and developing technologies in distribution.
CO 3: Discriminate the trade-off between economics and reliability of an electric power system.
CO 4: Differentiate various investment options (e.g. generation capacities, transmission, renewable, demand-side resources, etc) in electricity markets.
CO 5: Analyze the development of smart and intelligent domestic systems.

(A32032) AI TECHNIQUES IN ELECTRICAL ENGINEERING

CO 1: To get knowledge on basics of neural networks, types of neural networks and learning methods of neural networks.
CO 2: To get knowledge on back propagations algorithm, radial basic functions networks and hoped networks.
CO 3: To get knowledge on basic fuzzy systems, properties and operations of fuzzy sets and fuzzification and defuzzification methods.
CO 4: To get knowledge on genetic algorithm, genetic operators and generations cycle convergence of genetic algorithm.
CO 5: To get knowledge on applications of AI techniques like load forecasting, load flow studies, load frequency control, speed control of dc and ac motors etc.

(A32033) RELIABILITY ENGINEERING

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CO 1: Apply fundamental knowledge of Reliability to modeling and analysis of series-Parallel and Non-series parallel systems.
CO 2: Solve some practical problems related with Generation, Transmission and Utilization of Electrical Energy.

CO 3: Understand or become aware of various failures, causes of failures and remedies for failures in practical systems.

(A32205) ELECTRICAL SYSTEMS SIMULATION LAB

Upon the completion of this course, the student will be able to
CO 1: Acquire knowledge about potential software used in electrical engineering.
CO 2: Choose and simulate any problem related to Power Electronics and allied fields using appropriate software.
CO 3: Validate the obtained results and maintain the record.

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ANURAG
ENGINEERING ENGINEERS

B.TECH.

MECHANICAL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	To transcend in professional career by acquiring knowledge in basic sciences, mathematics and mechanical engineering.
PEO II	:	To exhibit problem solving skills on par with global requirements in industry and R&D.
PEO III	:	To adopt latest technologies, evolve as entrepreneurs, solving mechanical engineering problems, dealing environmental society and ethical issues.
PEO IV	:	Ability to involve actively in multidisciplinary teams and lifelong learning.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	Problem Solving Skills: Ability identifies, analyze and solve engineering problems relating to mechanical engineering system together with allied engineering streams.
PSO 2	:	Professional Skills: Ability to use the software effectively in the design, analysis and manufacturing of mechanical components and systems.
PSO 3	:	Successful Career and Entrepreneurship Skills: An ability of collaborative learning to find out cost-effective, optimal solution, sustainable growth

PROGRAM OUTCOMES		
PO 1:	:	An ability to apply the knowledge of mathematics, science and engineering fundamentals.

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PO 2	:	An ability to conduct Investigations using design of experiments, analysis and interpretation of data to arrive at valid conclusions
PO 3	:	An ability to design mechanical engineering components and processes within economic, environmental, ethical and manufacturability constraints.
PO 4	:	An ability to function effectively in multidisciplinary teams.
PO 5	:	An ability to identify, formulates, analyze and solve Mechanical Engineering problems.
PO 6	:	An ability to understand professional, ethical and social responsibility.
PO 7	:	An ability to communicate effectively through written reports or oral presentations.
PO 8	:	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
PO 9	:	An ability to recognize the need and to engage in independent and life-long learning.
PO 10	:	A knowledge of contemporary issues.
PO 11	:	An ability to use the appropriate techniques and modern engineering tools necessary for engineering practice.

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ENGINEERING ENGINEERS

B.TECH.

MECHANICAL ENGINEERING

R18 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA101BS	Mathematics - I	BS	3	1	0	4	25	75	100
2	CH102BS	Engineering Chemistry	BS	3	1	0	4	25	75	100
3	EN103HS	English	HS	2	0	0	2	25	75	100
4	CS104ES	Programming for Problem Solving - I	ES	2	0	0	2	25	75	100
5	CH105BS	Engineering Chemistry Lab	BS	0	0	3	1.5	25	75	100
6	EN106HS	English Language Communication Skills Lab – I	HS	0	0	2	1	25	75	100
7	CS107ES	Programming for Problem Solving - I Lab	ES	0	0	2	1	25	75	100
8	ME108ES	Engineering Workshop	ES	0	0	3	1.5	25	75	100
Total				**10**	**2**	**10**	**17**	**200**	**600**	**800**

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C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA201BS	Mathematics - II	BS	3	1	0	4	25	75	100
2	PH202BS	Engineering Physics	BS	3	1	0	4	25	75	100
3	ME203ES	Engineering Mechanics	ES	3	1	0	4	25	75	100
4	CS204ES	Programming for Problem Solving - II	ES	2	0	0	2	25	75	100
5	ME205ES	Engineering Graphics	ES	1	0	4	3	25	75	100
6	PH206BS	Engineering Physics Lab	BS	0	0	3	1.5	25	75	100
7	CS207ES	Programming for Problem Solving - II Lab	ES	0	0	3	1.5	25	75	100
8	EN208HS	English Language Communication Skills Lab - II	HS	0	0	2	1	25	75	100
Total				**12**	**3**	**12**	**21**	**200**	**600**	**800**

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II YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	AM301BS	Numerical Methods &Partial Differential Equations	BS	3	0	0	3	25	75	100
2	ES302BS	Environmental Sciences	BS	3	0	0	3	25	75	100
3	ME303ES	Metallurgy and Material Science	ES	3	0	0	3	25	75	100
4	EE304ES	Basic Electrical and Electronics Engineering	ES	3	0	0	3	25	75	100
5	ME305PC	Mechanics of Solids	PC	3	1	0	4	25	75	100
6	ME306PC	Thermodynamics	PC	3	0	0	3	25	75	100
7	ME307ES	Metallurgy and Mechanics of Solids Lab	ES	0	0	2	1	25	75	100
8	ME308PC	Basic CAD Lab	PC	0	0	2	1	25	75	100
9	HS309MC	Gender Sensitization	MC	0	0	2	0	100	0	100
Total				**18**	**1**	**6**	**21**	**300**	**600**	**900**

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II YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	PS401BS	Probability and Statics	BS	3	0	0	3	25	75	100
2	ME402PC	Kinematics of Machinery	PC	3	0	0	3	25	75	100
3	ME403PC	Production Technology	PC	3	0	0	3	25	75	100
4	ME404PC	Thermal Engineering-I	PC	3	0	0	3	25	75	100
5	ME405PC	Mechanics of Fluids and Hydraulic Machines	PC	3	0	0	3	25	75	100
6	ME406PC	Machine Drawing	PC	3	0	0	3	25	75	100
7	ME407PC	Mechanics of Fluids and Hydraulic Machines Lab	PC	0	0	2	1	25	75	100
8	ME408PC	Production Technology Lab	PC	0	0	2	1	25	75	100
9	HS409MC	Human Values and Professional Ethics	MC	0	0	2	0	100	0	100
Total				**18**	**0**	**6**	**20**	**300**	**600**	**900**

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III YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	AE501HS	Managerial Economics and Financial Analysis	HS	3	0	0	3	25	75	100
2	ME502PC	Dynamics of Machinery	PC	3	1	0	4	25	75	100
3	ME503PC	Machine Tools & Metrology	PC	3	0	0	3	25	75	100
4	ME504PC	Design Of Machine Members-I	PC	3	0	0	3	25	75	100
5	ME505PC	Thermal Engineering-II	PC	3	0	0	3	25	75	100
6	PROFESSIONAL ELECTIVE-I		PE	3	0	0	3	25	75	100
7	ME506PC	Machine Tools & Metrology Lab	PC	0	0	2	1	25	75	100
8	ME507PC	Thermal Engineering Lab	PC	0	0	2	1	25	75	100
9	HS508MC	Constitution of India	MC	0	0	2	0	100	0	100
Total				**18**	**1**	**6**	**21**	**300**	**600**	**900**

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III YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	IM601HS	Industrial Management	HS	3	0	0	3	25	75	100
2	ME602PC	Heat Transfer	PC	3	1	0	4	25	75	100
3	ME603PC	Design Of Machine Members-II	PC	3	0	0	3	25	75	100
4	ME604PC	Operations Research	PC	3	0	0	3	25	75	100
5	PROFESSIONAL ELECTIVE - II		PE	3	0	0	3	25	75	100
6	OPEN ELECTIVE-I		OE	3	0	0	3	25	75	100
7	EN605HS/ EN505HS	Advanced English Communication Skills Lab	HS	0	0	2	1	25	75	100
8	ME606PC	Heat Transfer lab	PC	0	0	2	1	25	75	100
9	HS607MC	Intellectual Property Rights	MC	0	0	2	0	100	0	100
Total				**18**	**1**	**6**	**21**	**300**	**600**	**900**

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IV YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	ME701PC	CAD/CAM	PC	3	0	0	3	25	75	100
2	ME702PC	Instrumentation and Control Systems	PC	3	0	0	3	25	75	100
3	PROFESSIONAL ELECTIVE - III		PE	3	0	0	3	25	75	100
4	PROFESSIONAL ELECTIVE - IV		PE	3	0	0	3	25	75	100
5	OPEN ELECTIVE - II		OE	3	0	0	3	25	75	100
6	ME703PC	Advanced CAD/CAM Lab	PC	0	0	2	1	25	75	100
7	ME704PW	Mini Project Evaluation	PW	0	0	4	2	25	75	100
8	ME705PW	Project Stage-I	PW	0	0	8	4	100	0	100
Total				**15**	**0**	**14**	**22**	**275**	**525**	**800**

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IV YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	PROFESSIONAL ELECTIVE - V		PE	3	0	0	3	25	75	100
2	PROFESSIONAL ELECTIVE - VI		PE	3	0	0	3	25	75	100
3	OPEN ELECTIVE - III		OE	3	0	0	3	25	75	100
4	CE801PW	SEMINAR	PW	0	0	4	2	100	0	100
5	CE802PW	PROJECT STAGE-II	PW	0	0	12	6	25	75	100
Total				**9**	**0**	**16**	**17**	**200**	**300**	**500**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
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Professional Electives	Course codes	Subjects
Professional Elective -I	ME511PE	Automobile engineering
	ME512PE	Welding Technology
	ME513PE	Turbo Machinery
Professional Elective -II	ME621PE	Refrigeration & Air Conditioning
	ME622PE	Nano Technology
	ME623PE	Tribology
Professional Elective -III	ME731PE	Power Plant Engineering
	ME732PE	Introduction to Finite Element Methods
	ME733PE	Unconventional Machining Process
Professional Elective -IV	ME741PE	Automation in Manufacturing Systems
	ME742PE	Plant Layout &Material handling
	ME743PE	Computational Fluid Dynamics
Professional Elective -V	ME851PE	Industrial Robotics
	ME852PE	Mechatronics
	ME853PE	Composite Materials
Professional Elective -VI	ME861PE	Production planning and Control
	ME862PE	Mechanical vibrations
	ME863PE	Flexible Manufacturing Systems

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE611OE	Construction Materials	Civil Engineering
2	CE612OE	Waste Management	
3	EE611OE	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	EE612OE	Electrical Power Generation Systems	
5	ME611OE	Advanced Engineering Materials	Mechanical Engineering
6	ME612OE	Introduction to Automobile Engineering	
7	EC611OE	Principles of Communications	Electronics & Communication Engineering
8	EC612OE	Basic Electronic Circuits Simulation & Design	
9	CS611OE	Software Engineering	Computer Science & Engineering
10	CS612OE	Database Management Systems	

OPEN ELECTIVE- II			
S. No.	**Course Code**	**Name of the Course**	**Offering Department**
1	CE721OE	Disaster Management	Civil Engineering
2	CE722OE	Remote Sensing and Geographic Information System	
3	EE721OE	Maintenance of Electrical Systems	Electrical & Electronics Engineering
4	EE722OE	Renewable Energy Sources	
5	ME721OE	Fundamentals of Refrigeration & Air Conditioning	Mechanical Engineering
6	ME722OE	Industrial Robotics	
7	EC721OE	Principles of Signal Processing	Electronics & Communication Engineering
8	EC722OE	Nano Materials and Technology	
9	CS721OE	Object Oriented Analysis and Design	Computer Science & Engineering
10	CS722OE	Cyber Forensics	

OPEN ELECTIVE- III			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE831OE	Project Management	Civil Engineering
2	CE832OE	Safety Engineering	
3	EE831OE	Electrical Engineering Materials	Electrical & Electronics Engineering
4	EE832OE	Fuzzy Logic and its Applications	
5	ME831OE	Power Plant Engineering	Mechanical Engineering
6	ME832OE	Nano Technology	
7	EC831OE	Fundamentals of Embedded Systems	Electronics & Communication Engineering
8	EC832OE	Biometric Systems	
9	CS831OE	Software Project Management	Computer Science & Engineering
10	CS832OE	Human Computer Interaction	

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ANURAG
ENGINEERING ENGINEERS

B.TECH.

MECHANICAL ENGINEERING

R18 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(MA101BS) MATHEMATICS – I

CO 1: Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
CO 2: Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
CO 3: Analyze the convergence of sequence and series.
CO 4: Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
CO 5: Examine the extreme values of functions of two variables with / without constraints.

(CH102BS) ENGINEERING CHEMISTRY

CO 1: Apply the knowledge of atomic, molecular and electronic changes related to conductivity
CO 2: Analyze the troubles caused by impure water and method of purification of water.
CO 3: Apply the knowledge of electrode potentials for the protection of metals from corrosion.
CO 4: Explain the concept of configurationally and conformational analysis of molecules and reaction mechanism.
CO 5: Apply the knowledge of polymers in everyday's life.

(EN103HS) ENGLISH

CO 1: Get Inspiration and Motivation from Dr.C.V. Raman.
CO 2: Understanding ancient architecture of India.
CO 3: Know about Invention of Blue Jeans.
CO 4: Learn what type of diet to take and maintain good health.
CO 5: Understand the result of hard work and confidence.

(CS104ES) PROGRAMMING FOR PROBLEM SOLVING – I

CO 1: Design algorithms and flowcharts for real world applications
CO 2: Know the usage of various operators in Program development
CO 3: Design programs involving decision and iteration structures.
CO 4: Apply the concepts code reusability using Functions
CO 5: Analyze the concepts of Arrays and Strings for real world problems.

(CH105ES) ENGINEERING CHEMISTRY LAB

CO 1: Determination of parameters like hardness and alkalinity of water.
CO 2: Estimation of rate constant of a reaction from concentration – time relationships.
CO 3: Determination of physical properties like surface tension and viscosity.
CO 4: Calculation of strength of compound using instrumentation techniques.
CO 5: The impart Fundamental knowledge in handling the equipment/glassware and chemicals in chemical laboratory.

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(EN106HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

CO 1: Understand the importance of speech sounds and Listening Comprehension.
CO 2: Understand syllables and Consonant Clusters.
CO 3: Speak with appropriate Word Accent and Intonation.
CO 4: Learn to communicate effectively at work place with a special focus on social and professional etiquette.
CO 5: Learn Task Based Language Learning (TBLL) through various language activities effectively.

(CS107ES) PROGRAMMING FOR PROBLEM SOLVING LAB – I

CO 1: Formulate the algorithms and flowcharts for simple problems
CO 2: Apply fundamental programming concepts, to solve simple problems
CO 3: Enhance debugging skills
CO 4: Exercise conditional and iterative statements to Write C programs
CO 5: Modularize the code with functions so that they can be reused
CO 6: Represent and manipulate data with arrays and strings

(ME108ES) ENGINEERING WORKSHOP

CO 1: Practice on manufacturing of components using workshop trades includingCarpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring andBlack Smithy.
CO 2: Apply basic electrical engineering knowledge for house wiring practice.
CO 3: Identify and apply suitable tools for different trades of engineering processes including Material removing, measuring and chiseling.
CO 4: Study and practice on Plumbing, Machine tools, Power tools, Wood working, Plastic Molding and their operations
CO 5: Learn how to analyze products and be able to improve their manufacture ability and make the cost effectively.

I YEAR II SEMESTER

(MA201BS) MATHEMATICS – II

CO 1: Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
CO 2: Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
CO 3: Evaluate the multiple integrals.
CO 4: Identify the vector differential operators physically in engineering problems.
CO 5: Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

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(PH202BS) ENGINEERING PHYSICS

CO 1: Solve engineering problems using the concepts of wave and oscillations.
CO 2: Analyze the intensity variation of light due to interference, diffraction and polarization. Understand their applications in the field of engineering.
CO 3: Use the fundamental knowledge of crystallography to identify the crystal structure and defects in crystal.
CO 4: Understand the propagation of light through fiber optics in various communication fields and use of lasers as light sources for low and high energy applications.
CO 5: Classify magnetic and dielectric behavior of solids and test these materials for various applications

(ME203ES) ENGINEERING MECHANICS

CO 1: Solve the resultant of forces which are acting on the systems and also the Systems and able to apply the equilibrium conditions on a body.
CO 2: Solve the problems based on friction.
CO 3: Calculate the centroid and centre of gravity of composite sections.
CO 4: Solve the area and mass moment of inertia of simple and composite sections.
CO 5: Calculate the distance travelled and time required for the practice in case of Connected systems

(CS204ES) PROGRAMMING FOR PROBLEM SOLVING – II

CO 1: Develop programs with user defined data types.
CO 2: Use dynamic memory allocation functions with pointers.
CO 3: Apply various file handling techniques for better data management
CO 4: Distinguish between stacks and queues.
CO 5: Analyze various dynamic data structures.

(ME205ES) ENGINEERING GRAPHICS

CO 1: Understand engineering drawing and its place in society.
CO 2: Visualize the different aspects of Points, Lines and Planes.
CO 3: Acquire knowledge on projections of solids.
CO 4: Draw sections of solids and plan the drawing for development of surfaces.
CO 5: Understand the isometric views and projections. Exposure to computer-aided geometric design and creating working drawings.

(PH206BS)ENGINEERING PHYSICS LAB

CO 1: Apply the various procedures and techniques for the experiments.
CO 2: Use the different measuring devices and meters to record the data with precision.
CO 3: Test optical components using principles of interference and diffraction of light.
CO 4: Apply the mathematical concepts/equations to obtain quantitative results.
CO 5: Develop the basic communication through working in the groups and performing theLaboratory experiments and by interpreting the results.

(CS207ES)PROGRAMMING FOR PROBLEM SOLVING LAB – II

CO 1: Develop applications on user defined data types.
CO 2: Apply dynamic memory allocation through pointers.
CO 3: Use different data structures for create/update basic data files.

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CO 4: Implement linear data structures through stacks and queues.
CO 5: Implement various searching and sorting techniques, Linked lists.

(EN208HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB - II

CO 1: Understand the variants in Pronunciation.
CO 2: Differentiate Spoken and Written English in formal and informal situations
CO 3: Understand the emphasis on Pronunciation of English Language in the global world.
CO 4: Apply strategies for Effective Communication in different situations.
CO 5: Participate in conversation, Public Speaking and Group Discussion.

II YEAR ISEMESTER

(AM301BS)NUMERICAL METHODS & PARTIAL DIFFERENTIAL EQUATIONS

CO 1: Determination of roots of an equation and calculate some simple methods of obtainingapproximate roots of algebraic and transcendental equation and Interpolate the values using the techniques of Newton's forward and backward, Gauss forward and backward,Lagrange's and spline interpolations.
CO 2: Evaluate Numerical differentiation and Numerical integration
CO 3: Able to solve first order equation using numerical techniques.
CO 4: Evaluate the sol of PDE.
CO 5: Evaluate the Solution of Second order partial differential equation and Able to solve onedimensional wave and heat equations.

(ES302BS)ENVIRONMENTAL SCIENCES

CO 1: The multidisciplinary nature of environment, essence of environment, biodiversity and its Conservation
CO 2: About the natural resources and their protection
CO 3: About the causes and effects of environmental pollution as well as environmental issues
CO 4: About the management of environmental wastes, disasters and rules, regulations, policies For the protection of environment
CO 5: About the natural functioning of ecosystems

(ME303ES) METALLURGY AND MATERIAL SCIENCE

CO 1: Acquire an understanding of the main concepts related to the structure and properties of Materials.
CO 2: Understand about phase rules and Iron-Iron Carbon equilibrium diagram, TTT diagrams.
CO 3: Understand the basic concepts of Heat treatment processes.
CO 4: Understand the micro structure of ferrous and non-ferrous materials.
CO 5: Understand the basic methods of manufacturing various types of composite materials.

(EE304ES) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

CO 1: Introduction of Electrical Elements, Electrical circuits and applications of KVL, KCL, and Ohm's Law,
CO 2: DC machines and their applications.

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CO 3: AC machines and their applications.
CO 4: Electronic devices like Diode, Transistors and their applications.
CO 5: Working principle of CRO and its internal parts.

(ME305PC)MECHANICS OF SOLIDS

CO 1: Calculate stress, strain, and deformation for basic geometries subjected to axial loading and thermal effects.
CO 2: Calculate bending and shear stresses from shear force and bending moment diagram for Cantilever, simply supported and over hanging beams of transverse loading.
CO 3: Calculate shear stresses for torsional loading and identify the location of shear centers for the various sections of beams.
CO 4: Calculate analytically and graphically (Mohr's Circle) the maximum and minimum normal and shear stresses and the orientations at which they occur for an arbitrary two-dimensional stress/strain state for combined loading conditions.
CO 5: Calculate Circumferential Stress, Longitudinal And Volumetric Strain.

(ME306PC)THERMODYNAMICS

CO 1: Understand The Fundamentals Of Thermodynamics.
CO 2: Apply mass and energy balances (First Law) to a variety of simple processes.
CO 3: Determine the properties of a pure substance using thermodynamic tables.
CO 4: Analyze Rankine's ideal power cycle.
CO 5: Analyze and apply knowledge on power cycle.

(ME307ES)METALLURGY AND MECHANICS OF SOLIDS LAB

CO 1: Analyze the behavior of the solid bodies subjected to various types of loading.
CO 2: Apply knowledge of materials and structural elements to the analysis of simple structures.
CO 3: Undertake problem identification, formulation and solution using a range of analytical methods.
CO 4: Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.
CO 5: Expectation and capacity to undertake lifelong learning.

(ME308PC)BASIC CAD LAB

CO 1: To get Practice on Draw and Modify Commands.
CO 2: To get practice on dimensioning commands.
CO 3: To get practice on Text commands.
CO 4: To get practice on Layers.
CO 5: Develop the Engineering Orthographic and isometric views.

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(HS309MC)GENDER SENSITIZATION (MANDATORY COURSE)

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.

CO 2: Students will be sensitized to basic dimensions of the biological, sociological, Psychological and legal aspects of gender. This will be achieved through discussion of materials from research, facts, everyday life, literature and film.

CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.

CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.

CO 5: Men and women students and professions a will be better equipped to work and live together as equals.

II YEAR IISEMESTER

(PS401BS) PROBABILITY AND STATISTICS

CO 1: Students would be able to identify distribution in certain realistic situation.

CO 2: It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables involved in the probability models. It is quite useful for all branches of engineering.

CO 3: The student would be able to calculate mean and proportions (small and large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations .It is Mainly useful for non-circuit branches of engineering.

CO 4: The student would able to understand about the random process, Markov process and Markov chains which essentially models of many time dependent processes are such as signals in communications, time series analysis, queuing systems.

CO 5: The student would be able to find the limiting probabilities and the probabilities in nth state. It is quite useful for all branches of engineering.

(ME402PC)KINEMATICS OF MACHINERY

CO 1: Analyze different mechanisms and machines.

CO 2: Calculate position, velocity, and acceleration of linkages.

CO 3: Develop the cam profiles. Calculate velocity, and acceleration of follower.

CO 4: Calculate the length of path of contact, length of arc of contact, contact ratio, no of teeth's required to avoid interference and speed.

CO 5: Calculate the velocity ratio and know the concept of belt, rope & chain drives.

(ME403PC)PRODUCTION TECHNOLOGY

CO 1: Select materials, types and allowances of patterns used in casting and analyze the components of moulds.

CO 2: Illustrate principles of advanced casting processes.

CO 3: Demonstrate applications of various types of welding processes.

CO 4: Principle of concept of metal forming and metal working process.

CO 5: Illustrate the concept of extrusion process and producing plastic components.

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(ME404PC)THERMAL ENGINEERING – I

CO 1: Analyze air standard cycles used in I.C. Engines.
CO 2: Understand the combustion phenomena in I.C.Engines.
CO 3: Analyze the performance of I.C engines.
CO 4: Understand the Concept About Reciprocating And Rotary Compressors.
CO 5: Understand the Concept About Centrifugal And Axial Compressors

(ME405PC)MECHANICS OF FLUIDS AND HYDRAULIC MACHINES

CO 1: Understand the Importance of fluid Mechanic, and behavior fluids Dimensions and units, physical properties of fluids, types of fluid flows, Stream line, path line and streak lines and stream tube, classification of flows.
CO 2: Understand types of losses and measurement of fluid flows.
CO 3: Apply the momentum principles for impact of jets.
CO 4: Analyze the hydraulic pumps.
CO 5: Analyze the hydraulic turbines.

(ME406BS)MACHINE DRAWING

CO 1: Identify the national and international standards pertaining to machine drawing.
CO 2: Draw the conventional representation for screws, nuts, and bolts, keys, gears, webs and ribs.
CO 3: Draw the machine elements for riveted joints and bearings.
CO 4: Draw the machine elements for couplings and pipe joints.
CO 5: Draw the assembly drawing for the machine parts.

(ME407PC)MECHANICS OF FLUIDS AND HYDRAULIC MACHINES LAB

After completion of this course the students will be able to:

CO 1: Understand the basic concept of types of pumps and study their performance.

CO 2: Analyze the impact of fluid jet on structure of vanes.

CO 3: Study the types of turbines and their overall efficiency.

CO 4: Study the losses in pipes due to different pipe fittings.

CO5: Measure fluid flow rates using flow measuring devices.

(ME408PC)PRODUCTION TECHNOLOGY LAB

CO 1: Apply some of the manufactures process directly in the industry for preparation of complicated jobs.
CO 2: At the end of the lab learn preparation of various joining process.
CO 3: The student will be trained to implement similar features in preparation of jobs can be extended to implement in the preparation of complicated jobs.
CO 4: At the end lab student should learn strength of metals.
CO 5: Apply some of the plastic material manufactures product

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(HS409MC) HUMAN VALUES AND PROFESSIONAL ETHICS (MANDATORY COURSE)

After completion of the course the student is able to:

CO 1: Understood the core values that shape the ethical behavior of an Engineer.
CO 2: Exposed awareness on professional ethics and human values.
CO 3: An ability to communicate effectively.
CO 4: Known their role in technological development.
CO 5: An understanding of professional and ethical responsibility.

III YEAR I SEMESTER

(AE501HS)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

CO 1: The market dynamics namely demand, demand forecasting, elasticity of demand.
CO 2: Gain an insight in to how production function is carried out to achieve least cost combination of inputs and cost analysis.
CO 3: Know the types of markets and pricing methods and Strategies.
CO 4: Analyze how capital budgeting decisions are carried out.
CO 5: The importance of Accounting and know How to analyze and Interpret the Financial statements through Ratio Analysis

(ME502PC)DYNAMICS OF MACHINERY

CO 1: Attain a deeper understanding on the gyroscopic effects of rotating bodies for aero- Planes, naval ships, automobiles, and two wheelers.
CO 2: To gain the knowledge on the Brakes and Clutches.
CO 3: Analyze different types of governors which controls speed of the machine or engine
CO 4: Understand how to balance several masses in different planes along with rotating and reciprocating masses.
CO 5: Analyze the response of the vibrating mass at different operating conditions Calculate Natural frequencies for different modes of vibrations for transverse and TorsionalLoading conditions.

(ME503PC)MACHINE TOOLS AND METROLOGY

CO 1: Hands on experience on lathe machine to perform turning, facing, threading operations.
CO 2: Skill development in drilling threading and slotting, shaping operations.
CO 3: Practical exposure on flat surface machining, milling and grinding operations.
CO 4: Get acquainted with limits, tolerances and gauge design and understand the principles Of Linear and angular measuring instruments.
CO 5: Understand the surface roughness terminology and types of various surface roughness Measuring instruments and Coordinate Measuring Machines.

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(ME504PC)DESIGN OF MACHINE MEMBERS-I

CO 1: Understand the design process, properties of materials and machining considerationsin design and able calibrate the stresses in machine members.
CO 2: They are able to know the component behavior subjected to fluctuating loads.
CO 3: Analyze the Design of riveted joints and Bolted joints.
CO 4: They can understand the design of keys, cotters and also the design of knuckle joints.
CO 5: Students are able to know the Design of Shafts and Shaft couplings.

(ME505PC)THERMAL ENGINEERING – II

CO 1: Student shall be able to know the basic concepts of Rankine cycles and methods to Improve the performance.
CO 2: Shall acquire knowledge on principles of working accessories and safety features of steam Generators.
CO 3: Shall acquire knowledge on stream flow through varying areas and capable of solving related problems and to understand functioning of steam condenser.
CO 4: To be able to determine the efficiency of the impulse and reaction turbine using velocity Triangles.
CO 5: Analyze gas turbines cycles and compare the operational aspects of jet engines.

PROFESSIONAL ELECTIVE - I
(ME511PE) AUTOMOBILE ENGINEERING

CO 1: Analyze the basic lay-out of automobile and modern trends, working and other details about I.C Engines used in automobiles.
CO 2: To gain the knowledge on working of ignition, generating and air-conditioning systems.
CO 3: Understand how the transmission system works and the working knowledge of various Components in transmission system.
CO 4: Students will able to explain working principle of various parts of automobile such as axles, Wheels, tires and steering system.
CO 5: Understand the various braking systems and pollution standards and its significance.

(ME512PE)WELDING TECHNOLOGY

CO 1: Understand the different types of welding process.
CO 2: Understand the operation of FSW, EBW, and LBW.
CO 3: Understand the principles of various surface hardness techniques.
CO 4: Understand the ability of cast iron and steel.
CO 5: Understand the principles of various welding Techniques.

(ME513PE)TURBO MACHINERY

CO 1: Basic understanding of IC engine working and thermodynamics in association with turbo Machinery.
CO 2: Analyze Performance of Internal Combustion Engines.
CO 3: Analyze Compressors and Steam Nozzles for energy transfer.
CO 4: Understanding of Refrigeration cycles and cooling effects.

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CO 5: Design and performance evaluation of air-conditioning and heat recovery systems.

(ME506PC) MACHINE TOOLS AND METROLOGY LAB

CO 1: Get knowledge on hand tools, equipments and machines.
CO 2: Get knowledge on the mechanisms of all the machine tools.
CO 3: Get Practical exposure on milling, grinding and slotter operations.
CO 4: Get knowledge procedure for setting the given object to a required angle using sine bar.
CO 5: Use different measuring instruments towards quality control.

(ME507PC)THERMAL ENGINEERING LAB

CO 1: Measure the thermal properties of different fuels.
CO 2: Analyze the properties of various fuels and emission standards.
CO 3: Determine the efficiency of compressor and blower.
CO 4: Analyze the performance and determine the operating characteristics of I.C engines [2-stroke, 4-stroke, petrol, Diesel] using rope brake, hydraulic and, electrical dynamometers.
CO 5: Draw the valve and port timing diagrams of two and four stroke engines.

(HS508MC) CONSTITUTION OF INDIA (MANDATORY COURSE)

CO 1: Understand the meaning and historical perspective of constitution of India.
CO 2: Knows fundamental rights of Indian citizen.
CO 3: Know structure, rights of federal and legislative bodies.
CO 4: President and parliament powers given by constitution.
CO 5: Know the local bodies rights and limitations.

III YEAR II SEMESTER

(IM601HS)INDUSTRIAL MANAGEMENT

CO 1: About management functions, theories and Organizational structures.
CO 2: About Production methods, Techniques under quality control and inventory control.
CO 3: About functions & importance of HRM, Marketing functions and product life cycle.
CO 4: About techniques in Networking for time required to complete the project.
CO 5: About Corporate strategy implementation methods and other few contemporary management practices.

(ME602PC)HEAT TRANSFER

CO 1: Formulate heat conduction problems in rectangular, cylindrical and spherical coordinate System, by transforming the physical system into a mathematical model.
CO 2: Familiarize with time dependent heat transfer.
CO 3: Compute convective heat transfer coefficients in forced convection for external flows.
CO 4: Know the design fundamentals of heat transfer coefficients in natural

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Flows and heat exchangers, which include the LMTD and ε-NTU approaches.

CO 5: Understand the fundamental mechanism involved in boiling and condensation and radiation Heat between black and non-black bodies.

(ME603PC)DESIGN OF MACHINE MEMBERS – II

CO 1: To apply the design principles for the design of various engine parts

CO 2: Estimate the life of rolling element bearings and their selection for given service conditions.

CO 3: Acquaintance with design of the components as per the standard, recommended Procedures which is essential in design and development of machinery in industry.

CO 4: Understand the design of springs, Belt & pulleys.

CO 5: Understand the design of Gears with design parameters.

(ME604PC)OPERATIONS RESEARCH

CO 1: Identify and develop O.R models from the verbal description of the real system.

CO 2: Understand the mathematical tools to solve assignment, transportations and travelling Salesman problem.

CO 3: Able to calculate the Total Elapsed Time and idle time for different machines and minimize the cost.

CO 4: Able to calculate saddle point of games and Able to solve Inventory models.

CO 5: Calculate service time for different models and able to apply dynamic programming and Able to know the advantages and disadvantages of simulation.

PROFESSIONAL ELECTIVE-II

(ME621PE) REFRIGERATION AND AIR CONDITIONING

CO 1: Ability to understand various refrigeration systems.

CO 2: Ability to understand the operation of various devices of VCR system.

CO 3: Ability to demonstrate the working of refrigeration equipment.

CO 4: Ability to understand various psychometric processes.

CO 5: Ability to explain the air-conditioning equipment and heat pump circuits.

(ME622PE) NANO TECHNOLOGY

CO 1: Apply engineering and physics concepts to the nano-scale and non-continuum domain.

CO 2: Understand Carbon Nano Tubes structures and manufacturing process.

CO 3: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of nano materials.

CO 4: Understand the principles and microelectronics fabrication.

CO 5: Understand the concept of Convective Heat Transfer in Nano fluids.

(ME623) TRIBOLOGY

CO 1: Understanding friction characteristics in journal bearings.

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CO 2: Knowledge about different theories of lubrication to reduce friction and wear.
CO 3: Knowledge about Materials which is used in bearings.
CO 4: Understanding the concepts of boundary friction and dry friction.
CO 5: Understanding friction characteristics and power losses in journal bearings.

OPEN ELECTIVE-I

(CE611OE) CONSTRUCTION MATERIALS (CE)

CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
CO 4: Students are Gain About Basic Knowledge on Timber and Other Materials
CO 5: Students are get knowledge on Modern construction materials.

(CE612OE) WASTE MANAGEMENT (CE)

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.
CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.
CO 3: Understand the working procedure in various industries sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.
CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.
CO 5: Understand the waste disposal methods and requirement of treatment plants.

(EE611OE)SOLAR PHOTOVOLTAIC SYSTEMS (EEE)

CO 1: Understand the basics of solar energy and its geometry.
CO 2: Analyze the various topologies of solar photovoltaic cells.
CO 3: Understand the protection and measurement of solar photovoltaic system.
CO 4: Understand the design considerations of solar photovoltaic system.
CO 5: Analyze the various maximum power point tracking techniques.

(EE612OE) ELECTRICAL POWER GENERATION SYSTEMS (EEE)

CO 1: Understand the electrical power generation process from Thermal and Nuclear power stations.
CO 2: Analyze the electrical power generation from Hydro and Gas power stations.
CO 3: Analyze the electrical power generation by using solar energy.
CO 4: Understand the electrical power generation from wind energy & biomass energy.
CO 5: Know the working of fuel cells and ocean energy conversion.

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(ME611OE) ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of Advanced materials
CO 2: Understand the basic concepts of ferrous and nonferrous metals and alloys.
CO 3: Understand the ceramics and composite materials
CO 4: To understand the application of super alloys and intermetallic
CO 5: Understand the basic methods of manufacturing various types of composite materials.

(ME612OE) INTRODUCTION TO AUTOMOBILE ENGINEERING (ME)

CO 1: Analyze the basic lay-out of automobile, working and other details about I.C Engines used in automobiles.
CO 2: To gain the knowledge on working of ignition, Electrical systems.
CO 3: Understand how the transmission system works and the working knowledge of various Components in transmission system.
CO 4: Students will able to explain working principle of various parts of automobile such as axles, steering system and Suspension System.
CO 5: Understand the various braking systems and pollution standards and its significance.

(EC611OE) PRINCIPLES OF COMMUNICATIONS (ECE)

CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.

(EC612OE) BASIC ELECTRONC CIRCUITS SIMULATION & DESIGN (ECE)

CO 1: Describe circuits for PSpice simulation.
CO 2: Understand the types of dc - ac and their output variables analysis
CO 3: Understand the response of Transient analysis and obtain their output variables.
CO 4: Students can able to analyze and develop simulation circuit for different applications.

(CS504PC/CS611OE) SOFTWARE ENGINEERING (CSE)

CO 1: Apply software engineering principles and techniques.
CO 2: Analyze software system requirements.
CO 3: Produce efficient, reliable, robust and cost-effective software solutions.
CO 4: Apply testing strategies.
CO 5: Ensure good quality software.

(CS406PC/CS612OE) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Design Entity- Relationship Model for enterprise leveldatabases.
CO 2: Develop the database and provide restricted access to different users of database and formulate the Complex SQLqueries.
CO 3: Analyze various Relational Formal Query Languages and various Normal forms to carry out Schemarefinement
CO 4: Use of suitable Indices and Hashing mechanisms for real timeimplementation.

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CO 5: Analyze various concurrency control protocols and working principles of recovery algorithms.

(EN605HS)ADVANCED ENGLISH COMMUNICATION SKILLS LAB

CO 1: Understand the importance of vocabulary and using in real life situations.
CO 2: Apply reading strategies to enhance reading comprehension skills.
CO 3: Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.
CO 4: Develop presentation skills to apply in professional life.
CO 5: Apply Techniques to clear group discussions and Interviews.

(ME606PC)HEAT TRANSFER LAB

CO 1: Perform the steady state conduction experiments to estimate thermal conductivity of different materials
CO 2: Evaluate Perform of transient heat conduction experiment.
CO 3: Estimate heat transfer coefficients in forced convection, free convection, condensation and correlate with theoretical values
CO 4: Obtain variation of temperature along the length of the pin fin under forced and free Convection
CO 5: Perform the radiation experiment to Determine surface emissivity of a test plate and Stefan- Boltzmann's constant and compare with theoretical value

(HS607MC) INTELLECTUAL PROPERTY RIGHTS (MANDATORY COURSE)

After completion of the course the student will be able to

CO 1: Understand the fundamentals of intellectual properties and its agencies.
CO 2: Know the trade mark registration process and its rights.
CO 3: Understand the fundamentals of copy rights and patent law.
CO 4: Know the trade secret determination and protection.
CO 5: Know the recent developments in protection of intellectual property rights.

IV YEAR I SEMESTER

((ME701PC)CAD/CAM

CO 1: Understand geometric transformation techniques in CAD.
CO 2: Model engineering components using solid modeling techniques.
CO 3: Develop programs for CNC to manufacture industrial components.
CO 4: Understand the integrate various inspection methods with Computer Aided Design and Computer Aided Manufacturing.
CO 5: To understand the application of computers in various aspects of Manufacturing viz., Design, proper planning, Manufacturing cost, Layout & Material Handling system.

(ME702PC)INSTRUMENTATION & CONTROL SYSTEMS

CO 1: Understand the basic principles and performance characteristics of measurement.
CO 2: Apply the basic principles to measure the temperature, pressure with the help of Thermocouple and different pressure gauges.

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CO 3: Measure speed, flow and level with the help of various instruments.
CO 4: Understand the measurement of Acceleration, Vibration and Stress Strain.
CO 5: Understand the Measurement of Humidity, Force, Torque and measurement of power and Applications of various control Systems.

PROFESSIONAL ELECTIVE - III
(ME731PE) POWER PLANT ENGINEERING

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine and gas turbine power plant.
CO 3: To know the concept of hydroelectric power plant.
CO 4: To know the concept of nuclear power stations and non-conventional power sources.
CO 5: Understand the power plant economics and environmental considerations.

(ME732PE) INTRODUCTION TO FINITE ELEMENT METHODS

CO 1: Understand the Finite Element formulation procedure for structural problems.
CO 2: Able to evaluate field variables for members of 1-D bars.
CO 3: Able to evaluate field variables for Trusses, Beams using stiffness and shape function Equations.
CO 4: Familiar with triangular and quadrilateral elements and solve problems on numerical Integration Gaussian quadrature and axi symmetric elements.
CO 5: Formulate and Solve Simple Heat Transfer Problem and solve linear structural Problems.

(ME733PE)UNCONVENTIONAL MACHINING PROCESSES

CO 1: Student will identify the problem faced in traditional metal cutting and come to an Understanding of the need for the development of Unconventional machining processes.
CO 2: Gain the knowledge of basic mechanism of various Unconventional machining processes and related equipment, variables, advantages, disadvantages, applications.
CO 3: Given a set of physical, electrical and other parameters. Student can identify a suitableUnconventional machining process.
CO 4: Student will identify the different types of chemical removal process.
CO 5: Student will identify the different types of micro machining process.

PROFESSIONAL ELECTIVE - IV
(ME741PE)AUTOMATION IN MANUFACTURING

CO 1: Illustrate the basic concepts of automation in machine tools.
CO 2: Analyze various automated flow lines, Explain assembly systems and line balancing methods.
CO 3: Describe the importance of automated material handling and storage systems.

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CO 4: Knowledge about various components of automation like sensors, actuators, PLC.
CO 5: Interpret the importance of adaptive control systems, automated inspection systems.

(ME742PE)PLANT LAYOUT AND MATERIAL HANDLING

CO 1: Understand the basic concepts involved in different types of plant layouts and Computerized Layout Planning.
CO 2: Understand the basic concepts involved in Material Handling systems.
CO 3: Understand the basic concepts involved in Material Handling Oriented systems.
CO 4: Understand the basic concepts involved in methods to minimizing Material Handling Systems.
CO 5: Understand the basic concepts involved in Safety of Material Handling equipments.

(ME743PE) COMPUTATIONAL FLUID DYNAMICS

CO 1: The information about some techniques for numerical solutions for flow problems. These Equations are applicable to time and space marching solutions especially parabolic Hyperbolic and elliptic equations.
CO 2: How to discretize partial differential equations, including the governing flow equations which is the foundation for the finite difference method.
CO 3: Explicit and implicit approaches represent the fundamental distinction between various Numerical techniques.
CO 4: The fundamental principles of fluid mechanics, its governing differential equations and Boundary conditions.
CO 5: Understand and to appreciate the need for validation of numerical solution.

OPEN ELECTIVE-II

(CE721OE) DISASTER MANAGEMENT (CE)

CO 1: Application of different approaches, human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(CE511PE/CE722OE) REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM

(CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.

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CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(EE721OE) MAINTAINANCE OF ELECTRICAL SYSTEMS(EEE)

CO 1: Identify the Engineering materials, properties and applications.
CO 2: Test the domestic appliances.
CO 3: Know the use of UPS and SMPS and maintenance of power devices.
CO 4: Understand the maintenance of batteries, ups/inverter, motors and starters.
CO 5: Rescue a person met with Electric shock.

(EE722OE/ EE511PE) RENEWABLE ENERGY SOURCES (EEE)

CO 1: Learn the principles of solar radiation and collection of solar energy.
CO 2: Understand the various solar energy storage methods and solar applications.
CO 3: Analyze the Wind energy conversion and Biomass energy conversion.
CO 4: Analyze the geothermal energy conversion and ocean energy conversion.
CO 5: Analyze the various direct energy conversion devices.

(ME721OE) FUNDAMENTALS OF REFRIGERATION & AIR CONDITIOING (ME)

CO 1: Ability to understand various refrigeration systems.
CO 2: Ability to understand the operation of various devices of VCR system.
CO 3: Ability to demonstrate the working of refrigeration equipments.
CO 4: Ability to understand various psychometric processes.
CO 5: Ability to explain the air-conditioning equipment.

(ME722OE/ME851PE) INDUSTRIAL ROBOTICS(ME)

CO 1: Understand the basic components of Robots and differentiate types of robots and robot grippers.
CO 2: Model forward and inverse kinematics of robot manipulators.
CO 3: Analyze forces in links and joints of a robot.
CO 4: Programme a robot to perform tasks in industrial applications.
CO 5: Design intelligent robots using sensors.

(EC721OE) PRINCIPLES OF SIGNAL PROCESSING (ECE)

CO 1: Perform Fourier transform and Z transform analysis on signals and systems
CO 2: Understanding the inter-relationship between DFT and various transforms
CO 3: Understand the Discrete Fourier series and various transforms
CO 4: Ability to design various IIR digital filter structures
CO 5: Ability to design a digital FIR filter for a given specification.

(EC623PE/EC722OE) NANO MATERIALS AND TECHNOLOGY (ECE)

After completion of the course the student will be able to
CO 1: Understand the basic concepts of Nano technology.
CO 2: Understand the basic concepts of Nano materials
CO 3: Familiar with fabrication process of Nano Technology.
CO 4: Known the scaling and role of electrons in solids and Nanostructures.
CO 5: Understand the structures of Nan devices.

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(CS603PC/CS721OE)OBJECT ORIENTED ANALYSIS AND DESIGN (CSE)

CO 1: Demonstrate the concepts and principles of object oriented programming.
CO 2: Understand the purposes, major components and key mechanisms of Class and Object Diagram.
CO 3: Describe the basic resource management responsibilities of InteractionDiagram.
CO 4: Knowledge on State-chartDiagram.
CO 5: Applying the techniques for Component and Deployment Diagrams.

(CS722OE/CS862PE) CYBER FORENSICS (CSE)

CO 1: Understand the fundamentals of computer forensics and various forensic technologies used for a wide variety of investigations.
CO 2: Apply digital evidence controls.
CO 3: Identify current practices for processing crime and incident scenes.
CO 4: Apply various computer forensics tools to solve the computer forensic cases.
CO 5: Understand whole disk encryption, windows registry and virtual systems.

(ME703PC)ADVANCED CAD/CAM LAB

CO 1: Ability to develop 2D and 3D models using modeling Softwares.
CO 2: Modeling of simple machine parts and assemblies from the part drawing using Standard CAD packages.
CO 3: Ability to understand the basic principles of different types of analysis.
CO 4: Ability to understand CNC control in modern manufacturing system.
CO 5: Ability to prepare CNC part programming and perform manufacturing

IV YEAR II SEMESTER

PROFESSIONAL ELECTIVE-V
(ME851PC) INDUSTRIAL ROBOTICS

CO 1: At the end of the course, the student will be able to understand the basic components of robots and differentiate types of robots and robot
CO 2: Model forward and inverse kinematics of robot manipulators.
CO 3: Analyze forces in links and joints of a robot.
CO 4: Programme a robot to perform tasks in industrial applications.
CO 5: Design intelligent robots using sensors

(ME852PC)MECHATRONICS

CO 1: Model, analyze and control engineering systems.
CO 2: Identify sensors, transducers and actuators to monitor.
CO 3: Control the behavior of a process or product.
CO 4: Develop PLC programs for a given task.
CO 5: Evaluate the performance of mechatronic systems.

(ME853PC) COMPOSITE MATERIALS

CO 6: Provide knowledge on characteristics of composites.
CO 7: Get knowledge on manufacturing and testing methods and mechanical behavior of composites

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CO 8: Get the exposure of different properties of material.
CO 9: Understand the preparation of composite laminates.
CO 10: Provide knowledge on test procedure and failure theories of composite materials.

PROFESSIONAL ELECTIVE - VI
(ME861PE)PRODUCTION PLANNING AND CONTROL

CO 1: Understand production systems and their characteristics.
CO 2: Evaluate MRP and JIT systems against traditional inventory control systems.
CO 3: Understand basics of variability and its role in the performance of a production system and
CO 4: Analyze aggregate planning strategies.
CO 5: Apply forecasting and scheduling techniques to production systems.

(ME862PE) MECHANICAL VIBRATIONS

CO 1: Understand the causes and effects of vibration in mechanical systems.
CO 2: Develop schematic models for physical systems and formulate governing equations of motion.
CO 3: Understand the role of damping, stiffness and inertia in mechanical systems.
CO 4: Analyze rotating and reciprocating systems and compute critical speeds.
CO 5: Analyze and design machine supporting structures, vibration isolators and absorbers.

(ME863PE) FLEXIBLE MANUFACTURING SYSTEMS

CO 1: Understand FMS and job-shop and mass production manufacturing systems.
CO 2: Understand processing stations and material handling systems used in FMS environments.
CO 3: Design and analyze FMS using simulation and analytical techniques.
CO 4: Understand tool management in FMS.
CO 5: Analyze the production management problems in planning, loading, scheduling, routing and breakdown in a typical FMS.

OPEN ELECTIVE - III
(CE831OE) PROJECT MANAGEMENT (CE)

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
CO 2: Use the mechanized construction equipments at different situations or any hugeprojects
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management, estimation and project planning techniques
CO 5: Use the CPM – PERT Problems in project scheduling

(CE831OE) SAFETY ENGINEERING (CE)

CO 1: Know how to Handle and Protect the Machine and himself while working on it

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CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment
CO 3: Understand the knowledge of safety rules and regulations of working at construction industry
CO 4: Understand the knowledge about working at all stages in different heights at construction site
CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(EE831OE) ELECTRICAL ENGINEERING MATERIALS (EEE)

CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Understand the properties and importance of insulating and dielectric medium.
CO 3: Evaluate magnetic materials and their behavior.
CO 4: Evaluate semiconductor materials and technologies.
CO 5: Know the materials used in electrical engineering and applications.

(EE832OE) FUZZY LOGIC AND ITS APPLICATIONS (EEE)

CO 1: Operation and properties of crisp and fuzzy logic.
CO 2: Operation and properties of crisp relations and fuzzy relations.
CO 3: Laws and inference of classical propositional, predicate and fuzzy propositional logic.
CO 4: Membership value assignment.
CO 5: Methods of defuzzification and fuzzy rule based system.

(/ME731PE/ME831OE) POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine and gas turbine power plant.
CO 3: To know the concept of hydroelectric power plant.
CO 4: To know the concept of nuclear power stations and non-conventional power sources.
CO 5: Understand the power plant economics and environmental considerations.

(ME622PE/ME832OE) NANO TECHNOLOGY (ME)

CO 1: Apply engineering and physics concepts to the Nano-scale and non-continuum domain.
CO 2: Understand Carbon Nano Tubes structures and manufacturing process.
CO 3: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of Nano materials.
CO 4: Understand the principles and microelectronics fabrication.
CO 5: Understand the concept of Convective Heat Transfer in Nano fluids.

(EC831OE)FUNDAMENTALS OF EMBEDDED SYSTEMS (ECE)

CO 1: Summarize the different development tool for embedded system, features of advanced buses for distributed data transfer in system design.

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CO 2: Develop the different processors on hardware and software for the development of embedded system design.
CO 3: Contrast the basics of embedded system Firmware.
CO 4: Implement the concepts of RTOS in real timeprogramming
CO 5: Understand the development of distributed embedded system design.

(EC733PE/EC832OE)BIOMETRIC SYSTEMS (ECE)

CO 1: Understand differences between a biometric method and a biometric system.
CO 2: Organize and conduct biometric data collection processes.
CO 3: Understand the concepts of IRIS recognition.
CO 4: Understand the concepts of FACE recognition.
CO 5: Understand how to use biometric databases in system evaluation.

(CS853PE/CS831OE) SOFTWARE PROJECT MANAGEMENT (CSE)

CO 1: Apply the practice of project management in delivering of projects.
CO 2: Evaluate the project against strategic, technical and economic criteria.
CO 3: Identify effort estimation and activity plan of a project.
CO 4: Categorize and prioritize actions for risk management.
CO 5: Evaluate the characteristics of various team structures.

(CS511PE/CS832OE) HUMAN COMPUTER INTERACTION (CSE)

CO 1: Identify and formulate characteristics and components of graphical user interface.
CO 2: Apply an interactive design process and universal design principles to designing HCI systems
CO 3: Analyze&implement various design paradigms for human computer interaction.
CO 4: Apply the navigation schemes through window, device and screen based controls
CO 5: Use HCI in the software process.

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ENGINEERING ENGINEERS

B.TECH.

MECHANICAL ENGINEERING

R15 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A51001	English-I	HS	2	0	2	25	75	100
2	A51002	Mathematics-I	BS	3	1	3	25	75	100
3	A51003	Engineering Physics-I	BS	2	1	2	25	75	100
4	A51004	Applied Chemistry-I	BS	2	1	2	25	75	100
5	A51005	Computer Programming- I	ES	3	1	3	25	75	100
6	A51006	Engineering Graphics-I	ES	0	4	2	25	75	100
7	A51007	Engineering Mechanics-I	ES	2	1	2	25	75	100
8	A51209	Computer Programming Lab-I	ES	0	3	2	25	75	100
9	A51210	English Language Communication Skills Lab-I	HS	0	3	2	25	75	100
10	A51211	Engineering Physics and Applied Chemistry Lab-I	BS	0	3	2	25	75	100
11	A51212	Engineering Workshop-I	ES	0	3	2	25	75	100
Total				**14**	**21**	**24**	**275**	**825**	**1100**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A52001	English-II	HS	2	0	2	25	75	100
2	A52002	Mathematics-II	BS	3	1	3	25	75	100
3	A52003	Engineering Physics-II	BS	2	1	2	25	75	100
4	A52004	Applied Chemistry-II	BS	2	1	2	25	75	100
5	A52005	Computer Programming- II	ES	3	1	3	25	75	100
6	A52006	Engineering Graphics-II	ES	0	4	2	25	75	100
7	A52007	Engineering Mechanics- II	ES	2	1	2	25	75	100
8	A52209	Computer Programming Lab-II	ES	0	3	2	25	75	100
9	A52210	English Language Communication Skills Lab-II	HS	0	3	2	25	75	100
10	A52211	Engineering Physics and Applied Chemistry Lab-II	BS	0	3	2	25	75	100
11	A52212	Engineering Workshop- II & IT Workshop	ES	0	3	2	25	75	100
Total				**14**	**21**	**24**	**275**	**825**	**1100**

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II YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A53013	Mechanics of Solids	ES	4	1	4	25	75	100
2	A53014	Thermodynamics	PC	4	1	4	25	75	100
3	A53015	Metallurgy & Material Science	ES	3	1	3	25	75	100
4	A53016	Environmental Studies	ES	3	1	3	25	75	100
5	A53001	Mathematics-III	BS	3	1	3	25	75	100
6	A53017	Electrical and Electronics Engineering	ES	3	1	3	25	75	100
7	A53207	Electrical and Electronics Engineering Lab	ES	-	3	2	25	75	100
8	A53208	Metallurgy and Mechanics of Solids Lab	ES	-	3	2	25	75	100
9	A53209	Gender Sensitization	MC	-	3	-	25	75	100
Total				**20**	**15**	**24**	**225**	**675**	**900**

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II YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A54012	Production Technology	PC	3	1	3	25	75	100
2	A54013	Kinematics of machinery	PC	4	1	4	25	75	100
3	A54014	Thermal Engineering-I	PC	4	1	4	25	75	100
4	A54015	Mechanics of Fluids and Hydraulic Machines	PC	3	1	3	25	75	100
5	A54016	Machine Drawing	PC	_	6	3	25	75	100
6	A54001	Probability & Statistics	BS	3	1	3	25	75	100
7	A54207	Production Technology Lab	PC	_	3	2	25	75	100
8	A54208	Mechanics of Fluids and Hydraulic Machines Lab	PC	_	3	2	25	75	100
9	A54209	Human Values and Professional Ethics	MC	3	-	-	25	75	100
Total				**20**	**17**	**24**	**225**	**675**	**900**

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III YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A55017	Machine Tools &Metrology	PC	3	1	3	25	75	100
2	A55018	Dynamics Of Machinery	PC	3	1	3	25	75	100
3	A55019	Design Of Machine Members-I	PC	4	1	4	25	75	100
4	A55020	Thermal Engineering-II	PC	4	1	4	25	75	100
5	A55021	Managerial Economics and Financial Analysis	HS	3	1	3	25	75	100
6	PROFESSIONAL ELECTIVE - I								
	A55022	Automobile Engineering	PE	3	1	3	25	75	100
	A55023	Welding Technology							
	A55024	Turbo Machinery							
7	A55205	Metrology &Machine Tools Lab	PC	-	3	2	25	75	100
8	A55206	Thermal Engineering Lab	PC	-	3	2	25	75	100
Total				**20**	**12**	**24**	**200**	**600**	**800**

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III YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A56015	Design Of Machine Members-II	PC	3	1	3	25	75	100
2	A56016	Heat Transfer	PC	4	1	4	25	75	100
3	A56017	Refrigeration & Air Conditioning	PC	4	1	4	25	75	100
4	A56018	Operation Research	PC	3	1	3	25	75	100
5	PROFESSIONAL ELECTIVE - II								
	A56019	Industrial Management	PE	3	1	3	25	75	100
	A56020	Nano Technology							
	A56021	Tribology							
6	OPEN ELECTIVE-I		OE	3	1	3	25	50	75
7	A56205	Heat Transfer Lab	PC	-	3	2	25	75	100
8	A56206	Advanced English Communication Skills Lab	PC	-	3	2	25	75	100
Total				**20**	**12**	**24**	**200**	**600**	**800**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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IV YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A57019	CAD/CAM	PC	4	1	4	25	75	100
2	A57020	Instrumentation & Control Systems	PC	3	1	3	25	75	100
3	A57021	Finite Element Analysis	PC	3	1	3	25	75	100
4	PROFESSIONAL ELECTIVE - III								
	A57022	Power Plant Engineering	PE	3	1	3	25	75	100
	A57023	CNC Technologies							
	A57024	Unconventional Machining Process							
5	PROFESSIONAL ELECTIVE - IV								
	A57025	Automation in Manufacturing Systems	PE	3	1	3	25	75	100
	A57026	Plant Layout &Material handling							
	A57027	Computational Fluid Dynamics							
6	OPEN ELECTIVE-II		OE	3	0	3	25	75	100
7	A57207	Computer Aided Design & Computer Aided manufacturing Lab	P.C	-	3	2	25	75	100
8	A57208	PDP &Instrumentation Lab	P.C	-	3	2	25	75	100
9	A57209	Mini Project	PW	-	-	2	-	100	100
Total				**19**	**12**	**25**	**200**	**700**	**900**

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IV YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	PROFESSIONAL ELECTIVE - V								
	A58013	Industrial Robotics	PE	3	1	3	25	75	100
	A58014	Mechatronics							
	A58015	Composite Materials							
2	PROFESSIONAL ELECTIVE - VI								
	A58016	Production Planning and Control	PE	3	1	3	25	75	100
	A58017	Mechanical vibrations							
	A58018	Flexible Manufacturing Systems							
3	OPEN ELECTIVE-III		OE	3	0	3	25	75	100
7	A58207	Seminar	PW	-	6	2	100	-	100
8	A58208	Project work	PW	-	15	10	50	150	200
9	A58209	Comprehensive viva	PW	-	-	2	100	-	100
Total				**09**	**24**	**23**	**325**	**375**	**700**

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S.No	**Course code**	**Course**	**Offering Department**
1	A56301	Construction Materials	Civil Engineering
2	A56302	Waste Management	
3	A56303	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	A56304	Maintenance of Electrical Systems	
5	A56305	Advanced Engineering Materials	Mechanical Engineering
6	A56306	Mechatronics	
7	A56307	Principles of Communication Systems	Electronics & Communication Engineering
8	A56308	Electronic Measuring Instruments	
9	A56309	Java Programming	Computer Science & Engineering
10	A56310	Computer Networks	

OPEN ELECTIVE- II			
S.No.	**Course code**	**Subject**	**Offering Department**
1	A57301	Disaster Management and Mitigation	Civil Engineering
2	A57003	Geological Information System & Remote Sensing	
3	A57302	Energy Storage Systems	Electrical & Electronics Engineering
4	A57303	Electrical Engineering Materials	
5	A57022	Power Plant Engineering	Mechanical Engineering
6	A57304	Industrial Robotics	
7	A57305	Computer Organization	Electronics & Communication Engineering
8	A57306	Principles of Signal Processing	
9	A57307	Database Management Systems	Computer Science & Engineering
10	A57308	Web Technologies	

OPEN ELECTIVE- III			
S.No	**Course code**	**Subject**	**Offering Department**
1	A58301	Construction Technology and Project Management	Civil Engineering
2	A58302	Safety Engineering	
3	A58303	Energy conservation and Audit	Electrical & Electronics Engineering
4	A58304	Artificial Neural Networks	
5	A58305	Renewable Energy Sources	Mechanical Engineering
6	A58306	Automobile Engineering	
7	A58307	Nanotechnology	Electronics & Communication Engineering
8	A58308	Biometric System	
9	A58309	Game Theory with Engineering Applications	Computer Science & Engineering
10	A58310	Software Engineering	

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B.TECH.

MECHANICAL ENGINEERING

R15 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(A51001) English-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Narrate the stories and knowthe significance of humor.
CO 2: Promote awareness amongst students how visvesvaraya became role model to others.
CO 3: Create awareness in students the development & security features of polymer banknotes.
CO 4: How to utilize organs &know the importance of life. Awareness on everyday is new day Every day is last day.
CO 5: Students know about accidents often happen because of carelessness. If we take care can avoid Accidents..

(A51002) MATHEMATICS-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand Rolle's and the Mean value theorems and to verify the Mean value theorems and Apply partial derivatives to study maxima and minima of functions of two variables.
CO 2: Define rank and elementary transformations of a matrix and Discuss Non homogeneous and homogeneous system of equations.
CO 3: Compute eigen values and corresponding eigen vectors of a square matrix.
CO 4: Specify standard methods for solving differential equations and their applications in geometrical and physical problems.
CO 5: Identify different types of higher order differential equations and their applications in engineering problem solving.

(A51003) ENGINEERING PHYSICS – I

CO 1: Understand the intensity variation of light due to interference, diffraction and polarization.
CO 2: Employ the knowledge of crystallography and X-Rays to understand the structure-property relationship of materials.
CO 3: Implement the concept of various distributions and statistical mechanics for research applications.
CO 4: Understand the classification of Magnetic materials, Superconductors and their applications in various fields.
CO 5: Acquire basic knowledge of dielectrics and the applications of piezo, pyro and ferro-electric materials.

(A51004) APPLIED CHEMISTRY – I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Industrious Students and health conscious ones remain inquisitive on potable water its parameter and usage

CO 2: Dynamic students indeed capable of explaining the various aspects of electro chemistry work out numerical problems
CO 3: Thorough with cells and solar, fuel cells.
CO 4: gets augmented to the caliber in knowing corrosion and causes going around and capable of suggesting periodical maintenance
CO 5: Archetypal students comprehend the applications of colloids in various fields in exhort their immense significance

(A51005) COMPUTER PROGRAMMING – I

CO 1: Ability to design algorithmic solutions to problem
CO 2: Ability to convert algorithms to C-Programs
CO 3: Ability to write, compile and debug programs in C Language
CO 4: Ability to write Programs using selection and repetition statements
CO 5: Ability to write programs using Arrays and Strings
CO 6: Ability to design structured programming.

(A51006) ENGINEERING GRAPHICS – I

CO 1: To know the importance of Engineering Graphics and to represent the various Curves, Conic Sections, and Cycloids used in Engineering Graphics.
CO 2: To Draw and understand the Construction of Plane, Diagonal and Vernier Scales used in Engineering Graphics and also represent the Construction of Polygons and Involutes.
CO 3: To Draw and understand the Principles involved in Orthographic Projections and to represent the Principles involved in Points, Lines and Traces.
CO 4: To Draw and understand the construction Principles involved in Planes.
CO 5: To Draw and understand the construction Principles involved in Solids.

(A51007) ENGINEERING MECHANICS – I

On successful completion of this course, it is expected that the students will be able to,

CO 1: To introduce the basic principles of mechanics applicable to rigid bodies inequilibrium.
CO 2: Construct free body diagrams and develop appropriate equilibrium equations.
CO 3: Analyse the systems with friction.
CO 4: Determine the centriod and centre of gravity for composite areas.
CO 5: Determine the moment of inertia for composite areas

(A51209) COMPUTER PROGRAMMING – I LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: To make the student to implement various sorting and searching techniques
CO 2: To introduce the student to structures, unions, and enumeration types and operations on them
CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.

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CO 5: To make the student to create various types of files in 'C' Language.

(A51210) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

On successful completion of this course, it is expected that the students will be able to,

CO 1: Get familiarity with vowels and consonants and speak with pronunciation. Learn to communicate in individual activates.

CO 2: Learn to reduce mother tongue influence for intelligibility. Gaining confidence using language in conversations and dialogues

CO 3: Better understanding of pronunciation through syllables and clusters. Learning etiquette in different situations make the students more professional.

CO 4: Mastering supra segmental features of phonetics thereby improving correct pronunciation. Improve presentation skill.

CO 5: Neutralization of accent for intelligibility. Improve employability skills of the students.

(A51211) ENGINEERING PHYSICS AND APPLIED CHEMISTRY LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply the various procedures and techniques for the experiments Use the different measuring devices and meters to record the data with precision.

CO 2: Apply the mathematical concepts/equations to obtain quantitative results

CO 3: Develop the basic communication through working in the groups and performing the laboratory experiments and by interpreting the results.

CO 4: Determination of parameters like hardness and alkalinity of water

CO 5: Estimation of rate constant of a reaction from concentration time relationships

CO 6: Determination of physical properties like surface tension

(A51212) ENGINEERING WORKSHOP-I

CO 1: To make a lap joint

CO 2: To make a dovetail- joint

CO 3: To make a T-briddle joint

CO 4: To prepare a flat filing

CO 5: To prepare a step cutting

CO 6: To prepare a angular cutting

CO 7: To prepare a open scoop

CO 8: To prepare a rectangular tray

CO 9: To prepare a square tin

CO 10: To understand and to give the connections for one light point control by one single pole switch.

CO 11: To understand and to give the connections for one light point control by two-two way switchs (parallel connections)

CO 12: To understand and to give the connections for to-connect a electrical bell by using bell push

CO 13: To understand and to give the connections for two light point controlled by one single pole switch.

CO 14: To prepair a pipe joint , tap- connections by using pluming

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CO 15: To apply different operations to be performed on the lathe machines.

I YEAR II SEMESTER

(A52001)ENGLISH – II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the social behavior of the current society.
CO 2: Promote awareness regarding how India achieved success with human values.
CO 3: Create awareness regarding the key for success through Narayana Murthy words.
CO 4: Realize the hardship in the life of Sachin Tendulkar to reach success.
CO 5: Know about the secret of success and happiness in the words of swami vivekanandaquoting from the Bhagavath geetha.

(A52002)MATHEMATICS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
CO 2: Apply Laplace transform to solve differential equations which will be converted to algebraic
CO 3: Evaluate double integrals by changing variables , changing order and triple integrationCalculate line integrals along piecewise smooth paths, interpret such quantities as work done by a force
CO 4: Apply Green's theorem to evaluate line integrals along simple closed contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and Divergence theorem to give physical interpretation of the divergence of a vector field
CO 5: Develop Fourier series of periodic functions.

(A52003) ENGINEERING PHYSICS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Implement the concepts of Quantum mechanics for research applications.
CO 2: Explain the electrical conductivity of the metals and classification of materials in to conductors, semiconductors and insulators.
CO 3: Understand the construction and working of semiconducting devices and fiber optics to their applications in various fields.
CO 4: Understand the construction and working of different kinds of Lasers to their applications in various fields.
CO 5: Acquire Basic knowledge of synthesis of non-materials and their applications in the field of medicine, data storage devices and electronics.

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(A52004) APPLIED CHEMISTRY-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Apply the knowledge of polymers in every day's life
CO 2: The student able to apply the knowledge about material chemistry
CO 3: Establishing the conditions for heterogeneous equilibrium between different phases
CO 4: Learn to assess the quality of fuel of fuel to be used in domestic usage
CO 5: Gain knowledge of the properties of engineering use in different industrial applications

(A52005) ENGINEERING MECHANICS-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: Determine the axial forces in the members of trusses.
CO 2: Determine the kinematic relations of particles & rigid body motion.
CO 3: Apply equations of kinetics motions to particle and rigid body motion.
CO 4: Analyze motion of particles & rigid bodies using the principle of work-energy.
CO 5: Determine the equilibrium conditions(FBD) in terms of virtual work

(A52005)COMPUTER PROGRAMMING – II

CO 1: Upon completion of this course the students will have an:
CO 2: Ability to design various sorting and searching techniques
CO 3: Ability to design user defined data types to solve real world problems
CO 4: Ability to manage heap memory
CO 5: Ability to implement and use data structures like stacks, queues and linked lists
CO 6: Ability to create and use various types of files in 'C' Language.

(A52006)ENGINEERING GRAPHICS – II

CO 1: To Draw and understand about the Sections of Solids, Development of Surfaces and intersections of similar Solids used in Engineering Graphics.
CO 2: To Draw and understand the construction Principles involved in Isometric Projections.
CO 3: To Draw and understand about Conversion of Orthographic Views to Isometric Views and also represent it's Transformation of Projections.
CO 4: To Draw and understand about the construction Principles involved in Perspective Projections.
CO 5: To Draw and understand about the Computer Aided Drafting used in Engineering Graphics

(A52007)ENGINEERING MECHANICS – II

CO 1: Determine the axial forces in the members of trusses.
CO 2: Determine the kinematic relations of particles & rigid body motion.
CO 3: Apply equations of kinetics motions to particle and rigid body motion.
CO 4: Analyze motion of particles & rigid bodies using the principle of work-energy.

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CO 5: Determine the equilibrium conditions(FBD) in terms of virtual work

(A52209) COMPUTER PROGRAMMING II LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: To make the student to implement various sorting and searching techniques
CO 2: To introduce the student to structures, unions, and enumeration types and operations on them
CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.
CO 5: To make the student to create various types of files in 'C' Language.

(A52210)ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-II

On successful completion of this course, it is expected that the students will be able to,

CO 1: The students become aware of different pronunciations.Gain confidence in using language in different contexts.
CO 2: Equip with good listening skills Enrichment of fluency there by students becomes confidence.
CO 3: Better understanding of intonation and sentence stress for intelligibility. Mastering functions of language.
CO 4: Familiarize With nuances of pronunciation. Giving speeches make students more confident and get rid of stage fear.
CO 5: Improve analytical thinking and written language. Speaking with clarity and fluency in group activities.

(A52211) ENGINEERING PHYSICS AND APPLIED CHEMISTRY LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Awareness in obtaining some important products with enough yield.
CO 2: Gets familiar with synthesis of thermosetting plastics.
CO 3: Calculation of strength of compounds using instrumentation techniques
CO 4: Determination of physical properties like viscosity
CO 5: To synthesize of Thiokol rubber and nylon 6,6 polymer

(A52212) ENGINEERING WORKSHOP – II AND IT WORKSHOP

On successful completion of this course, it is expected that the students will be able,

CO 1: To prepare a various shape of (S-shape, T- shape, Z- shape)
CO 2: To prepare a single piece and double piece pattern by using casting process
CO 3: To make a lap-joint, but-joint and angular joint.
CO 4: To apply different operations to be performed on the lathe machines.
CO 5: To prepare a switch boards, wood drilling and threading different various sizes.

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II YEAR I SEMESTER

(A53013)MECHANICS OF SOLIDS

CO 1: Calculate stress, strain, and deformation for basic geometries subjected to axial loading and thermal effects.
CO 2: Calculate bending and shear stresses from shear force and bending moment diagram for cantilever, simply supported and over hanging beams of transverse loading.
CO 3: Calculate shear stresses for torsional loading and identify the location of shear centers for the various sections of beams.
CO 4: Calculate analytically and graphically (Mohr's Circle) the maximum and minimum normal and shear stresses and the orientations at which they occur for an arbitrary two-dimensional stress/strain state for combined loading conditions.
CO 5: Calculate Circumferential Stress, Longitudinal And Volumetric Strain.

(A53014)THERMODYNAMICS

CO 1: Understand The Fundamentals Of Thermodynamics
CO 2: Apply mass and energy balances (First Law) to a variety of simple processes
CO 3: Determine the properties of a pure substance using thermodynamic tables
CO 4: Analyze Rankine's ideal power cycle
CO 5: Analyze and apply knowledge on power cycle

(A53015)METALLURGY AND MATERIAL SCIENCE

CO 1: Acquire an understanding of the main concepts related to the structure and properties of materials
CO 2: Understand about phase rules and Iron-Iron Carbon equilibrium diagram, TTT diagrams
CO 3: Understand the basic concepts of Heat treatment processes
CO 4: Understand the micro structure of ferrous and non-ferrous materials
CO 5: Understand the basic methods of manufacturing various types of composite materials.

(A53016) ENVIRONMENTAL STUDIES

On successful completion of this course, it is expected that the students will be able to,

CO 1: Understand the concept of ecosystem and biodiversity and its conservation.
CO 2: Understand the types of natural resources such as soil, water, marine etc.
CO 3: Learnt about the causes of environmental pollutions and their effects and control measures.
CO 4: Understand how to manage the solid waste and waste water treatment.
CO 5: Get the knowledge about the future sustainable development.

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(A53001) MATHEMATICS-III

On successful completion of this course, it is expected that the students will be able to,

CO 1: Determination of roots of an equation and calculate some simple methods of obtaining approximate roots of algebraic and transdental equations.
CO 2: Interpolate the values using the techniques of newton's forward and backward, Gauss forward and backward, Lagranges and splines interpolations.
CO 3: Analyze and calculate numerical differentiation and numerical integration methods.
CO 4: Calculate sol of ODE using Taylor's, Euler's, Picard's, Rungi-Kutta and Predictor-Corrector method.
CO 5: Evaluate the sol of PDE and calculate boundary value problems.

(A53017) ELECTRICAL AND ELECTRONICS ENGINEERING

CO 1: Introduction of Electrical Elements, Electrical circuits and applications of KVL, KCL, and Ohm's Law.
CO 2: DC machines and their applications.
CO 3: AC machines and their applications.
CO 4: Electronic devices like Diode, Transistors and their applications.
CO 5: Working principle of CRO and its internal parts.

(A53207) ELECTRICAL AND ELECTRONICS ENGINEERING LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Swinburne's test on DC shunt machine.
CO 2: OC & SC tests on single phase transformer.
CO 3: Brake test on 3-phase induction motor.
CO 4: Transistor CE characteristics.
CO 5: Full wave rectifier with and without filters.

(A53208) METALLURGY AND MECHANICS OF SOLIDS LAB

CO 1: Determine Young's modulus by conducting tensile, torsion tests on mild steel rods, compression test on springs, bricks, concrete, and impact strength of steel.
CO 2: Study of the micro structure of iron, Cu.Al, MS, LCS, HCS.

(A53209) GENDER SENSITIZATION

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary in India.
CO 2: Students will be sensitized to basic dimensions of Biological, Sociological Psychological and legal aspects of gender.
CO 3: Students will acquire insight into the gendered division of labor and it's relation to politics and economics.
CO 4: Men and Women students and professions will be better equipped to work and live to get her as equals
CO 5: Students will develop a sense of appreciation of women in all walks of life.

II YEAR II SEMESTER

(A54012) PRODUCTION TECHNOLOGY

CO 1: Understand the technology of the casting processes.
CO 2: Understand the various casting methods.
CO 3: Differentiate the various joining processes with application.
CO 4: Understand the various bulk forming processes.
CO 5: Understand the various extrusion process

(A54013) KINEMATICS OF MACHINARY

CO 1: Analyze different mechanisms and machines.
CO 2: Calculate position, velocity, and acceleration of linkages.
CO 3: Develop the cam profiles. Calculate velocity, and acceleration of follower.
CO 4: Calculate the length of path of contact, length of arc of contact, contact ratio, no of teeth's required to avoid interference and speed.
CO 5: Calculate the velocity ratio and know the concept of belt, rope & chain drives.

(A54014) THERMAL ENGINEERING – I

CO 1: Analyze air standard cycles used in I.C. Engines.
CO 2: Understand the combustion phenomena in I.C. Engines.
CO 3: Analyze the performance of I.C engines.
CO 4: Understand The Concept About Reciprocating And Rotary Compressors.
CO 5: Understand The Concept About Centrifugal And Axial Compressors.

(A54015) MECHANICS OF FLUIDS AND HYDRAULIC MACHINES

CO 1: Understand the Importance of fluid Mechanic, and behavior fluids Dimensions and units, physical properties of fluids, types of fluid flows, Stream line, path line and streak lines and stream tube, classification of flows.
CO 2: Understand types of losses and measurement of fluid flows.
CO 3: Apply the momentum principles for impact of jets.
CO 4: Analyze the hydraulic pumps.
CO 5: Analyze the hydraulic turbines

(A54016) MACHINE DRAWING

CO 1: Draw the conventional represent for screws, nuts, and bolts. Keys, gears, webs and ribs.
CO 2: Drew the machine elements for riveted joints and bearings.
CO 3: Drew the assembly the machine parts.

(A54001) PROBABILITY AND STATISTICS

CO 1: Understand Chance causes and random variable that describes randomness or an uncertainty in certain realistic situation. It can be of either discrete or continuous type.
CO 2: In the discrete case, study of the binomial and the Poisson random variables and the Normal random variable for the continuous case predominantly describe important probability distributions. Important

statistical properties for these random variables provide very good insight and are essential for industrial applications.

CO 3: The student would be able to calculate mean and proportions (small and large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations. It is mainly useful for non-circuit branches of engineering.

CO 4: The student would be able to calculate the types of sampling, Sampling distribution of means, Sampling distribution of variance.

CO 5: Understanding the Experiment and the design of experiment.

(A54207) PRODUCTION TECHNOLOGY LAB

CO 1: Make a pattern design and making.
CO 2: Understand about sand properties testing.
CO 3: Understand about different type of joining process.
CO 4: know the concept of mechanical pressing and processing of plastics

(A54209) HUMAN VALUES AND PROFESSIONAL ETHICS

On successful completion of this course, it is expected that the students will be able to,

CO 1: Students will learn basic guidelines, content and process for value education and understanding of basic requirements for fulfillments of aspiration of every human being with their correct priority.

CO 2: Students understood that human being as a co-existence of the sentient "I" and material "Body".

CO 3: Students will know understanding harmony in the family as the basic unit of human interaction.

CO 4: Students will understand the harmony in the nature and holistic perception of harmony at all levels of existence.

CO 5: Students will learn Basic for humanistic education, humanistic constitution and humanistic Universal order.

III YEAR I SEMESTER

(A55017) MACHINE TOOLS AND METROLOGY

CO 1: Get acquainted with limits, tolerances and gauge design.
CO 2: Get familiarity with terminology and errors in measurement
CO 3: Understand the principles of linear and angular measuring instruments.
CO 4: Understand the surface roughness terminology and types of various surface roughness measuring instruments.
CO 5: Understand the strain measurement.
CO 6: Familiarize with temperature measuring instruments

(A55018) DYNAMICS OF MACHINERY

CO 1: Understand how to balance several masses in different planes along with rotating and reciprocating masses.

CO 2: Analyze different types of governors which controls speed of the machine or engine

CO 3: Attain a deeper understanding on the gyroscopic effects of rotating bodies for aero-planes, naval ships, automobiles, and two wheelers

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CO 4: Calculate natural frequencies for un damped and damped vibrating systems.

CO 5: Analyze the response of the vibrating mass at different operating conditions Calculate natural frequencies for different modes of vibrations for transverse and tensional loading conditions.

(A55019) DESIGN OF MACHINE MEMBERS-I

CO 1: The student acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure.

CO 2: Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading.

CO 3: Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element.

(A55020) THERMAL ENGINEERING – II

CO 1: Develop state – space diagrams based on the schematic diagrams of process flow of steam and gas turbine plants

CO 2: Apply the laws of Thermodynamics to analyze thermodynamic cycles

CO 3: Differentiate between vapour power cycles and gas power cycles

CO 4: Infer from property charts and tables and to apply the data for the evaluation of performance parameters of the steam and gas turbine plants

CO 5: Understand the functionality of major components of steam and gas turbine plants and to do the analysis of these components

(A55021) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

By the end of this course the students will be able to

CO 1: Get the knowledge on Nature and scope of Managerial Economics, analysis of demand forecasting and its methods.

CO 2: Assess the costs useful for managerial decision making and determine Break Even Point (BEP) of an enterprise.

CO 3: Get the knowledge on Market structures and Policies of Pricing.

CO 4: Analyze the Capital and its significance and Capital Budgeting.

CO 5: Process the principles of accounting and interpret the financial statements of a business enterprise by using ratios

PROFESSIONAL ELECTIVE-I
(A55022) AUTOMOBILE ENGINEERING

CO 1: Understand the basic lay-out of an automobile.

CO 2: Understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.

CO 3: Understand the principles of transmission, suspension, steering and braking systems.

CO 4: Understand automotive electronics. Study latest developments in automobiles

(A55023) WELDING TECHNOLOGY

CO 1: Understand the different types of welding process.

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CO 2: Understand the operation of FSW,EBW,LBW.
CO 3: Understand the principles of various surface hardness techniques.

(A55024) TURBO MACHINERY

CO 1: Apply thermodynamic concepts to analyze turbo machines.
CO 2: Analyze power plant and propulsion cycles.
CO 3: Analyze impulse and reaction turbo machines for energy transfer.
CO 4: Design gas turbine and steam turbine components.
CO 5: Evaluate the performance of turbo machine components

(A55205) METROLOGY AND MACHINE TOOLS LAB

CO 1: Get knowledge on hand tools, equipments and machines.
CO 2: Get knowledge on the mechanisms of all the machine tools.
CO 3: Get Practical exposure on milling, grinding and slotter operations.
CO 4: Get knowledge procedure for setting the given object to a required angle using sine bar.
CO 5: Use different measuring instruments towards quality control.

(A55206) THERMAL ENGINEERING LAB

CO 1: Measure the thermal properties of different fuels.
CO 2: Analyze the properties of various fuels and emission standards
CO 3: Determine the efficiency of compressor and blower.
CO 4: Analyze the performance and determine the operating characteristics of I.C engines [2-stroke, 4-stroke, petrol, diesel] using rope brake, hydraulic and, electrical dynamometers.
CO 5: Draw the valve and port timing diagrams of two and four stroke engines.

III YEAR II SEMESTER

(A56015) DESIGN OF MACHINE MEMBERS – II

CO 1: Knowledge about journal bearing design using different empirical
CO 2: Estimation of life of rolling element bearings and their selection for given service conditions.
CO 3: Acquaintance with design of the components as per the standard, recommended procedures which is essential in design and development of machinery in industry.

(A56016) HEAT TRANSFER

CO 1: Formulate heat conduction problems in rectangular, cylindrical and spherical coordinate system, by transforming the physical system into a mathematical model.
CO 2: Familiarize with time dependent heat transfer.
CO 3: Compute convective heat transfer coefficients in forced convection, natural convection for internal flows & external flows.
CO 4: Know the fundamental mechanism involved in boiling and condensation.
CO 5: Know the design fundamentals for heat exchangers, which include the LMTD and ε-NTU approaches.
CO 6: Understand radiation heat transfer and can compute radiation heat transfer between black and non-black bodies.

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(A56017) REFRIGERATION AND AIR CONDITIONING

CO 1: Understand and analyze air refrigeration, simple and complex vapor compression refrigeration systems and their subsystems.
CO 2: Understand the operation of various devices of VCR system and their effect on the performance of whole refrigeration system
CO 3: Analyze the aqua ammonia and LiBr absorption refrigeration and understand their merits as alternatives to VCR systems.
CO 4: Select the most appropriate refrigerant for a given cooling application and understand the impact of refrigerants on the environment
CO 5: Understand thermodynamics of air –vapor mixtures and various A/C process and presenting them on psychometric chat.
CO 6: Understand various A/C systems and heat pump circuits and using them in combination to design real world heating & cooling needs

(A56018) OPERATIONS RESEARCH

CO 1: Understanding the problem, identifying variables & constants, formulas of optimization model and.
CO 2: applying appropriate optimization techniques

PROFESSIONAL ELECTIVE - II
(A56019) INDUSTRIAL MANAGEMENT

On completion of the course, the student should be able to discuss
CO 1: the main techniques and methods used within management science,
CO 2: critically appraise the strengths and limitations of these techniques and methods, and
CO 3: carry out simple exercises using such techniques and methods themselves.

(A56020) NANO TECHNOLOGY

CO 4: To evaluate electronic structural studies of Nano materials and different synthesis methods to obtain Nano structures.
CO 5: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of Nano materials.
CO 6: Applications of Nano materials for specific purposes like MEMS, NEMS, Nano electronics, and energy storage.

(A56021) TRIBOLOGY

CO 1: Understanding friction characteristics in journal bearings.
CO 2: Knowledge about different theories of lubrication to reduce friction and wear

OPEN ELECTIVE - I
(A56301) CONSTRUCTION MATERIALS(CE)

On successful completion of this course, it is expected that
CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.

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CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
CO 4: Students are Gain About Basic Knowledge on Timber And Other Materials
CO 5: Students are get knowledge on Modern construction materials.

(A56302) WASTE MANAGEMENT (CE)

At the end of the course student will be able to,
CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.
CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.
CO 3: Understand the working procedure in various industries, sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.
CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.
CO 5: Understand the waste disposal methods and requirement of treatment plants.

(A56303) SOLAR PHOTO VOLTAIC SYSTEMS (EEE)

After this course, the student will be able to
CO 1: Identify photovoltaic system components and system types and calculate electrical energy and power
CO 2: Correctly size system components, design considerations of solar equipment
CO 3: Design a basic grid-tied PV system.

(A56304) MAINTAINANCE OF ELECTRICAL SYSTEMS (EEE)

After this course, the student will be able to
CO 1: Identify the Engineering materials and testing of domestic appliances.
CO 2: Know the use of UPS and SMPS and maintenance of power devices.
CO 3: Rescue a person met with Electric shock.

(A56305)ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of advanced materials
CO 2: Understand the basic concepts of ferrous and non ferrous metals and alloys.
CO 3: Understand the ceramics and composite materials
CO 4: To understand the application of super alloys and inter metallic
CO 5: Understand the basic methods of manufacturing various types of composite

(A56306)MECHATRONICS (ME)

At the end of the course, the student will be able to,
CO 1: Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product.

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CO 2: Develop PLC programs for a given task.
CO 3: Evaluate the performance of mechatronic systems.

(A56307) PRINCIPLES OF COMMUNICATION SYSTEMS(ECE)

By completing this subject, the student can be able to
CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems

(A56308)ELECTRONIC MEASURING INSTRUMENTS (ECE)

By completing this subject, the student can be able to
CO 1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
CO 2: Measure various physical parameters by appropriately selecting the transducers
CO 3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals

(A56309) JAVA PROGRAMMING (CSE)

CO 1: Understanding of OOP concepts and basics of Java programming (Console and GUI based).
CO 2: The skills to apply OOP and Java programming in problem solving.
CO 3: Should have the ability to extend his/her knowledge of Java programming further on his/her own.

(A56310)COMPUTER NETWORKS (CSE)

CO 1: Analyze TCP/IP and OSI models and variousprotocols
CO 2: Identify suitable multiple access protocol for differentnetworks
CO 3: Analyze various error handlingmechanisms
CO 4: Use of various devices in connecting different types ofLANs
CO 5: Compare and contrast ipv4 andipv6

(A56205) HEAT TRANSFER LAB

CO 1: Perform steady state conduction experiments to estimate thermal conductivity of different materials
CO 2: Perform transient heat conduction experiment
CO 3: Estimate heat transfer coefficients in forced convection, free convection , condensation and correlate with theoretical values
CO 4: Obtain variation of temperature along the length of the pin fin under forced and free convection
CO 5: Perform radiation experiments: Determine surface emissivity of a test plate and Stefan- Boltzmann's constant and compare with theoretical value

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(A56206) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

On successful completion of this course, it is expected that the students will be able to,

CO 1: Get familiarity with vowels and consonants and speak with pronunciation. Learn to communicate in individual activates.

CO 2: Better understanding of pronunciation through syllables and clusters. Learning etiquette in different situations make the students more professional.

CO 3: Neutralization of accent for intelligibility. Improve employability skills of the students.

CO 4: Improve to speak and write correct English. Enrichment of fluency there by students becomes confidence.

CO 5: Learn to reduce mother tongue influence for intelligibility. Gaining confidence using language in conversations and dialogues

IV YEAR I SEMESTER

(A57019) CAD/CAM

CO 1: Understand geometric transformation techniques in CAD.

CO 2: Develop mathematical models to represent curves and surfaces .Model engineering components using solid modeling techniques.

CO 3: Develop programs for CNC to manufacture industrial components.

CO 4: To understand the application of computers in various aspects of Manufacturing viz.,

CO 5: Design, Proper planning, Manufacturing cost, Layout & Material Handling system.

(A57020) INSTRUMENTATION & CONTROL SYSTEMS

CO 1: To identify various elements and their purpose in typical instruments, to identify various errors that would occur in instruments.

CO 2: Analysis of errors so as to determine correction factors for each an instrument.

CO 3: To understand static and dynamic characteristics of instrument and should be able to determine loading response time.

CO 4: For given range of displacement should be able to specify transducer, it accurate and loading time of that transducer.

(A57021) FINITE ELEMENT METHODS

CO 1: Understand the philosophy of discretization of continuum

CO 2: Assemble element matrices based on local-global connectivity to generate total system equations

CO 3: Impose boundary conditions and solve for unknown field variables

CO 4: Interpret results from the calculated field variables

PROFESSIONAL ELECTIVE-III
(A57022) POWER PLANT ENGINEERING

CO 1: Understand the principle of various sources of energy, resources and development of power.

CO 2: To know the concept of internal combustion engine power plant.

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CO 3: To know the concept of gas turbine power plant.
CO 4: To know the concept of hydroelectric power plant.
CO 5: To know the concept of power from non-conventional sources.
CO 6: To know the concept of nuclear power stations and its types.
CO 7: Understand the power plant economics and environmental considerations.

(A57023) CNC TECHNOLOGIES

CO 1: should be able to select tooling method, control mechanism and do part programming for a given product.

(A57024) UNCONVENTIONAL MACHINING PROCESSES

CO 1: Identify the problem faced in traditional metal cutting and come to an understanding of the need for the development of Unconventional machining processes.
CO 2: Gain the knowledge of basic mechanism of various Unconventional maching processes and related equipment, variables, advantages, disadvantages, applications.
CO 3: Given a set of physical, electrical and other parameters. Student can identify a suitable Unconventional machining process.

PROFESSIONAL ELECTIVE - IV
(A57025) AUTOMATION IN MANUFACTURING

CO 1: Able to understand the applications of various types of end effectors, and sensor devices

(A57026) PLANT LAYOUT AND MATERIAL HANDLING

CO 1: Understand the basic concepts involved in Material Handling systems.
CO 2: Understand the basic concepts involved in Material Handling Oriented systems.
CO 3: Understand the basic concepts involved in methods to minimizing Material Handling systems.
CO 4: Understand the basic concepts involved in Ergonomics of Material Handling equipments.

(A57027) COMPUTATIONAL FLUID DYNAMICS

CO 1: The information about some techniques for numerical solutions for flow problems. These equations are applicable to time and space marching solutions especially parabolic hyperbolic and elliptic equations.
CO 2: How to discretize partial differential equations, including the governing flow equations which is the foundation for the finite difference method.
CO 3: Explicit and implicit approaches represent the fundamental distinction between various numerical techniques.
CO 4: The fundamental principles of fluid mechanics, its governing differential equations and boundary conditions.

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OPEN ELECTIVE- II

(A57301) DISASTER MANAGEMENT AND MITIGATION (CE)

CO 1: Application of different approaches , human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(A57003)GEOLOGICAL INFORMATION SYSTEM & REMOTE SENSING (CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(A57303)ENERGY STORAGE SYSTEMS (EEE)

After this course, the student
CO 1: Can analyze the characteristics of energy from various sources and need for storage
CO 2: Can classify various types of energy storage and various devices used for the purpose
CO 3: Can apply the same concepts to real time problem.

(A57304)ELECTRICAL ENGINEERING MATERIALS (EEE)

Will be able to
CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Evaluate magnetic materials and their behavior.
CO 3: Evaluate semiconductor materials and technologies.
CO 4: Understand different types of materials used in electrical engineering and applications

(A57022)POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine power plant.
CO 3: To know the concept of gas turbine power plant.
CO 4: To know the concept of hydroelectric power plant.
CO 5: To know the concept of power from non-conventional sources.
CO 6: To know the concept of nuclear power stations and its types.
CO 7: Understand the power plant economics and environmental considerations.

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(A57304)INDUSTRIAL ROBOTICS (ME)

At the end of the course, the student will be able to understand the

CO 1: Basic components of robots.
CO 2: Differentiate types of robots and robot grippers.
CO 3: Model forward and inverse kinematics of robot manipulators.
CO 4: Analyze forces in links and joints of a robot.
CO 5: Programme a robot to perform tasks in industrial applications.
CO 6: Design intelligent robots using sensors.

(A55021)COMPUTER ORGANIZATION(ECE)

At the end of the course, the student will be able to understand the

CO 1: Student will learn the concepts of computer organization for several engineering applications.
CO 2: Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.
CO 3: An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principles

(A57035)PRINCIPLES OF SIGNAL PROCESSING (ECE)

At the end of the course, the student will be able to understand the

CO 1: Apply to current technologies and issues that are specific to image processing systems.
CO 2: Leverage the student's knowledge of image processing to a practical system.
CO 3: Compress the Digital image which is required for storage and transmission of digital images.

(A57307) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Demonstrate the basic elements of a relational database management system.
CO 2: Ability to identify the data models for relevant problems.
CO 3: Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
CO 4: Apply normalization for the development of application soft wares

(A57308) WEB TECHNOLOGIES (CSE)

CO 1: Designstaticwebpagesandprovideclientsideauthentication.
CO 2: Prepare Static Web pages WithValidations.
CO 3: Develop new tag sets using XMLmechanism.
CO 4: DesignanddevelopwebapplicationsusingJSPandMVCarchitecture
CO 5: Understanddatabaseconnectivityandretrievingdatausingclient/serverdata base

(A57207) COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING LAB

CO 1: To understand the analysis of various aspects in of manufacturing design

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(A57208) PRODUCTION DRAWING PRACTICE AND INSTRUMENTATION LAB

CO 1: Draw and understand about the conventional representations of Materials, Screws, Welded joints, springs, gears, and electrical, pneumatic, hydraulic circuits.

CO 2: Draw and understand about the limits and fits used in engineering drawing.

CO 3: Draw and understand about the form and positional tolerances used in engineering drawing.

CO 4: Draw and understand about the heat treatment and surface treatment symbols used in engineering drawing.

CO 5: Draw and understand about the drawings of parts from assembly drawings

IV YEAR II SEMESTER

PROFESSIONAL ELECTIVE - V
(A58013) INDUSTRIAL ROBOTICS

CO 1: At the end of the course, the student will be able to understand the basic components of robots.
CO 2: Differentiate types of robots and robot grippers.
CO 3: Model forward and inverse kinematics of robot manipulators.
CO 4: Analyze forces in links and joints of a robot. Programme a robot to perform tasks in industrial applications.
CO 5: Design intelligent robots using sensors

(A58014) MECHATRONICS

At the end of the course, the student will be able to,
CO 1: Model, analyze and control engineering systems.
CO 2: Identify sensors, transducers and actuators to monitor and control the behavior of a process or product.
CO 3: Develop PLC programs for a given task.
CO 4: Evaluate the performance of mechatronic systems.

(A58015) COMPOSITE MATERIALS

CO 1: It is to understand the need of composite materials and know the properties, types and Applications of various types of composites
CO 2: Student can able to understand the properties advantages, limitations of carbon composites and manufacturing methods of carbon composites.
CO 3: Is to understand the properties advantages, limitations of ceramics, types of ceramics and manufacturing methods of ceramic composites.

PROFESSIONAL ELECTIVE - VI
(A58016) PRODUCTION PLANNING AND CONTROL

At the end of the course, the student will be able to,
CO 1: Understand production systems and their characteristics.
CO 2: Evaluate MRP and JIT systems against traditional inventory control systems.

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CO 3: Understand basics of variability and its role in the performance of a production system.
CO 4: Analyze aggregate planning strategies.
CO 5: Apply forecasting and scheduling techniques to production systems.
CO 6: Understand theory of constraints for effective management of production systems.

(A58017) MECHANICAL VIBRATIONS

At the end of the course, the student will be able to,
CO 1: Understand the causes and effects of vibration in mechanical systems.
CO 2: Develop schematic models for physical systems and formulate governing equations of motion.
CO 3: Understand the role of damping, stiffness and inertia in mechanical systems
CO 4: Analyze rotating and reciprocating systems and compute critical speeds.
CO 5: Analyze and design machine supporting structures, vibration isolators and absorbers

(A58018) FLEXIBLE MANUFACTURING SYSTEMS

CO 1: Understand FMS and job-shop and mass production manufacturing systems.
CO 2: Understand processing stations and material handling systems used in FMS environments.
CO 3: Design and analyze FMS using simulation and analytical techniques.
CO 4: Understand tool management in FMS.

OPEN ELECTIVE-III

(A58301) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT (CE)

After successfully completion of this course, the student will be able to
CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
CO 2: Use the mechanized construction equipments at different situations or any huge projects
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management , estimation and project planning techniques
CO 5: Use the CPM – PERT Problems in project scheduling

(A58302) SAFETY ENGINEERING (CE)

After successfully completion of this course, the student will be able to
CO 1: Know how to Handle and Protect the Machine and himself while working on it
CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment
CO 3: Understand the knowledge of safety rules and regulations of working at construction industry
CO 4: Understand the knowledge about working at all stages in different heights at construction site

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CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(A58303)ENERGY CONSERVATION AND AUDIT(EEE)

By the end of this course the students are able to analyze

CO 1: Principles of thermodynamics and heat exchange theory.
CO 2: Energy conservation and energy auditing.
CO 3: Thermal insulation and heat recovery systems.

(A58304)ARTIFICIAL NEURAL NETWORKS (EEE)

After this course, the student will be able to understand the

CO 1: Basics and models of Neural Networks and its architectures.
CO 2: Operation of feed forward and propagation networks.
CO 3: Associative memories and the applications of Neural Networks.

(A58305) RENEWABLE ENERGY SOURCES(ME)

After this course, the student will be able to understand the

CO 1: The student will be able analyze.
CO 2: Solar thermal and photovoltaic systems and related technologies for energy conversion.
CO 3: Wind energy conversion, Biomass conversion, Geo thermal energy conversion and principles and technologies.
CO 4: Power from oceans and conversion, Fundamentals of direct energy conversion systems.

(A58306)AUTOMOBILE ENGINEERING(ME)

After this course, the student will be able to understand the

CO 1: Understand the basic lay-out of an automobile.
CO 2: Understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.
CO 3: Understand the principles of transmission, suspension, steering and braking systems.
CO 4: Understand automotive electronics. Study latest developments in automobiles

(A56023)NANOTECHNOLOGY (ECE)

After successfully completion of this course, the student will be able to

CO 1: Appreciate the importance of Nano dimensional materials and their applications.
CO 2: Realize and explain that the properties of Nano materials are size dependent and vary from corresponding bulk materials
CO 3: Demonstrate the skills required to prepare some of the Nano materials in the laboratory
CO 4: Characterize and study the properties with respect to their size and shapes.
CO 5: Appreciate the applications of Nano electronic devices and understand their basic principles

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(A58308) BIOMETRIC SYSTEM (ECE)

After successfully completion of this course, the student will be able to

CO 1: Describe principles of the selected physical and behavioral biometric methods, and know how to deploy them in authentication scenarios

CO 2: Organize and conduct biometric data collection processes, and understand how to use biometric databases in system evaluation

CO 3: Understand differences between a biometric method and a biometric system

CO 4: Itemize the most up-to-date examples of real biometric applications in human authentication

(A58309)GAME THEORY WITH ENGINEERING APPLICATIONS (CSE)

CO 1: Students should able to understand the Equilibrium and Non-Equilibrium strategies in gaming.

CO 2: Students should able to learn mixed strategies and rationalizability in gaming domain.

CO 3: Students should able to develop knowledge on Electronic mail game

CO 4: Students should able to develop the idea of repeated games

(A58310)SOFTWARE ENGINEERING (CSE)

After successfully completion of this course, the student will be able to

CO 1: Ability to identify the minimum requirements for the development of application.

CO 2: Ability to develop, maintain, efficient, reliable and cost effective software solutions.

CO 3: Ability to critically thinking and evaluate assumptions and arguments.

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M.TECH.

MACHINE DESIGN

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	Work in the domain of manufacturing, thermal and fluid sciences to solve engineering problems by utilizing advanced technologies.
PEO II	:	Design the mechanical equipment and processes with the help of domain specific software tools.
PEO III	:	Apply the knowledge of design and production processes to work effectively on multidisciplinary research areas for the benefit of society.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	To provide students a thorough understanding of basic sciences, Mathematics and in the field of Mechanical Engineering, to demonstrate their ability both in theory and Practicals, which help to build up their careers and to impart the knowledge in the interdisciplinary areas.
PSO 2	:	To encourage students to acquire and analyze in depth and real time knowledge of contemporary industrial practices, and to carry their projects with Institution-Industry Collaboration. To provide a platform for lifelong learning and inculcate the culture of R & D.
PSO 3	:	To facilitate the learning of software technology, modelling and analysis techniques to solve the Mechanical Engineering problems and to acquire knowledge of various production practices essential for Mechanical Design to innovate new products and become entrepreneurs through which they can demonstrate their environmental, social and ethical responsibilities.

PROGRAM OUTCOMES		
PO 1:	:	The student shall be able to apply knowledge of mathematics, science, and engineering.
PO 2	:	The student shall be able to design and conduct experiments, as well as to analyze and interpret data.

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PO 3	:	**The student shall be able to** design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
PO 4	:	**The student shall be able to** function on multidisciplinary teams.
PO 5	:	**The student shall be** able to identify, formulate, and solve **engineering problems**
PO 6	:	**The student shall be able to** understand the professional and ethical **responsibility.**
PO 7	:	The student shall be able to communicate effectively.
PO 8	:	The student shall understand the Broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
PO 9	:	The student shall be able to Recognize the need for, and able to engage in life-long learning.
PO 10	:	The student shall have the Knowledge of contemporary issues.
PO 11	:	The student shall be able to use the techniques, skills, and modern engineering tools necessary for engineering practice.
PO 12	:	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadcast context of technological change.

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ANURAG
ENGINEERING ENGINEERS

M.TECH.

MACHINE DESIGN

R15 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

Course Code	Category	Course Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A31001	Core Course I	Advanced Mechanical Engineering Design	4	0	4	25	75	100
A31002	Core Course II	Advanced Mechanics of Solids	4	0	4	25	75	100
A31003	Core Course III	Fatigue & Fracture Mechanics	4	0	4	25	75	100
A31004	Core Elective-I	Advanced Finite Element Analysis	4	0	4	25	75	100
A31005		Applied Tribology						
A31006		Theory of Elasticity & Plasticity						
A31007	Core Elective-II	Concurrent Engineering	4	0	4	25	75	100
A31008		Advanced Mechanics of Composite Materials						
A31009		Advanced Computer Aided Design						
A31010	Open Elective I	Computational Methods in engineering	4	0	4	25	75	100
A31011		Database Management System						
A31201	Lab	Dynamics & Analysis of Structure Lab	--	4	2	25	75	100
A31202	Seminar	Seminar	--	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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I YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A32001	Core Course V	Advanced Mechanics of Machinery	4	0	4	25	75	100
A32002	Core Course VI	Mechanical Vibrations	4	0	4	25	75	100
A32003	Core Course VII	Experimental Stress Analysis	4	0	4	25	75	100
A32004	Core Elective-III	Pressure Vessel Design	4	0	4	25	75	100
A32005		Design Synthesis						
A32006		Industrial Robotics						
A32007	Core Elective-IV	Mechatronics	4	0	4	25	75	100
A32008		Computational Fluid Dynamics						
A32009		Theory of plates and Shells						
A32010	Open Elective II	Advanced Optimization Techniques and Applications	4	0	4	25	75	100
A32011		Signal Analysis and Condition Monitoring						
A32201	Lab	Computer Aided Testing, Analysis & Modeling Lab	0	4	2	25	75	100
A32202	Seminar	Seminar	-	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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II YEAR I SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A33207		Comprehensive Viva-Voce	--	--	4	--	100	100
A33208		Project work Review I	--	24	12	50	--	50
Total			**--**	**24**	**16**	**50**	**100**	**150**

II YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A34201		Project work Review II	--	8	4	50	--	50
A34202		Project Evaluation (Viva-Voce)	--	16	12	--	150	150
Total			**--**	**24**	**16**	**50**	**150**	**200**

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R15 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(A31001) ADVANCED MECHANICAL ENGINEERING DESIGN

CO 1: To know concept of various design models and introduced the concept of product design
CO 2: To introduced the concept of design for manufacturing process for plastic, rubber, ceramic, wood and glass
CO 3: To know concept of all theories of failures and creep.
CO 4: To know the concept of surface failure for dynamic contact stress, adhesive wear abrasive wear, corrosion wear and surface fatigue.
CO 5: To know the concept for breakeven analysis and value engineering.

(A31002) ADVANCED MECHANICS OF SOLIDS

CO 1: To determine the shear center for axi-symmetrical and un-symmetrical section.
CO 2: To determine stress for Winkler batch formula, radial stress in curved beams.
CO 3: To derive the expression for saint venant semi inverse method, prandtle elastic numbrane, narrow rectangular cross-section.
CO 4: To know concept of flat plate, kinematics strain displacement relation for plates, strain energy of plate, boundary centers for plates.
CO 5: To know the concept of contact stress for deflection of bodies in point contact, stress for two bodies in contact over narrow rectangular area.

(A31003) FATIGUE CREEP AND FRACTURE MECHANICS

CO 1: To know the concept of fracture behavior of metals and alloys and concept for basic stress analysis for Mohr's circle and mechanical properties.
CO 2: To know the concept of stress intensity factor and its use in fracture mechanics.
CO 3: To know the concept of elastic for plastic fracture mechanics for crack opening displacement, J-integral, R-curve analysis.
CO 4: To know concept of fatigue for co-efficient for Manson law and determine the expressions for Basque's law, Goodman, Soderberg and Gerbermean stress.
CO 5: To know the concept of fatigue of welded structure in creep.

(A31010)COMPUTATIONAL METHODS IN ENGINEERING

CO 1: To determine matrix inversion, iterative method, relaxation method and Newton cotes integration formula.
CO 2: To derive the expression for ID uncertained optimization.
CO 3: To know the concept of law-places equation, boundary condition, explicitly method- crank nickel son method
CO 4: To determine the wave equation by finite difference stability of numerical method – regression analysis- multiply linear and non-linear regression

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ELECTIVE – I

(A31004) ADVANCED FINITE ELEMENT ANALYSIS

CO 1: To know the concept of FEM application, shape function, boundary condition.
CO 2: To know the concept of axial bar element, stiffness matrix and analysis of stresses.
CO 3: To know the concept of CST, LST, force terms numerical integration, Jacobian matrix.
CO 4: To know concept of I-Dof heat conduction slab fins 2-D heat conduction
CO 5: To know concept of Eigen values, Eigen vector, natural frequency.

(A31005)APPLIED TRIBILOGY

CO 1: To know the historical background of viscosity, flow, shear stress, energy equation and physical properties of mineral oils.
CO 2: To understand the concept of circumferential oil flow through a bearing having circumferential oil groove and bearing design.
CO 3: To know the of elastohydro dynamic lubrication, film thickness equation and different regimes in EBL contact.
CO 4: To know the of Surface Topography, Surface characterization derivation of average Reynolds equation for partially lubricated surface.
CO 5: To study the different Laws of friction, classification of wear, mechanisms of wear quantitative laws of wear.

(A31006)THEORY OF ELASTICITY AND PLASTICITY

CO 1: To know the concept elasticity for 2D dimensional stress analysis Plane stress, Plane strain problem in rectangular and polar coordinates.
CO 2: To understand the concept analysis of stress and strain in three dimensions Strain spherical and deviatoric stress.
CO 3: To understand the concept bending of prismatic bars.
CO 4: To know the concept Plastic deformation of metals -, Structure of metals, Deformation Creep stress and Approximate equation of plasticity.
CO 5: To analyze Compression of metal under press.

ELECTIVE – II

(A31007)CONCURRENT ENGINEERING

CO 1: To know the concept of concurrent design of products and systems
CO 2: To know the concept of manufacturing system design procedure and part feeding alternatives.
CO 3: To know the concept of system design procedure design factors of part feeding alternatives floor layout and system alternative.
CO 4: To know concept of assembly workstation design and automated fabrication system.
CO 5: To study of automobile air conditioning module robot assembly of automobile rear axles.

(A31008)ADVANCED MECHANICS OF COMPOSITE MATERIALS

CO 1: Understand composite material and their reinforcements

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CO 2: Select constituent materials glass, carbon, aramid, ceramic fibers and resins
CO 3: Understand engineering mechanics, analysis and design, macro and micro mechanics of composites
CO 4: Develop and processing of metal- matrix, ceramic -matrix and carbon-carbon composites
CO 5: Understand and analyze the properties and performance of composites

(A31009)ADVANCED COMPUTER AIDED DESIGN

CO 1: To know the concept of principles of computer graphics
CO 2: To study the different cad tools and geometric modeling
CO 3: To know the concept of surface modeling
CO 4: To understand the concept of parametric representation of synthetic surfaces
CO 5: To understand the concept of geometricmodelling-3d and Collaborative Engineering

OPEN ELECTIVE – I
(A31010) COMPUTATIONAL METHODS IN ENGINEERING

CO 1: To determine matrix inversion, iterative method, relaxation method and Newton cotes integration formula.
CO 2: To derive the expression for ID uncertained optimization.
CO 3: To know the concept of law-places equation, boundary condition, explicitly method- crank nickelson method
CO 4: To determine the wave equation by finite difference stability of numerical method – regression analysis- multiply linear and non-linear regression

(A31011)DATA BASE MANAGEMENT SYSTEM

CO 1: To know the concept Database System Applications and Database languages
CO 2: To know the concept of introduction to the relational model
CO 3: To know the concept Form of basic SQL Query, multi valued dependencies forth normal form.
CO 4: To understand the concept of Relational Algebra and Calculus.
CO 5: To understand the concept of storage and indexing and Tree structure Indexing

(A31201) DYNAMICS AND ANALYSIS OF STRUCTURES LAB

CO 1: To understand and determination of damped natural frequency of vibration of the vibrating system.
CO 2: To determine the study state amplitude of forced vibrating system.
CO 3: To determine the natural frequency of given suitable using FFT analyzer.

I YEAR II SEMESTER

(A32001)ADVANCED MECHANICS OF MACHINERY

CO 1: To understand the concept of euler savery equation, collination axis, harts manns construction.

CO 2: To understand the concept of plain motion for polode curvature in the four bar mechanism.
CO 3: To understand the concept of synthesis graphical method for overlays methods, hroness and nelson motion atlas and Roberts theorems.
CO 4: To introduced the concept of synthesis graphical method for four bar linkage, rotocenter triangle burmister curve
CO 5: To determine the synthesis for four bar mechanism and path generation

(A32002)MECHANICAL VIBRATIONS

CO 1: To understand the concept of Euler Savery equation, Collination axis, harts manns construction.
CO 2: To understand the concept of plain motion for polode curvature in the four bar mechanism.
CO 3: To understand the concept of synthesis graphical method for overlays methods, Hroness and nelson motion atlas and Roberts theorems.
CO 4: To introduced the concept of synthesis graphical method for four bar linkage, rotocenter triangle burmister curve
CO 5: To determine the synthesis for four bar mechanism and path generation

(A32003) EXPERIMENTAL STRESS ANALYSIS

CO 1: To introduced the concept of plain stress and plain strain and strain measurement methods .
CO 2: To know the concept of recording instrument for static and data logging, dynamic recording.
CO 3: To know the concept of brittle coating for crack patterns, ceramics and moirefringer analysis.
CO 4: To understand the concept of photo elasticity, polariscope plane and circular polarized light .
CO 5: To understand the concept of 3-D photo elasticity for frozen stress methods, stress separation method.

ELECTIVE – III

(A32004)PRESSURE VESSEL DESIGN

CO 1: To know the concept of Materials- shapes of Vessels –stresses in cylindrical spherical and arbitrary.
CO 2: To study the theory of rectangular plates and Theory of circular plates.
CO 3: To understand the concept of discontinuity stresses in pressure vessels and Pressure vessel materials and their environment.
CO 4: To understand the concept of stress concentrations factors.
CO 5: To know the concept of design features in cylindrical vessel, circular hole and elliptical openings.

(A32005)DESIGN SYNTHESIS

CO 1: To study the Design process and methodologies of systematic design conceptual design variants.
CO 2: To understand the concept of Tolerance from process and function,
CO 3: To know the concept of design of case, forged sheet metal parts and welded constructions machine considerations.

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CO 4: To know the concept of design for assembly and dismantling modular constructions erection.
CO 5: To understand the concept of problems formulation for design optimization.

(A32006)INDUSTRIAL ROBOTICS

CO 1: To know and understand about automation, anatomy configuration, motion joints, drive systems for a robots.
CO 2: To know and understand the motion analysis and control systems for robot.
CO 3: To know and understand about the end effectors and machine vision for robot.
CO 4: To write and understand about the robot programming languages.
CO 5: To understand the working principle of cell design, control and application of robot.

ELECTIVE – IV

(A32007)MECHATRONICS

CO 1: To know and understand about the levels of systems, design process, measurement, control system, micro process-based controller of mechatronics systems.
CO 2: To know and understand about PN-junction diode, BJT, FET,DIA &TRIAC .To understand about the hydraulic, pneumatic, mechanical and electrical actuating systems.
CO 3: To understand about the digital electronic, logic control, micro processes and PLC
CO 4: To know the general design guide line for manual assembly processing.

(A32008)COMPUTATIONAL FLUID DYNAMICS

CO 1: Explain the differential equations for flow phenomena and numerical methods for their solution
CO 2: Critically analyze different mathematical models and computational methods for fluid flow and heat transfer simulations
CO 3: Solve computational problems related to fluid flows and heat transfer.
CO 4: Analyze the accuracy of a numerical solution by comparison to known solutions of simple test problems and by mesh refinement studies
CO 5: Evaluate forces in both internal and external flows. Use and develop flow simulation software for the most important classes of flows in engineering and science.

(A32009)THEORY OF PLATES AND SHELLS

CO 1: To determine the Slope and curvature of slightly bent plates
CO 2: To know the concept of symmetrical bending of circular plates
CO 3: To analyze the Rectangular plates with various edge conditions
CO 4: To study the concept of Approximate design of continuous plates with equal spans
CO 5: To understand the concept of general theory of cylindrical shells

OPEN ELECTIVE – II

(A32010)ADVANCED OPTIMIZATION TECHNIQUES AND APPLICATIONS

CO 1: To determine the single variable I-D optimization methods, unimodal function quadratic and cubic interpolation method.
CO 2: To understand the multivariable non-linear unconstrained optimization for Powell's Hookjeevs Rosen rock search method, gradient method.
CO 3: To understand the multistage desion process principle of optimality.
CO 4: To analysis the change in the constraints cost co-efficient and co-efficient constraints
CO 5: To determine the basic concept of Gomory cutting plane algorithm.

(A32011)SIGNAL ANALYSIS AND CONDITION MONITORING

CO 1: Understand the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors.
CO 2: Analyze for machinery condition monitoring and explain how this compliments monitoring the condition.
CO 3: Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure.
CO 4: Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system.
CO 5: Identify vibration measurement, lubrication oil analysis.

(A32201)COMPUTER AIDED TESTING, ANALYSIS AND MODELLING LAB

CO 1: To know and study of the microstructure for ferrous, non-ferrous and its analysis.
CO 2: To know and modeling of surface, solid drafting and assembling system
CO 3: To analysis the various structures by using a FEA packages

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ANURAG
ENGINEERING ENGINEERS

B.TECH.

ELECTRONICS AND COMMUNICATION ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	Excel in professional career & higher education, by acquiring knowledge in related fields of Electronics & Communication Engineering.
PEO II	:	Exhibit leadership in their profession, through technological ability and contemporary knowledge for solving real life problems appropriately that are technically sound, economically feasible & socially acceptable.
PEO III	:	Adapt to the emerging technologies for sustenance by exhibiting professionalism, ethical attitude & communication skills in their relevant areas of interest by engaging in lifelong learning.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	The ability to analyze, design and implement application specific electronic system for complex engineering problems, for Analog, Digital domain, communications and signal processing applications by applying the knowledge of basic mathematics and engineering fundamentals.
PSO 2	:	The ability to adapt for rapid changes in tools and technology with an understanding of societal and ecological issues relevant to professional engineering practice through life-long learning.
PSO 3	:	Excellent adaptability to function in multi-disciplinary work environment, good interpersonal skills as a leader in a team in appreciation of professional ethics and societal responsibilities.

PROGRAM OUTCOMES		
PO 1:	:	An ability to apply knowledge of mathematics, science, fundamentals of engineering to solve electronics and communication engineering problems.
PO 2	:	An ability to identify, formulate and analyze and solve complex electronics and communication Engineering using the first principles of mathematics and engineering sciences.

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PO 3	:	An ability to develop solutions to electronics and communication systems to meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO 4	:	An ability to design and perform experiments of electronic circuits and systems, analyze and interpret data to provide valid conclusions.
PO 5	:	An ability to learn, select and apply appropriate techniques, resources and modern engineering tools including prediction and modelling, to complex electronics and communication systems.
PO 6	:	An ability to assess the knowledge of contemporary issues to the societal responsibilities relevant to the professional practice.
PO 7	:	An ability to understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge for the need of sustainable development.
PO 8	:	An ability to demonstrate the understanding of professional, ethical responsibilities and norms of engineering practice.
PO 9	:	An ability to function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
PO 10	:	An ability to communicate effectively with the engineering community and with society at large.
PO 11	:	An ability to demonstrate knowledge and understanding of engineering and management principles and apply these to manage projects.
PO 12	:	An ability to recognize the need for, and engage in lifelong learning in the broadest context of technological change.

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ENGINEERING ENGINEERS

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ELECTRONICS AND COMMUNICATION ENGINEERING

R18 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA101BS	Mathematics - I	BS	3	1	0	4	25	75	100
2	AP102BS	Applied Physics	BS	3	1	0	4	25	75	100
3	EE103ES	Basic Electrical Engineering	ES	3	0	0	3	25	75	100
4	CS104ES	Programming for Problem Solving - I	ES	2	0	0	2	25	75	100
5	ME105ES	Engineering Graphics	ES	1	0	4	3	25	75	100
6	EN106HS	English Language Communication Skills Lab - I	HS	0	0	2	1	25	75	100
7	CS107ES	Programming for Problem Solving - I Lab	ES	0	0	2	1	25	75	100
8	AP108BS	Applied Physics Lab	BS	0	0	3	1.5	25	75	100
9	EE109ES	Basic Electrical Engineering Lab	ES	0	0	2	1	25	75	100
Total				**12**	**2**	**13**	**20.5**	**225**	**675**	**900**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA201BS	Mathematics - II	BS	3	1	0	4	25	75	100
2	CH202BS	Engineering Chemistry	BS	3	1	0	4	25	75	100
3	EN203HS	English	HS	2	0	0	2	25	75	100
4	CS204ES	Programming for Problem Solving - II	ES	2	0	0	2	25	75	100
5	CH205BS	Engineering Chemistry Lab	BS	0	0	3	1.5	25	75	100
6	ME206ES	Engineering Workshop	ES	0	0	3	1.5	25	75	100
7	CS207ES	Programming for Problem Solving - II Lab	ES	0	0	3	1.5	25	75	100
8	EN208HS	English Language Communication Skills Lab - II	HS	0	0	2	1	25	75	100
Total				**10**	**2**	**11**	**17.5**	**200**	**600**	**800**

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C- Credits

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II YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA301BS	Mathematics – III	BS	3	0	0	3	25	75	100
2	ES302BS	Environmental Studies	BS	3	0	0	3	25	75	100
3	EC303ES	Electronic Devices and Circuits	ES	3	0	0	3	25	75	100
4	EC304PC	Probability Theory and Stochastic Processes	PC	3	1	0	4	25	75	100
5	EC305PC	Signals and Systems	PC	3	0	0	3	25	75	100
6	EC306PC	Switching Theory and Logic Design	PC	3	0	0	3	25	75	100
7	EC307ES	Electronic Devices and Circuits Lab	ES	0	0	2	1	25	75	100
8	EC308PC	Basic Simulation Lab	PC	0	0	2	1	25	75	100
9	HS309MC	Gender Sensitization	MC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

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II YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA401BS	Mathematics – IV	BS	3	0	0	3	25	75	100
2	EE402PC	Control Systems	PC	3	0	0	3	25	75	100
3	EC403PC	Electromagnetic Theory and Transmission Lines	PC	3	0	0	3	25	75	100
4	EC404PC	Electronic Circuits & Analysis	PC	3	0	0	3	25	75	100
5	EC405PC	Analog Communications	PC	3	0	0	3	25	75	100
6	EC406PC	Pulse and Digital Circuits	PC	3	0	0	3	25	75	100
7	EC407PC	Analog Communications Lab	PC	0	0	2	1	25	75	100
8	EC408PC	Electronic & Pulse Circuits Lab	PC	0	0	2	1	25	75	100
9	HS409MC	Human values and Professional Ethics	MC	0	0	2	0	25	75	100
Total				**18**	**0**	**6**	**20**	**225**	**675**	**900**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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III YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	EC501PC	Antennas and Wave Propagation	PC	3	0	0	3	25	75	100
2	EC502PC	Digital Communications	PC	3	0	0	3	25	75	100
3	EC503PC	Linear and Digital IC Applications	PC	3	0	0	3	25	75	100
4	EC504PC	Computer Organization and Architecture	PC	3	0	0	3	25	75	100
5	EC505PC	Microprocessors and Microcontrollers	PC	3	0	0	3	25	75	100
6	PROFESSIONAL ELECTIVE - I		PE	3	0	0	3	25	75	100
7	EN506HS	Advanced English Communication Skills Lab	HS	0	0	2	1	25	75	100
8	EC507PC	Microprocessors and Microcontrollers Lab	PC	0	0	2	1	25	75	100
9	HS508MC	Constitution of India	MC	0	0	2	0	25	75	100
10	EC509PC	Linear and Digital IC Applications Lab	PC	0	0	2	1	25	75	100
Total				**18**	**1**	**8**	**21**	**250**	**750**	**1000**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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III YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	AE601HS	Managerial Economics and Financial Analysis	HS	3	0	0	3	25	75	100
2	EC602PC	Microwave Engineering	PC	3	1	0	4	25	75	100
3	EC603PC	Computer Networks	PC	3	0	0	3	25	75	100
4	EC604PC	Digital Signal Processing	PC	3	0	0	3	25	75	100
5	PROFESSIONAL ELECTIVE - II		PE	3	0	0	3	25	75	100
6	OPEN ELECTIVE - I		OE	3	0	0	3	25	75	100
7	EC605PC	Microwave Engineering and Digital Communications Lab	PC	0	0	2	1	25	75	100
8	EC606PC	Digital Signal Processing Lab	PC	0	0	2	1	25	75	100
9	HS607MC	Intellectual Property Rights	MC	0	0	2	0	25	75	100
Total				**18**	**1**	**6**	**21**	**225**	**675**	**900**

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IV YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MS701HS	Management Science	HS	3	0	0	3	25	75	100
2	EC702PC	VLSI Design	PC	3	0	0	3	25	75	100
3	PROFESSIONAL ELECTIVE - III		PE	3	0	0	3	25	75	100
4	PROFESSIONAL ELECTIVE - IV		PE	3	0	0	3	25	75	100
5	OPEN ELECTIVE - II		OE	3	0	0	3	25	75	100
6	EC703PC	E- CAD AND VLSI Design Lab	PC	0	0	2	1	25	75	100
7	EC704PW	MINIPROJECT EVALUATION	PW	0	0	4	2	25	75	100
8	EC705PW	PROJECT STAGE-I	PW	0	0	8	4	100	0	100
Total				**15**	**0**	**14**	**22**	**275**	**525**	**800**

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C- Credits

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IV YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	PROFESSIONAL ELECTIVE - V		PE	3	0	0	3	25	75	100
2	PROFESSIONAL ELECTIVE - VI		PE	3	0	0	3	25	75	100
3	OPEN ELECTIVE - III		OE	3	0	0	3	25	75	100
4	CS801PW	Seminar	PW	0	0	4	2	100	0	100
5	CS802PW	Project Stage-II	PW	0	0	12	6	25	75	100
Total				**9**	**0**	**16**	**17**	**200**	**300**	**500**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

Professional Electives	Course Code	Course Name
Professional Elective-I	EC511PE	Artificial Neural Networks
	EC512PE	Java Programming
	EC513PE	Electronic Measurements & Instrumentation
Professional Elective-II	EC621PE	Telecommunication Switching Systems
	EC622PE	Television Engineering
	EC623PE	Nano Materials and Technology
Professional Elective-III	EC731PE	Embedded Systems Design
	EC732PE	Optical Communications
	EC733PE	Biometric System
Professional Elective-IV:	EC741PE	Digital Image Processing
	EC742PE	Satellite Communications
	EC743PE	Network Security
Professional Elective-V	EC851PE	Cellular & Mobile Communications
	CS852PE	Internet of Things
	EC853PE	DSP Processors & Architectures
Professional Elective-VI	EC861PE	Scripting Languages
	EC862PE	Radar Systems
	EC863PE	Wireless Communications & Networks

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE611OE	Construction Materials	Civil Engineering
2	CE612OE	Waste Management	
3	EE611OE	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	EE612OE	Electrical Power Generation Systems	
5	ME611OE	Advanced Engineering Materials	Mechanical Engineering
6	ME612OE	Introduction to Automobile Engineering	
7	EC611OE	Principles of Communications	Electronics & Communication Engineering
8	EC612OE	Basic Electronic Circuits Simulation & Design	
9	CS611OE	Software Engineering	Computer Science & Engineering
10	CS612OE	Database Management Systems	

OPEN ELECTIVE- II			
S. No.	**Course Code**	**Name of the Course**	**Offering Department**
1	CE721OE	Disaster Management	Civil Engineering
2	CE722OE	Remote Sensing and Geographic Information System	
3	EE721OE	Maintenance of Electrical Systems	Electrical & Electronics Engineering
4	EE722OE	Renewable Energy Sources	
5	ME721OE	Fundamentals of Refrigeration & Air Conditioning	Mechanical Engineering
6	ME722OE	Industrial Robotics	
7	EC721OE	Principles of Signal Processing	Electronics & Communication Engineering
8	EC722OE	Nano Materials and Technology	
9	CS721OE	Object Oriented Analysis and Design	Computer Science & Engineering
10	CS722OE	Cyber Forensics	

OPEN ELECTIVE- III			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE831OE	Project Management	Civil Engineering
2	CE832OE	Safety Engineering	
3	EE831OE	Electrical Engineering Materials	Electrical & Electronics Engineering
4	EE832OE	Fuzzy Logic and its Applications	
5	ME831OE	Power Plant Engineering	Mechanical Engineering
6	ME832OE	Nano Technology	
7	EC831OE	Fundamentals of Embedded Systems	Electronics & Communication Engineering
8	EC832OE	Biometric Systems	
9	CS831OE	Software Project Management	Computer Science & Engineering
10	CS832OE	Human Computer Interaction	

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ENGINEERING ENGINEERS

B.TECH.

ELECTRONICS AND COMMUNICATION ENGINEERING

R18 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(MA101BS) MATHEMATICS – I
Linear Algebra and Calculus

CO 1: Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
CO 2: Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
CO 3: Analyze the convergence of sequence and series.
CO 4: Discuss the applications of mean value theorems to the mathematical problems, evaluation of improper integrals using Beta and Gamma functions.
CO 5: Find the extreme values of functions of two variables with / without constraints.

(AP102BS) APPLIED PHYSICS

CO 1: The student would be able to learn the fundamental concepts on Quantum behavior of matter in its micro state.
CO 2: The knowledge of fundamentals of Band theory, free electron theory, Wave optics enable the students to apply to various engineering applications.
CO 3: design, characterization and study of properties of Semiconducting materials and Lasers, Fiber Optics help the students to prepare new materials for various engineering applications.

(EE103ES) BASIC ELECTRICAL ENGINEERING

CO 1: Understand the importance of DC circuits and analyze theorems.
CO 2: Understand the concept of AC circuits and resonance.
CO 3: Concept of Magnetic Circuits and Determine the losses and efficiency of single phase transformers.
CO 4: Analyze the performance of DC machines and Induction motors.
CO 5: Demonstrate the principle of operation of Synchronous generator and importance of Electrical installations.

(CS104ES) PROGRAMMING FOR PROBLEM SOLVING – I

CO 1: Design algorithms and flowcharts for real world applications
CO 2: Know the usage of various operators in Program development
CO 3: Design programs involving decision and iteration structures.
CO 4: Apply the concepts code reusability using Functions
CO 5: Analyse the concepts of Arrays and Strings for real world problems.

(ME105ES) ENGINEERING GRAPHICS

CO 1: Understand engineering drawing and its place in society.
CO 2: Visualize the different aspects of Points, Lines and Planes.
CO 3: Acquire knowledge on projections of solids.
CO 4: Draw sections of solids and plan the drawing for development of surfaces.

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CO 5: Understand the isometric views and projections. Exposure to computer-aided geometric design and creating working drawings.

(EN106HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

CO 1: Understand the importance of phonetics.
CO 2: Understand the variants in Pronunciation.
CO 3: Differentiate formal and informal English in different situations.
CO 4: Understand the Intonation of English Language in the global world.
CO 5: Participate in Mock Interviews.

(CS107ES) PROGRAMMING FOR PROBLEM SOLVING LAB – I

CO 1: Formulate the algorithms and flowcharts for simple problems.
CO 2: Apply fundamental programming concepts, to solve simple problems
CO 3: Enhance debugging skills.
CO 4: Exercise conditional and iterative statements to Write C programs.
CO 5: Modularize the code with functions so that they can be reused.
CO 6: Represent and manipulate data with arrays and strings.

(AP108BS) APPLIED PHYSICS LAB

CO 1: Apply the various procedures and techniques for the experiments.
CO 2: Use the different measuring devices and meters to record the data with precision
CO 3: Test optical components using principles of interference and diffraction of light.
CO 4: Apply the mathematical concepts/equations to obtain quantitative results.
CO 5: Develop the basic communication through working in the groups and performing the laboratory experiments and by interpreting the results.

(EE109ES) BASIC ELECTRICAL ENGINEERING LAB

CO 1: Verify the various electrical laws and theorems with DC Excitation.
CO 2: Determine the losses, efficiency and regulation of single phase transformer.
CO 3: Obtain the performance of induction motors.
CO 4: Control the speed of DC shunt motor.
CO 5: Obtain the OC & SC characteristics of Synchronous generator.

I YEAR II SEMESTER

(MA201BS) MATHEMATICS – II

CO 1: Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
CO 2: Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
CO 3: Evaluate the multiple integrals.
CO 4: Identify the vector differential operators physically in engineering problems.
CO 5: Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

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(CH202BS) ENGINEERING CHEMISTRY

CO 1: Apply the knowledge of atomic, molecular and electronic changes related to conductivity.
CO 2: Analyze the troubles caused by impure water and method of purification of water.
CO 3: Apply the knowledge of electrode potentials for the protection of metals from corrosion.
CO 4: Explain the concept of configurational and conformational analysis of molecules and reaction mechanism.
CO 5: Apply the knowledge of polymers in every day's life.

(EN203HS) ENGLISH

CO 1: Get inspiration and motivation from Dr. C.V. Raman.
CO 2: Understanding ancient architecture of India.
CO 3: Know about invention of Blue Jeans.
CO 4: Learn what type of diet to take and maintain good health.
CO 5: Understand the result of hard work and confidence.

(CS204ES) PROGRAMMING FOR PROBLEM SOLVING – II

CO 1: Develop programs with user defined data types.
CO 2: Use dynamic memory allocation functions with pointers.
CO 3: Apply various file handling techniques for better data management.
CO 4: Distinguish between stacks and queues.
CO 5: Analyze various dynamic data structures.

(CH205BS) ENGINEERING CHEMISTRY LAB

CO 1: Determination of parameters like hardness and alkalinity of water.
CO 2: Estimation of rate constant of a reaction from concentration – time relationships.
CO 3: Determination of physical properties like surface tension and viscosity.
CO 4: Calculation of strength of compound using instrumentation techniques.
CO 5: To impart fundamental knowledge in handling the equipment/glassware and chemicals in the chemistry laboratory

(ME206ES) ENGINEERING WORKSHOP

CO 1: Practice on manufacturing of components using workshop trades including Carpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring and Black Smithy.
CO 2: Apply basic electrical engineering knowledge for house wiring practice.
CO 3: Identify and apply suitable tools for different trades of Engineering processes including Material removing, measuring and chiseling.
CO 4: Study and practice on Plumbing, Machine tools, Power tools, Wood working, Plastic Mounding and their operations.

(CS207ES) PROGRAMMING FOR PROBLEM SOLVING LAB – II

CO 1: Develop applications on user defined data types
CO 2: Apply dynamic memory allocation through pointers
CO 3: Use different data structures for create/update basic data files
CO 4: Implement linear data structures through stacks and queues

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CO 5: Implement various searching and sorting techniques, Linked lists.

(EN208HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB – II

CO 1: Understand the variants in Pronunciation.
CO 2: Differentiate Spoken and Written English in formal and informal situations.
CO 3: Understand the emphasis on Pronunciation of English Language in the global world.
CO 4: Apply strategies for Effective Communication in different situations.
CO 5: Participate in conversation, Public Speaking and Group Discussion.

II YEAR I SEMESTER

(MA301BS)MATHEMATICS-II

CO 1: Use Laplace transforms techniques for solving DE's.
CO 2: Expand given function as a Fourier series.
CO 3: Apply Fourier transforms.
CO 4: Evaluate the solution of Algebraic and Transcendental Equations and apply the concept of interpolation to find the values of the function.
CO 5: Evaluate numerical integrals and evaluate Numerical solution of Ordinary Differential Equations.

(ES302BS) ENVIRONMENTAL SCIENCE

CO 1: The multidisciplinary nature of environment, essence of environment, biodiversity and its Conservation
CO 2: About the natural resources and their protection
CO 3: About the causes and effects of environmental pollution as well as environmental issues
CO 4: About the management of environmental wastes, disasters and rules, regulations, policies for the protection of environment
CO 5: About the natural functioning of ecosystem

(EC303ES) ELECTRONIC DEVICES AND CIRCUITS

CO 1: Recognize the transport phenomena of charge carriers in a semiconductor.
CO 2: Analyze the different types of diodes, operation and its characteristics.
CO 3: Describe Bipolar Junction Transistors and Field Effect Transistors..
CO 4: Analyze the different biasing techniques used in BJTs and FETs.
CO 5: Understand the concept of feedback amplifiers and types feedback

(EC304PC)PROBABILITY THEORY & STOCHASTIC PROCESSES

CO 1: Defining various probability functions.
CO 2: Gain advanced and integrated understanding of the fundamentals and interrelationship between discrete and continuous random variables.
CO 3: Compute mean and variance for linear functions of two or more random variables.
CO 4: Apply the specialized knowledge in random processes to solve practical engineering problems.
CO 5: Compute and understand the concepts of noise and spectral characteristics of random signals

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(EC305PC) SIGNALS & SYSTEMS

CO 1: Distinguish different signals, systems and their time and frequency domain analysis.
CO 2: Understand the significance of FT and sampling types.
CO 3: Identify the conditions for transmission of signals through systems and physical realization of systems.
CO 4: Identify the significance of convolution & correlation functions and their relation
CO 5: Identify the significance of LT, ZT and their relation.

(EC306PC)SWITCHING THEORY AND LOGIC DESIGN

CO 1: Understand numeric information in different forms, e.g. different bases, signed integers, various course such as ASCII, gray and BCD..
CO 2: Postulates of Boolean algebra and to minimize combinational functions..
CO 3: Design and analyze combinational and sequential circuits.
CO 4: Design and application of synchronous state machines using flip-flops.
CO 5: Understand the concepts of FSM and ASM charts.

(EC307ES)ELECTRONIC DEVICES AND CIRCUITS LAB

CO 1: Analyze the characteristics of different electronic devices such as Diodes and Transistors.
CO 2: Understand frequency response of amplifiers.
CO 3: Operate simple circuits like Rectifiers.

(EC308PC) BASIC SIMULATION LAB

CO 1: Understand and generate different signals and perform operations on them.
CO 2: Apply the properties like convolution and correlation on signals using transforms.
CO 3: Find transforms of different signals and locate poles and Zeros.

(HS309MC) GENDER SENSITIZATION (MANDATORY COURSE)

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economy.
CO 5: Men and women students and professionals will be better equipped to work and live together as equals.

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II YEAR II SEMESTER

(MA401BS) MATHEMATICS-IV

CO 1: Analyze the complex functions with reference to their analyticity.
CO 2: Evaluate integration using Cauchy's integral theorem
CO 3: Find the Taylor's and Laurent's series expansion of complex functions.
CO 4: Evaluation of integrals using Residue theorem.
CO 5: Identify the transformations like translation, magnification, rotation and reflection and inversion. Transform a given function from z - plane to w – plane.

(EE306PC/EE402PC) CONTROL SYSTEMS

CO 1: The basic concepts of control systems, transfer function representation and time response analysis.
CO 2: Stability analysis of control systems in time domain and frequency response analysis.
CO 3: Stability analysis of control systems in frequency domain, classical control design techniques and state space analysis.

(EC403PC) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

CO 1: Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magneto static Fields.
CO 2: Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions.
CO 3: Analyze the Wave Equations for good conductors, good dielectrics and evaluate the UPW Characteristics for several practical media of interest.
CO 4: Analyze the transmission line parameters and configurations.

(EC404PC)ELECTRONIC CIRCUITS & ANALYSIS

CO 1: Design the single stage amplifiers.
CO 2: Understand the concepts of High Frequency Analysis of transistors.
CO 3: Design the multistage amplifiers
CO 4: Understand and design the power amplifiers
CO 5: Design tuned amplifiers useable for audio and Radio applications.

(EC405PC)ANALOG COMMUNICATIONS

CO 1: Analyze and design of various continuous wave and angle modulation and demodulation techniques.
CO 2: Understand the effect of noise present in continuous wave and angle modulation techniques.
CO 3: Apply the knowledge about AM , FM Transmitters and Receivers.
CO 4: Analyze different Receiver Models in Analog Modulation and Compare different Figure of Merits.

(EC406PC)PULSE AND DIGITAL CIRCUITS

CO 1: Understand the applications of diode as integrator. differentiator , clipper ,clamper circuits
CO 2: Learn various switching devices such as diode , transistor
CO 3: Design of triggering circuit for specific application

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CO 4: Difference between logic gates ,sampling gates

(EC407PC)ANALOG COMMUNICATIONS LAB

CO 1: Analyze the practical aspects of various analog modulation schemes.
CO 2: Evaluate the various measures that improve receiver performance.
CO 3: Apply the programming aspects of MATLAB in simulating various analog modulation techniques .

(EC408PC) ELECTRONIC & PULSE CIRCUITS LAB

CO 1: Understand amplifiers frequency response
CO 2: Design power amplifiers and Analyze different Analog amplifier circuits
CO 3: Design oscillators and multivibrators and synthesize numerous non-sinusoidal waveform generators.
CO 4: Analyze the response of linear and nonlinear wave shaping circuits.

(HS409MC)HUMAN VALUES AND PROFESSIONAL ETHICS (MANDATORY COURSE)

CO 1: Learns about dilemmas and moral issues and be able to apply these concepts to solve various professional problems
CO 2: Acquires and understanding of the basic concepts of Professional ethics and human values &also gain the practical implication of ethical theories.
CO 3: Knows the duties and responsibilities towards the society being in engineering profession.
CO 4: Students gain the practical implication of evacuation from risk and maintaining confidentiality.
CO 5: Meets the global challenges and develop the skills to sustaining in competitive environment

III YEAR I SEMESTER

(EC501PC) ANTENNAS AND WAVE PROPAGATION

CO 1: To list the basics of antennas and various parameters of antenna
CO 2: To explain the concepts of different types of arrays
CO 3: To summarize antennas operated in VHF & UHF ranges
CO 4: To analyze the reflectors used along with antennas and study the experimental arrangements for measuring the radiation properties of antenna.
CO 5: To interpret the concepts of ground wave Propagation, Space-Wave
CO 6: Propagation, various factors affecting radio wave propagation

(EC502PC) DIGITAL COMMUNICATIONS

CO 1: To describe the process of Sampling, Quantization and PCM techniques
CO 2: To analyze the error rate due to noise in the digital modulation techniques.
CO 3: To understand and Implement the concepts of information theory for source
Coding and discrete memory-less channels
CO 4: To implement linear block codes and Convolutional codes for error detection and correction

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CO 5: To know the different types of Spread Spectrum Modulation.

EC503PC: LINEAR AND DIGITAL IC APPLICATION

CO 1: CO1: To Summarize the basics of linear integrated circuits and explain operational amplifiers with applications
CO 2: Able to explain the comparator circuits like Schmitt trigger, astable multivibrator etc
CO 3: To describe analog to digital converters (ADC), and digital to analog converters (DAC) with its Specifications
CO 4: To construct and explain the timer circuits
CO 5: To interpret the applications of PLL and special ICs like 565,566

(EC504PC) COMPUTER ORGANIZATION AND ARCHITECTURE

CO 1: Basic structure of a digital computer
CO 2: Arithmetic operations of binary number system
CO 3: The organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
CO 4: Operating system functions, types, system calls.
CO 5: Memory management techniques and dead lock avoidance operating systems' file system implementation and its interface.

(EC505PC) MICROPROCESSORS AND MICROCONTROLLERS

CO 1: In depth Architectural Knowledge of microprocessor.
CO 2: Various signals and interrupts of 8086 and their usage.
CO 3: Fundamental programming using 8086.
CO 4: Interfacing Various Devices and Working.
CO 5: Working and programming of microcontroller.

PROFESSIONAL ELECITIVE-I
(EC511PE) ARTIFICIAL NEURAL NETWORKS

CO 1: Explain the function of artificial neural networks of the Back-prop, Hopfield and SOM type
CO 2: Explain the difference between supervised and unsupervised learning
CO 3: Describe the assumptions behind, and the derivations of the ANN algorithms dealt with in the course
CO 4: Give example of design and implementation for small problems
CO 5: Implement ANN algorithms to achieve signal processing, optimization, classification and process modeling

(EC512PE / CS405PC) JAVA PROGRAMMING

CO 1: Design, write and test a java program to implement a working understand the Write code to define classes and interfaces that uses class libraries such as java.lang, java.util,java.io.
CO 2: Use exception handling and multithreading in programs.
CO 3: Develop GUI applications.
CO 4: Give object oriented solutions for the complex and real world problems.

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(EC513PE) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

CO 1: Able to calculate the basic parameters like voltage, resistance etc. And predict the behavior of the instrument.
CO 2: Able to differentiate working and design the different digital voltmeters and signal generators.
CO 3: Able to interpret working and design the CRO and Able to calculate the frequency and time by using CRO.
CO 4: Explain the different types of the transducers and basic working principle.
CO 5: Able to design different types of bridges and unknown components are determined

(EN506HS) ADVANCED ENGLISH COMMUNICATION SKILLS LAB After completing this course, the student will be able to:

CO 1: Understand the importance of vocabulary and using in real life situations.
CO 2: Apply reading strategies to enhance reading comprehension skills
CO 3: Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.
CO 4: Develop presentation skills to apply in professional life.
CO 5: Apply Techniques to clear group discussions and Interviews.

(EC507PC) MICROPROCESSORS AND MICROCONTROLLERS LAB

After completing this course, the student will be able to:

CO 1: Apply the fundamentals of assembly level programming of microprocessors.
CO 2: Build a program on a microprocessor using instruction set of 8086.
CO 3: Design and implement 8051 microcontroller based systems
CO 4: Contrast how different I/O devices can be interfaced to processor and will explore several techniques of interfacing.

(HS508MC) CONSTITUTION OF INDIA

CO 1: Understand the meaning and historical perspective of constitution of India.
CO 2: Know fundamental rights of Indian citizen.
CO 3: Know structure, rights of federal and legislative bodies.
CO 4: president and parliament powers given by constitution.
CO 5: Know the local bodies' rights and limitations.

(EC509PC) LINEAR AND DIGITAL IC APPLICATIONS LAB

CO 1: Students will have a thorough understanding of operational amplifier (741).
CO 2: Students will be able to design circuits using operational amplifiers for various applications.
CO 3: Students will be able to design various combinational circuits using various Digital Integrated IC's.
CO 4: They can know the differences between Linear and Digital Integrated IC's.
CO 5: Students will demonstrate their knowledge by designing analog circuits & digital circuits

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III YEAR II SEMESTER

(MB601HS) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

CO 1: Understand the internal and external decisions to be made by managers
CO 2: Analyze the demand and supply conditions and assess the position of a company
CO 3: Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.
CO 4: Analyze real-world business problems with a systematic theoretical framework.
CO 5: Make optimal business decisions by integrating the concepts of economics, mathematics and statistics.

(EC602PC) MICROWAVE ENGINEERING

After completing this course, the student will be able to:
CO 1: Ability to describe the characteristics of waveguides and micro strip lines.
CO 2: Learn the principle of operation of klystron theory for microwave signal generation and amplification
CO 3: Learn the principle of operation of magnetron and TWT for microwave signal generation and amplification
CO 4: Differentiate the principle of operation of solid state devices and Interpret the theory for microwave signal generation and amplification
CO 5: Ability to do experiments for the measurement of RF power, Impedance, Attenuation, Frequency, VSWR etc.

(EC603PC) COMPUTER NETWORKS

CO 1: Explain the hierarchical, layered structure of typical network architecture. .
CO 2: Explain data link layer protocols like Stop and wait HDLC and PPP.
CO 3: Explain the Theory involved in network layers and protocols.
CO 4: Explain the Theory involved in network, transport and application layers and protocols.
CO 5: Explain the Encryption and decryption.

(EC604PC) DIGITAL SIGNAL PROCESSING

CO 1: Perform time frequency and Z transform analysis on signals and systems
CO 2: Understanding the inter-relationship between DFT and various transforms
CO 3: Understand the significance of various filter structures
CO 4: Design a digital filter for a given specification.
CO 5: Understand multi rate Digital signal processing

.PROFESSIONAL ELECTIVE-II
(EC621PE) TELECOMMUNICATION SWITCHING SYSTEMS

CO 1: Describe the Elements of switching systems.
CO 2: Calculate network traffic load and parameters
CO 3: Classify different switching systems and Interpret the switching network configurations
CO 4: Explain the signaling techniques
CO 5: Explain subscriber loop systems, routing and protocol for ISDN.

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(EC622PE) TELEVISION ENGINEERING

CO 1: Expected to understand the concept of TV transmission and reception.
CO 2: Acquired knowledge about monochrome TV receiver.
CO 3: Expected to learn about VHF.&UHF tuners
CO 4: Expected to learn about color separation, color coding etc.,
CO 5: Expected to learn about color receiver & digital TV receiver.

(EC623PE) NANO MATERIALS AND TECHNOLOGY

CO 1: Understand the basic concepts of Nano technology.
CO 2: Understand the basic concepts of Nano materials
CO 3: Familiar with fabrication process of Nano Technology.
CO 4: Known the scaling and role of electrons in solids and Nano Structures.
CO 5: Known the structures of Nano Devices.

OPEN ELECTIVE-I
(CE611OE) CONSTRUCTION MATERIALS (CE)

CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
CO 4: Students are Gain About Basic Knowledge on Timber and Other Materials
CO 5: Students are get knowledge on Modern construction materials.

(CE612OE) WASTE MANAGEMENT (CE)

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.
CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.
CO 3: Understand the working procedure in various industries sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.
CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.
CO 5: Understand the waste disposal methods and requirement of treatment plants.

(EE611OE) SOLAR PHOTOVOLTAIC SYSTEMS (EEE)

CO 1: Understand the basics of solar energy and its geometry.
CO 2: Analyze the various topologies of solar photovoltaic cells.
CO 3: Understand the protection and measurement of solar photovoltaic system.
CO 4: Understand the design considerations of solar photovoltaic system.
CO 5: Analyze the various maximum power point tracking techniques.

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(EE612OE) ELECTRICAL POWER GENERATION SYSTEMS (EEE)

CO 1: Understand the electrical power generation process from Thermal and Nuclear power stations.
CO 2: Analyze the electrical power generation from Hydro and Gas power stations.
CO 3: Analyze the electrical power generation by using solar energy.
CO 4: Understand the electrical power generation from wind energy & biomass energy.
CO 5: Know the working of fuel cells and ocean energy conversion.

(ME611OE) ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of Advanced materials
CO 2: Understand the basic concepts of ferrous and nonferrous metals and alloys.
CO 3: Understand the ceramics and composite materials
CO 4: To understand the application of super alloys and intermetallic
CO 5: Understand the basic methods of manufacturing various types of composite materials.

(ME612OE) INTRODUCTION TO AUTOMOBILE ENGINEERING (ME)

Analyze the basic lay-out of automobile, working and other details about I.C Engines used in automobiles.

CO 1: To gain the knowledge on working of ignition, Electrical systems.
CO 2: Understand how the transmission system works and the working knowledge of various Components in transmission system.
CO 3: Students will able to explain working principle of various parts of automobile such as axles, steering system and Suspension System.
CO 4: Understand the various braking systems and pollution standards and its significance.

(EC611OE) PRINCIPLES OF COMMUNICATIONS (ECE)

CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.

(EC612OE) BASIC ELECTRONC CIRCUITS SIMULATION & DESIGN (ECE)

CO 1: Describe circuits for PSpice simulation.
CO 2: Understand the types of dc - ac and their output variables analysis
CO 3: Understand the response of Transient analysis and obtain their output variables.
CO 4: Students can able to analyze and develop simulation circuit for different applications.

(CS611OE) SOFTWARE ENGINEERING (CSE)

CO 1: Apply software engineering principles and techniques.
CO 2: Analyze software system requirements.
CO 3: Produce efficient, reliable, robust and cost-effective software solutions.

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CO 4: Apply testing strategies.
CO 5: Ensure good quality software.

(CS612OE) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Design Entity- Relationship Model for enterprise level databases.
CO 2: Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
CO 3: Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
CO 4: Use of suitable Indices and Hashing mechanisms for real time implementation.
CO 5: Analyze various concurrency control protocols and working principles of recovery algorithms.

(EC605PC) MICROWAVE ENGINEERING AND DIGITAL COMMUNICATIONS LAB

Upon the completion of this course, the student will be able to
CO 1: Energize microwave bench and work with various components present in the bench.
CO 2: Do standing wave analysis and measure scattering coefficients of various microwave components.
CO 3: Generate modulated/coded waveform for a given Digital/Hybrid modulation scheme and perform demodulation.
CO 4: Assess the amount of bandwidth/bit rate required in each modulation scheme and compare the schemes

(EC606PC) DIGITAL SIGNAL PROCESSING LAB

Upon the completion of this course, the student will be able to
CO 1: To understand about the basic signal generation
CO 2: To learn Fourier Transform Concepts
CO 3: To design FIR filters
CO 4: To design IIR filters.
CO 5: Demonstrate their abilities towards DSP processor based implementation of DSP systems

(HS607MC) INTELLECTUAL PROPERTY RIGHTS (MANDATORY COURSE)

After completion of the course the student will be able to
CO 1: Understand the fundamentals of intellectual properties and its agencies.
CO 2: Know the trade mark registration process and its rights.
CO 3: Understand the fundamentals of copy rights and patent law.
CO 4: Know the trade secret determination and protection.
CO 5: Know the recent developments in protection of intellectual property rights.

IV YEAR I SEMESTER

(MS701HS) MANAGEMENT SCIENCE

CO 1: About management functions, theories and Organizational structures.

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CO 2: About Production methods, Techniques under quality control and inventory control.
CO 3: About functions & importance of HRM, Marketing functions and product life cycle.
CO 4: About techniques in Networking for time required to complete the project.
CO 5: About Corporate strategy implementation methods and other few contemporary management practices.

(EC702PC) VLSI DESIGN

CO 1: Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
CO 2: Draw the layout of any logic circuit which helps to understand and estimate parasitic of any circuit.
CO 3: Design different types of gate level modeling using CMOS inverter and analyze their transfer characteristics
CO 4: Design simple memories using MOS transistors and can understand design of large memories.
CO 5: Understand the Verilog HDL languages.

PROFESSIONAL ELECTIVE-III
(EC731PE) EMBEDDED SYSTEMS DESIGN

Upon the completion of this course, the student will be able to
CO 1: Understand the Embedded systems concepts
CO 2: Understand the architecture of PIC Microcontrollers and its operations.
CO 3: Understand the memory mapping and interrupts of PIC Microcontrollers.
CO 4: Understand the basic concepts of RTOS, Windows & LINUX
CO 5: Understand the hardware and software architectures embedded systems.

(EC732PE) OPTICAL COMMUNICATIONS

Upon the completion of this course, the student will be able to
CO 1: Understanding characteristics of the optical fiber and various losses in the optical communication systems.
CO 2: Ability to analyze the Types of Dispersions and various types of joints in fiber optics.
CO 3: Understand basics, characteristics of LASER Diodes & LEDs and analyze how to launch the Power into Optical Fiber.
CO 4: Understand basics of Optical Detectors and their characteristics
CO 5: To gain the Knowledge of Optical System Design and the WDM concepts

(EC733PE) BIOMETRIC SYSTEMS

At the end of the course students should be able to:
CO 1: Understand differences between a biometric method and a biometric system.
CO 2: Organize and conduct biometric data collection processes.
CO 3: Understand the concepts of IRIS recognition.
CO 4: Understand the concepts of FACE recognition.
CO 5: Understand how to use biometric databases in system evaluation.

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PROFESSIONAL ELECTIVE-IV
(EC706PC) DIGITAL IMAGE PROCESSING

CO 1: Review the fundamental concepts of a digital image processing system and analyze images in the frequency domain using various transforms.
CO 2: Evaluate the techniques for image enhancement and image restoration.
CO 3: Analyze the Image segmentation concepts
CO 4: Categorize various compression techniques.
CO 5: Evaluate the techniques for image morphological processing and image restoration

(EC742PE) SATELLITE COMMUNICATIONS

Upon the completion of this course, the student will be able to
CO 1: Understand the communication satellite mechanics
CO 2: Know about the satellite internal sub systems for communication applications
CO 3: Design the power budget for satellite links
CO 4: Understand various constellations of satellite and their applications
CO 5: Know about the principles of GPS

.

(EC743PE) NETWORK SECURITY

Upon the successful completion of this course, the student will be able to:
CO 1: Analyze the importance of Network Security in real world.
CO 2: Designing and analysis of different encryption Algorithms.
CO 3: Designing and analysis of different Authentication Algorithms.
CO 4: Implementation of MAC and Hash functions, security at different layers of a network.
CO 5: Explore different types of intruders and viruses

OPEN ELECTIVE-II
(CE721OE) DISASTER MANAGEMENT (CE)

CO 1: Application of different approaches, human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(CE722OE) REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM (CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

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(EE721OE) MAINTAINANCE OF ELECTRICAL SYSTEMS (EEE)

CO 1: Identify the Engineering materials, properties and applications.
CO 2: Test the domestic appliances.
CO 3: Know the use of UPS and SMPS and maintenance of power devices.
CO 4: Understand the maintenance of batteries, ups/inverter, motors and starters.
CO 5: Rescue a person met with Electric shock.

(EE722OE/ EE511PE) RENEWABLE ENERGY SOURCES (EEE)

CO 1: Learn the principles of solar radiation and collection of solar energy.
CO 2: Understand the various solar energy storage methods and solar applications.
CO 3: Analyze the Wind energy conversion and Biomass energy conversion.
CO 4: Analyze the geothermal energy conversion and ocean energy conversion.
CO 5: Analyze the various direct energy conversion devices.

(ME721OE) FUNDAMENTALS OF REFRIGERATION & AIR CONDITIOING (ME)

CO 1: Ability to understand various refrigeration systems.
CO 2: Ability to understand the operation of various devices of VCR system.
CO 3: Ability to demonstrate the working of refrigeration equipments.
CO 4: Ability to understand various psychometric processes.
CO 5: Ability to explain the air-conditioning equipment.

(ME722OE) INDUSTRIAL ROBOTICS (ME)

CO 1: Understand the basic components of Robots and differentiate types of robots and robot grippers.
CO 2: Model forward and inverse kinematics of robot manipulators.
CO 3: Analyze forces in links and joints of a robot.
CO 4: Programme a robot to perform tasks in industrial applications.
CO 5: Design intelligent robots using sensors.

(EC721OE) PRINCIPLES OF SIGNAL PROCESSING (ECE)

CO 1: Perform Fourier transform and Z transform analysis on signals and systems
CO 2: Understanding the inter-relationship between DFT and various transforms
CO 3: Understand the Discrete Fourier series and various transforms
CO 4: Ability to design various IIR digital filter structures
CO 5: Ability to design a digital FIR filter for a given specification.

(EC623PE/EC722OE) NANO MATERIALS AND TECHNOLOGY (ECE)

After completion of the course the student will be able to
CO 1: Understand the basic concepts of Nano technology.
CO 2: Understand the basic concepts of Nano materials
CO 3: Familiar with fabrication process of Nano Technology.
CO 4: Known the scaling and role of electrons in solids and Nanostructures.
CO 5: Understand the structures of Nan devices.

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(CS721OE) OBJECT ORIENTED ANALYSIS AND DESIGN (CSE)

CO 1: Demonstrate the concepts and principles of object oriented programming.
CO 2: Understand the purposes, major components and key mechanisms of Class and Object Diagram.
CO 3: Describe the basic resource management responsibilities of Interaction Diagram.
CO 4: Knowledge on State-chart Diagram.
CO 5: Applying the techniques for Component and Deployment Diagrams.

(EC703PC) VLSI & E-CAD LAB

Upon successful completion of this course, students should be able to:
CO 1: Understand the concepts of digital system design methods through practical domain.
CO 2: Design combinational and sequential circuits
CO 3: Analyze and layout design of CMOS circuits in micron and submicron level using any platform
CO 4: Learn techniques and engineering tools to design & implement.

IV YEAR II SEMESTER

PROFESSIONAL ELECTIVE-V
(EC851PE) CELLULAR AND MOBILE COMMUNICATIONS

Upon successful completion of this course, students should be able to:
CO 1: Discuss cellular radio concepts.
CO 2: Identify various propagation effects.
CO 3: To have knowledge of the mobile antenna specifications.
CO 4: Understand the concepts of handoffs and dropped calls.
CO 5: Understand the GSM architecture and Classify multiple access techniques in mobile communication

(CS852PE) INTERNET OF THINGS

Upon successful completion of this course, students should be able to:
CO 1: Understand the concepts of Internet of Things.
CO 2: Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
CO 3: Apply data analytics and use cloud offerings related to Internet of Things.
CO 4: Interpret the impact and challenges posed by Internet of Things leading to Industry perspective.
CO 5: Analyze applications of Internet of Things in real time scenario.

(EC853PE) DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES

Upon successful completion of this course, students should be able to:
CO 1: Understand the concepts of Digital transform techniques and DSP implementation
CO 2: Understand the architectures of Programmable DSP Devices.
CO 3: Be able to write simple assembly language programs using instruction set of TMS320C54xx.
CO 4: Understand the architectures of analog devices like ADSP 2100, ADSP 2181 and Blackfin processor.

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CO 5: Understand the interfacing techniques to memory and I/O devices to DSP devices.

PROFESSIONAL ELECTIVE-VI
(EC861PE) SCRIPTING LANGUAGES

Upon successful completion of this course, students should be able to:

CO 1: Ability to create and run scripts using PHP.
CO 2: Create PHP authentication Methodology for security issues.
CO 3: Design, code, and test applications using Python scripts.
CO 4: Ability to use strings, list, tuples, and dictionaries in python script.
CO 5: Ability to create and run scripts using perl.

(EC862PE) RADAR SYSTEMS

Upon completion of the course, the students are able

CO 1: To derive and discuss the Range equation and the nature of detection.
CO 2: To apply Doppler principle to radars and hence detect moving targets.
CO 3: To understand the MTI and Doppler radars techniques.
CO 4: To understand the tracking radars techniques
CO 5: To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.

(EC863PE) WIRELESS COMMUNCIATIONS AND NETWORKS

Upon successful completion of this course, students should be able to:

CO 1: Understand the Principles of wireless communications and fundamentals of wireless networking.
CO 2: Analyze various multiple access schemes used in wireless communication.
CO 3: Understand wireless wide area network and their performance analysis.
CO 4: Familiar with some of the existing and emerging wireless standards.
CO 5: Understand the concept of orthogonal frequency division multiplexing.

OPEN ELECTIVE - III
(CE831OE) PROJECT MANAGEMENT (CE)

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
CO 2: Use the mechanized construction equipments at different situations or any huge projects
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management, estimation and project planning techniques
CO 5: Use the CPM – PERT Problems in project scheduling

(CE831OE) SAFETY ENGINEERING (CE)

CO 1: Know how to Handle and Protect the Machine and himself while working on it
CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment

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CO 3: Understand the knowledge of safety rules and regulations of working at construction industry
CO 4: Understand the knowledge about working at all stages in different heights at construction site
CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(EE831OE) ELECTRICAL ENGINEERING MATERIALS (EEE)

CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Understand the properties and importance of insulating and dielectric medium.
CO 3: Evaluate magnetic materials and their behavior.
CO 4: Evaluate semiconductor materials and technologies.
CO 5: Know the materials used in electrical engineering and applications.

(EE832OE) FUZZY LOGIC AND ITS APPLICATIONS (EEE)

CO 1: Operation and properties of crisp and fuzzy logic.
CO 2: Operation and properties of crisp relations and fuzzy relations.
CO 3: Laws and inference of classical propositional, predicate and fuzzy propositional logic.
CO 4: Membership value assignment.
CO 5: Methods of defuzzification and fuzzy rule based system.

(ME831OE) POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine and gas turbine power plant.
CO 3: To know the concept of hydroelectric power plant.
CO 4: To know the concept of nuclear power stations and non-conventional power sources.
CO 5: Understand the power plant economics and environmental considerations.

(ME832OE) NANO TECHNOLOGY (ME)

CO 1: Apply engineering and physics concepts to the Nano-scale and non-continuum domain.
CO 2: Understand Carbon Nano Tubes structures and manufacturing process.
CO 3: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of Nano materials.
CO 4: Understand the principles and microelectronics fabrication.
CO 5: Understand the concept of Convective Heat Transfer in Nano fluids.

(EC831OE) FUNDAMENTALS OF EMBEDDED SYSTEMS (ECE)

CO 1: Summarize the different development tool for embedded system, features of advanced buses for distributed data transfer in system design.

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CO 2: Develop the different processors on hardware and software for the development of embedded system design.
CO 3: Contrast the basics of embedded system Firmware.
CO 4: Implement the concepts of RTOS in real time programming
CO 5: Understand the development of distributed embedded system design.

(EC733PE/EC832OE) BIOMETRIC SYSTEMS (ECE)

CO 1: Understand differences between a biometric method and a biometric system.
CO 2: Organize and conduct biometric data collection processes.
CO 3: Understand the concepts of IRIS recognition.
CO 4: Understand the concepts of FACE recognition.
CO 5: Understand how to use biometric databases in system evaluation.

(CS831OE) SOFTWARE PROJECT MANAGEMENT (CSE)

CO 1: Apply the practice of project management in delivering of projects.
CO 2: Evaluate the project against strategic, technical and economic criteria.
CO 3: Identify effort estimation and activity plan of a project.
CO 4: Categorize and prioritize actions for risk management.
CO 5: Evaluate the characteristics of various team structures.

(CS832OE) HUMAN COMPUTER INTERACTION (CSE)

CO 1: Identify and formulate characteristics and components of graphical user interface.
CO 2: Apply an interactive design process and universal design principles to designing HCI systems
CO 3: Analyze & implement various design paradigms for human computer interaction.
CO 4: Apply the navigation schemes through window, device and screen based controls
CO 5: Use HCI in the software process.

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I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A51001	English-I	HS	2	1	2	25	75	100
2	A51002	Mathematics - I	BS	3	1	3	25	75	100
3	A51003	Engineering Physics-I	BS	3	-	3	25	75	100
4	A51005	Computer Programming – I	ES	3	-	3	25	75	100
5	A51008	Electrical Circuits	ES	3	1	3	25	75	100
6	A51009	Engineering Graphics	ES	2	-	2	25	75	100
7	A51201	English Language Communication Skills Lab-I	HS	-	3	2	25	75	100
8	A51202	Computer Programming Lab - I	BS	-	3	2	25	75	100
9	A51205	Engineering Physic Lab	ES	-	3	2	25	75	100
10	A51206	Engineering Workshop	ES	-	3	2	25	75	100
Total				**16**	**15**	**24**	**250**	**750**	**1000**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A52001	English-II	HS	2	1	2	25	75	100
2	A52002	Mathematics – II	BS	3	1	3	25	75	100
3	A52003	Engineering Physics-II	BS	2	1	2	25	75	100
4	A52008	Mathematics – III	BS	3		3	25	75	100
5	A52009	Engineering Chemistry	BS	3	1	3	25	75	100
6	A52010	Electronic Devices and Circuits	PC	3		3	25	75	100
7	A52201	English Language Communication Skills Lab-II	HS	-	3	2	25	75	100
8	A52205	Engineering Chemistry Lab	BS	-	3	2	25	75	100
9	A52206	IT Work shop	ES	-	3	2	25	75	100
10	A52207	Electronic Devices and Circuits Lab	PC	-	3	2	25	75	100
Total				**16**	**16**	**24**	**250**	**750**	**1000**

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II YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A53016	Environmental Studies	HS	3	-	3	25	75	100
2	A53007	Mathematics –IV	BS	3	1	3	25	75	100
3	A53018	Computer Programming-II	ES	4	-	4	25	75	100
4	A53008	Switching Theory and Logic Design	PC	3	1	3	25	75	100
5	A53019	Electronic Circuits Analysis	PC	4	1	4	25	75	100
6	A53020	Probability Theory & Stochastic Processes	PC	3	1	3	25	75	100
7	A53210	Computer Programming-II Lab	ES	-	3	2	25	75	100
8	A53211	Electronic Circuits Analysis Lab	PC	-	3	2	25	75	100
9	A53212	Gender Sensitization	MC	-	3	-	25	75	100
Total				**20**	**13**	**24**	**225**	**675**	**900**

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C- Credits

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II YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A54008	Managerial Economics &Financial Analysis	HS	3	0	3	25	75	100
2	A50017	Principles of Electrical Engineering	ES	3	1	3	25	75	100
3	A54018	Pulse and Digital Circuits	PC	3	1	3	25	75	100
4	A54019	Electromagnetic Theory and Transmission Lines	PC	4	0	4	25	75	100
5	A54020	Signals and Systems	PC	4	0	4	25	75	100
6	A54021	Digital Design Through Verilog HDL	PC	3	0	3	25	75	100
7	A54210	Electrical Engineering Lab	ES	-	3	2	25	75	100
8	A54211	Basic Simulation Lab	PC	-	3	2	25	75	100
9	A54212	Human values and Professional ethics	MC	-	2	-	25	75	100
Total				**20**	**10**	**24**	**225**	**675**	**900**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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III YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A55025	Computer Organization and Operating System	ES	3	0	3	25	75	100
2	A55026	Control Systems Engineering	PC	4	0	4	25	75	100
3	A55027	Antennas & Wave Propagation	PC	4	1	4	25	75	100
4	A55028	Analog Communications	PC	3	1	3	25	75	100
5	A55009	Linear IC Applications	PC	3	1	3	25	75	100
6	PROFESSIONAL ELECTIVE - I								
	A55029	Electronic Measurements & Instrumentation	PE	3	0	3	25	75	100
	A55030	Artificial Neural Networks							
	A55031	EMI/EMC							
7	A55207	PC & IC Lab	PC	-	3	2	25	75	100
8	A55208	Analog Communications Lab	PC	-	3	2	25	75	100
Total				**20**	**9**	**24**	**225**	**675**	**900**

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III YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A56022	Management Science	HS	3	0	3	25	75	100
2	A56023	Microprocessors and Microcontrollers	PC	3	1	3	25	75	100
3	A56024	Digital Communications	PC	4	1	4	25	75	100
4	A56025	Digital Signal Processing	PC	4	1	4	25	75	100
5	PROFESSIONAL ELECTIVE - II								
	A56026	Telecommunication switching Systems	PE	3	1	3	25	75	100
	A56027	Satellite Communications							
	A56020	Nanotechnology							
6	OPEN ELECTIVE-I		OE	3	0	3	25	75	100
7	A56207	Digital Signal Processing Lab	PC	-	3	2	25	75	100
8	A56208	Microprocessors and Microcontrollers Lab	PC	-	3	2	25	75	100
Total				**20**	**10**	**24**	**200**	**600**	**800**

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IV YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A57033	Computer Networks	PC	3	0	3	25	75	100
2	A57029	Microwave Engineering	PC	4	0	4	25	75	100
3	A57030	VLSI Design	PC	3	1	3	25	75	100
4	PROFESSIONAL ELECTIVE - III								
	A57031	Embedded Systems Design	PE	3	0	3	25	75	100
	A57032	Biometric System							
	A57028	Optical Communications							
5	PROFESSIONAL ELECTIVE - IV								
	A57034	Digital Signal Processors & Architectures	PE	3	0	3	25	75	100
	A57035	Digital Image Processing							
	A57036	Television Engineering							
6	OPEN ELECTIVE-II		OE	3	0	3	25	75	100
7	A57210	Advanced English Language Communication Skills Lab	HS	-	3	2	25	75	100
8	A57211	Microwave and Digital Communications Lab	PC	-	3	2	25	75	100
9	A57212	Mini Project	PW	-	3	2	-	100	100
Total				**19**	11	**25**	**200**	**700**	**900**

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IV YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	PROFESSIONAL ELECTIVE - V								
	A58019	Cellular & Mobile Communications	PE	3	1	3	25	75	100
	A58020	Radar Systems							
	A58021	Network Security							
2	PROFESSIONAL ELECTIVE - VI								
	A58022	Wireless Communications & Networks	PE	3	1	3	25	75	100
	A58023	Internet of Things							
	A58024	Scripting Languages							
3	OPEN ELECTIVE-III		OE	3	0	3	25	75	100
7	A58210	Seminar	PW	-	3	2	100		100
8	A58211	Major Project	PW	-	15	10	50	150	200
9	A58212	Comprehensive Viva	PW	-	-	2		100	100
Total				9	21	23	225	475	700

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S. No	**Course Code**	**Course**	**Offering Department**
1	A56301	Construction Materials	Civil Engineering
2	A56302	Waste Management	
3	A56303	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	A56304	Maintenance of Electrical Systems	
5	A56305	Advanced Engineering Materials	Mechanical Engineering
6	A56306	Mechatronics	
7	A56307	Principles of Communication Systems	Electronics & Communication Engineering
8	A56308	Electronic Measuring Instruments	
9	A56309	Java Programming	Computer Science & Engineering
10	A56310	Computer Networks	

OPEN ELECTIVE- II			
S. No.	**Course Code**	**Subject**	**Offering Department**
1	A57301	Disaster Management and Mitigation	Civil Engineering
2	A57003	Geological Information System & Remote Sensing	
3	A57302	Energy Storage Systems	Electrical & Electronics Engineering
4	A57303	Electrical Engineering Materials	
5	A57022	Power Plant Engineering	Mechanical Engineering
6	A57304	Industrial Robotics	
7	A57305	Computer Organization	Electronics & Communication Engineering
8	A57306	Principles of Signal Processing	
9	A57307	Database Management Systems	Computer Science & Engineering
10	A57308	Web Technologies	

OPEN ELECTIVE- III			
S. No	**Course Code**	**Subject**	**Offering Department**
1	A58301	Construction Technology and Project Management	Civil Engineering
2	A58302	Safety Engineering	
3	A58303	Energy conservation and Audit	Electrical & Electronics Engineering
4	A58304	Artificial Neural Networks	
5	A58305	Renewable Energy Sources	Mechanical Engineering
6	A58306	Automobile Engineering	
7	A58307	Nanotechnology	Electronics & Communication Engineering
8	A58308	Biometric System	
9	A58309	Game Theory with Engineering Applications	Computer Science & Engineering
10	A58310	Software Engineering	

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ANURAG
ENGINEERING ENGINEERS

B.TECH.

ELECTRONICS AND COMMUNICATION ENGINEERING

R15 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(A51001) ENGLISH-I

At the end of the course the students will be able to

CO 1: Narrate the stories and know the significance of humor.
CO 2: Promote awareness amongst students how visvesvaraya became a role model to others.
CO 3: Create awareness in students the development & security features of polymer banknotes.
CO 4: How to utilize organs know the importance of life. Awareness on every day is a new day
CO 5: Students know about accidents often happen because of carelessness. If we take care can avoid Accidents.

(A51002) MATHEMATICS-I

At the end of the course the students will be able to

CO 1: Understand Rolle's and the Mean value theorems and to verify the Mean value theorems and Apply partial derivatives to study maxima and minima of functions of two variables.
CO 2: Define rank and elementary transformations of a matrix and Discuss Non homogeneous and homogeneous system of equations.
CO 3: Compute Eigen values and corresponding Eigen vectors of a square matrix.
CO 4: Specify standard methods for solving differential equations and their applications in geometrical and physical problems.
CO 5: Identify different types of higher order differential equations and their applications in engineering problem solving.

(A51003)ENGINEERING PHYSICS-1

CO 1: Understand the intensity variation of light due to interference, diffraction and polarization.
CO 2: Employ the knowledge of crystallography and X-Rays to understand the structure-property relationship of materials.
CO 3: Implement the concept of various distributions and statistical mechanics for research applications.
CO 4: Understand the classification of Magnetic materials, Superconductors and their applications in various fields.
CO 5: Acquire basic knowledge of dielectrics and the applications of piezo, pyro and Ferro electric materials.

(A51005) COMPUTER PROGRAMMING – I

At the end of the course the students will be able to

CO 1: Ability to design algorithmic solutions to problems.
CO 2: Ability to convert algorithms to C-Programs
CO 3: to write, compile and debug programs in C Language
CO 4: Ability to write Programs using selection and repetition statements
CO 5: Ability to write programs using Arrays and Strings

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CO 6: Ability to design structured programming.

(A51008) ELECTRICAL CIRCUITS

At the end of the course the students will be able to

CO 1: To develop a basic concepts of electrical components, energy sources, their various types of connections and solutions of D.C circuits.

CO 2: To develop basic concepts of magnetic circuits, Faraday's Laws and analysis of series and parallel magnetic circuits.

CO 3: To develop a basic concept of different periodic waveforms, complex power, J-notation.

CO 4: To develop basic concepts of various types of connections of R-L, R-C, R-L-C and their solutions, concept of resonance of A.C circuits.

CO 5: To develop solutions of various complex circuit connections by using different theorems of D.C & A.C excitations.

(A51009) ENGINEERING GRAPHICS

At the end of the course the students will be able to

CO 1: To Know the importance of Engineering Graphics and to represent the various Polygons, Curves, Conic Sections, Cycloids and Involutes used in Engineering Graphics.

CO 2: To Draw and understand the Principles involved in Orthographic Projections and to represent the Principles involved in Points, Lines and Traces.

CO 3: To Draw and understand the construction Principles involved in Planes and Solids.

CO 4: To Draw and understand the construction Principles involved in Isometric Projections.

CO 5: To Draw and understand about Conversion of Orthographic Views to Isometric Views and also represent its Transformation of Projections.

(A51201) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

At the end of the course the students will be able to

CO 1: Get familiarity with vowels and consonants and speak with pronunciation. Learn to communicate in individual activates.

CO 2: Learn to reduce mother tongue influence for intelligibility. Gaining confidence using language in conversations and dialogues

CO 3: Better understanding of pronunciation through syllables and clusters. Learning etiquette in different situations make the students more professional.

CO 4: Mastering supra segmental features of phonetics thereby improving correct pronunciation. Improve presentation skill.

CO 5: Neutralization of accent for intelligibility. Improve employability skills of the students.

(A51214) Computer Programming Lab - I

At the end of the course the students will be able to

CO 1: To make the student to implement various sorting and searching techniques

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CO 2: To introduce the student to structures, unions, and enumeration types and operations on them
CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.
CO 5: To make the student to create various types of files in 'C' Language.

(A51205)ENGINEERING PHYSICS LAB

At the end of the course the students will be able to
CO 1: Elucidate the concepts of physics through involvement in the experiment by applying theoretical knowledge.
CO 2: Illustrate the basics of electromagnetism, optics, mechanics, semiconductors & quantum theory.
CO 3: Develop an ability to apply the knowledge of physics experiments in the later studies.

(A51206)ENGINEERING WORKSHOP LAB

At the end of the course the students will be able to
CO 1: To make a lap joint.
CO 2: To make a dovetail- joint.
CO 3: To make a T-bridle joint.
CO 4: To prepare a flat filing.
CO 5: To prepare a step cutting.
CO 6: To prepare an angular cutting.
CO 7: To prepare an open scoop.
CO 8: To prepare a rectangular tray.
CO 9: To prepare a square tin.
CO 10: To understand and to give the connections for one light point control by one single pole switch.
CO 11: To understand and to give the connections for one light point control by two-two way switches (parallel connections).
CO 12: To understand and to give the connections for to-connect an electrical bell by using bell- push.
CO 13: To understand and to give the connections for two light points controlled by one single pole switch.
CO 14: To prepare a pipe joint, tap and pressing- connections by using plumbing.
CO 15: To apply different operations to be performed on the lathe machines.
CO 16: To prepare switch boards, wood drilling and threading different various sizes.

I YEAR II SEMESTER

(A52001) ENGLISH-II

At the end of the course the students will be able to
CO 1: Understand the social behavior of the current society.
CO 2: Promote awareness regarding how India achieved success with human values.
CO 3: Create awareness regarding the key for success through Narayana Murthy words.
CO 4: Realize the hardship in the

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CO 5: life of Sachin Tendulkar to reach success.
CO 6: Know about the secret of success and happiness in the words of Swami Vivekananda quoting from the Bhagavad geetha

(A52002) MATHEMATICS – II

CO 1: Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
CO 2: Apply Laplace transform to solve differential equations which will be converted to algebraic
CO 3: Evaluate double integrals by changing variables, changing order and triple integration Calculate line integrals along piecewise smooth paths, interpret such quantities as work done by a force
CO 4: Apply Green's theorem to evaluate line integrals along simple closed contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and Divergence theorem to give physical interpretation of the divergence of a vector field
CO 5: Develop Fourier series of periodic functions.

(A52003) ENGINEERING PHYSICS – II

CO 1: Having the knowledge of semiconductors & fiber optics, there will be a chance to know their applications.
CO 2: There will be a chance for them to use the subject as a mathematical tool to solve their real life problems.
CO 3: The students will be able to know the working of different lasers & their real life applications.

(A52008) MATHEMATICS-III

CO 1: Determination of roots of an equation of the form f(x)=0 has great importance in the fields of science and engineering. Calculate some simple methods of obtaining approximate roots of algebraic and transcendental equations.
CO 2: Solutions of linear systems of equations can be found by numerical methods known as direct and indirect methods such as Gauss elimination and its modifications ,Jacobi and Gauss –seidel iterative methods, made the difference between those methods.
CO 3: Interpolate the values using the techniques of Newton's forward and backward, Gauss forward and backward, Lagrange's interpolation, and spline interpolation..
CO 4: Analyze and calculate numerical differentiation and numerical integration methods.
CO 5: Calculate solutions of ODE using Taylor's, Euler's, picard's, Runge-Kutta, Predictor and corrector methods.
CO 6: Calculate boundary value problems
CO 7: Calculate Solutions of partial differential equation

(A52009) ENGINEERING CHEMISTRY

CO 1: As commences with fundamentals which indeed takes the individual students to be more conversant with apparatus and allied.

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CO 2: Gets equipped with the technical importance of knowing the extent of hardness and Consciousness of units.
CO 3: Students gets augmented the adroitness and keep aware of some industrial determination techniques
CO 4: As commences with fundamentals which indeed takes the individual students to be more conversant with apparatus and allied.
CO 5: Gets equipped with the technical importance of knowing the extent of hardness and consciousness of units.

(A52010) ELECTRONIC DEVICES AND CIRCUITS

CO 1: Concepts of physical electronics particularly solid state devices and its conductivity.
CO 2: Operation of PN-junction diode, zener diode and other diodes and interpret its characteristics.
CO 3: Construction of different rectifier circuits with and without filters.
CO 4: Ability to draw characteristics of a transistor in various configurations and interpret its usages in different regions.
CO 5: The concepts of the load line or bias-curve which are used to establish the quiescent operating conditions in different amplifier circuits.
CO 6: Design specifications and circuit construction for Amplifiers & Oscillators.

(A52201) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-II

CO 1: The students become aware of different pronunciations. Gain confidence in using language in different contexts.
CO 2: Equip with good listening skills Enrichment of fluency there by students becomes confidence.
CO 3: Better understanding of intonation and sentence stress for intelligibility. Mastering functions of language
CO 4: Familiarize With nuances of pronunciation. Giving speeches make students more confident and get rid of stage fear.
CO 5: Improve analytical thinking and writing The students become aware of different pronunciations. Gain confidence in using language in different contexts.

(A52206) IT WORKSHOP

CO 1: Able to understand &identify the components and peripherals of computer.

CO 2: Gains Knowledge on Assembling and disassembling the PC.

CO 3: Attains Knowledge on installation of MS Windows & Linux Operating Systems.

CO 4: Gains Knowledge on MS OFFICE-2007.

(A52207) ELECTRONIC DEVICES AND CIRCUITS LAB

CO 1: To obtain the characteristics of the PN junction diode.
CO 2: To understand the application of the zener diode.

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CO 3: To obtain the input and output characteristics of Transistor in CB and CE Configuration and also obtain the frequency response of CE amplifier.
CO 4: To understand the operation of half wave and full wave rectifiers with & without filters.
CO 5: To obtain the FET Characteristics and also obtain the frequency response of FET amplifier.

II YEAR I SEMESTER

(A53016) ENVIRONMENTAL STUDIES

CO 1: Critical Thinking: demonstrate critical thinking skills in relation to environmental affairs
CO 2: Communication: demonstrate knowledge and application of communication skills and the ability to write effectively in a variety of contexts.
CO 3: Interdisciplinary Synthesis: demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns.
CO 4: Ecological Literacy: demonstrate an awareness, knowledge, and appreciation of the intrinsic values of ecological processes and communities.

(A53007)MATHEMATICS-IV

CO 1: One will be able to find the expansion of a given function by Fourier Transform of the function.
CO 2: Analyze the complex functions with reference to their analyticity, Integration using Cauchy's integral theorem,
CO 3: Find the Taylor's and Laurent series expansion of complex functions.
CO 4: To develop a working knowledge of Contour Integration
CO 5: To develop a working knowledge of Conformal Mapping, The conformal transformations of complex functions can be dealt with ease.

(A53018) COMPUTER PROGRAMMING – II

CO 1: Ability to design various sorting and searching techniques
CO 2: Ability to design user defined data types to solve real world problems
CO 3: Ability to manage heap memory
CO 4: Ability to implement and use data structures like stacks, queues and linked lists
CO 5: Ability to create and use various types of files in 'C' Language.

(A53008) SWITCHING THEORY AND LOGIC DESIGN

CO 1: Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various courses such as ASCII, gray and BCD.
CO 2: Be able to manipulate simple Boolean expressions using the theorem and postulate of Boolean algebra and to minimize combinational functions.

(A53019) ELECTRONIC CIRCUIT ANALYSIS

CO 1: Design and analysis the Dc bias circuitry of BJT and FET.
CO 2: Analyze the different types of amplifiers, operation and its characteristics.

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CO 3: Design circuits like amplifiers, oscillators using the transistors diodes and oscillators.

(A53020) PROBABILITY THEORY AND STOCHASTIC PROCESS

CO 1: Identify Bessel equation and legendary equation and solve the under special condition with the help series solution method. Also recurrence relation and Orthogonality properties of Bessel and legendre polynomials

(A53211) ELECTRONIC CIRCUIT ANALYSIS LAB

CO 1: Design a BJT amplifier at low frequencies for given specifications.
CO 2: Design a BJT amplifier at high frequencies for given specifications.
CO 3: Design and analyze a multistage amplifier.
CO 4: Design and analyze feedback amplifiers and oscillators

(A53210) COMPUTER PROGRAMMING – II LAB

CO 1: To make the student to implement various sorting and searching techniques
CO 2: To introduce the student to structures, unions, and enumeration types and operations on them
CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.
CO 5: To make the student to create various types of files in 'C' Language

(A53212) GENDER SENSITIZATION (MANDATORY COURSE)

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economy.
CO 5: Men and women students and professionals will be better equipped to work and live together as equals.
CO 6: Students will develop a sense of appreciation of women in all walks of life.
CO 7: Through providing accounts of studies and movements as well as new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

II YEAR II SEMESTER

(A54008) MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

CO 1: Understanding the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures.

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CO 2: Analyze how capital budgeting decisions
CO 3: Understand the framework for both manual and computerized accounting process.
CO 4: Know how to analyze and interpret the financial statements through ratio analysis

(A50017) PRINCIPLES OF ELECTRICAL ENGINEERING

CO 1: Transient response of different circuits with DC excitation, different two-port network parameters (Z, Y, ABCD, H), and their inter-relations
CO 2: Design filters and attenuators.
CO 3: Identify type of electrical machine for a given application

(A54018) PULSE AND DIGITAL CIRCUITS

CO 1: Understand the applications of diode as integrator, differentiator, clipper, clamper circuits
CO 2: Learn various switching devices such as diode, transistor, SCR
CO 3: Difference between logic gates, sampling gates
CO 4: Realizing using diode and transistor.

(A54019) ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

CO 1: Study time varying Maxwell's equations and their applications in electromagnetic problems.
CO 2: Determine the relationship between time varying electric and magnetic field and electromotive force.
CO 3: Analysis basic transmission line parameters in phasor domain.

(A54020) SIGNALS AND SYSTEMS

CO 1: Represent any arbitrary signals in terms of complete sets orthogonal functions and understands the principles of impulse function, step function and signum function.
CO 2: Under stands the principle of linear system, filter characteristics of system and its band width, the concept of autocorrelation and cross correlation and power density spectrum.
CO 3: Can design a system for sampling a signal.
CO 4: For a given system, response can be obtained using Laplace transform, properties and ROC of L.T.

(A54021) DIGITAL DESIGN USING VERILOG HDL

CO 1: Describe Verilog hardware description languages (HDL).
CO 2: Design digital circuits
CO 3: Write behavioral models of digital circuits
CO 4: Write register transfer level (RTL) models of digital circuits
CO 5: Verify behavioral and RTL models
CO 6: Describe standard cell libraries and FPGAS
CO 7: Synthesize RTL models to standard cell libraries and FPGAS
CO 8: Implement RTL Models On FPGA and testing & verification

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(A54211) BASIC SIMULATION LAB

CO 1: Can understand the basic operation on Matrices.
CO 2: Can analyze the generation of various signals and sequences such as unit impulse, unit step, square, saw tooth, Triangular, sinusoidal, Ramp, and Sinc.
CO 3: Understanding of convolution between signals and sequences.
CO 4: Can calculate the Even and Odd parts of signal/sequences and Real and Imaginary parts of signal.
CO 5: Can understand Gibbs Phenomenon.
CO 6: Verification of Linearity and Time Invariance properties of given continuous/Discrete systems.

(A54210) Principles of Electrical Engineering Lab

CO 1: Expound the principle of operation and construction of AC and DC machines.
CO 2: Determine performance of AC and DC machines.
CO 3: Explain the characteristics and speed control

(A54212)HUMAN VALUES AND PROFESSIONAL ETHICS (MANDATORY COURSE)

CO 1: Students should be able to inculcate the values and skills in modern life.
CO 2: Students would practice the value based living in natural way
CO 3: Student should adopt ethics and code of conduct in the society

III YEAR I SEMESTER

(A55025) COMPUTER ORGANIZATION AND OPERATING SYSTEM

CO 1: Basic structure of a digital computer
CO 2: Arithmetic operations of binary number system
CO 3: The organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
CO 4: Operating system functions, types, system calls.
CO 5: Memory management techniques and deadlock avoidance operating systems' file system implementation and its interface.

(A55026) CONTROL SYSTEMS ENGINEERING

CO 1: To Summarize the mathematical models of translational and rotational mechanical systems from their idealized elements
CO 2: To calculate the transfer function using block diagram reduction techniques and signal flow graph method
CO 3: To Apply their mathematical knowledge to calculate the response of a linear system to various types of inputs
CO 4: Be able to develop familiarity and confidence to explain transient and steady state responses of a linear system
CO 5: Be able to Construct Routh array and Root-Locus to describe the stability of linear time invariant system
CO 6: To predict the stability of a linear time invariant systems using frequency response plots

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CO 7: Be able to design and construct the compensators for linear systems to achieve the desired specifications.
CO 8: Be able to explain the stability of modern control systems using state space approach.

(A55027) ANTENNAS AND WAVE PROPAGATION

CO 1: To list the basics of antennas and various parameters of antenna along with Maxwell's equations
CO 2: To interpret the fields radiated power, directivity, effective length of small electric dipole & half wave-dipole, loop Antennas
CO 3: To explain the concepts of different types of arrays
CO 4: To summarize antennas operated in VHF & UHF ranges
CO 5: To analyze the reflectors used along with antennas
CO 6: To study the experimental arrangements for measuring the radiation properties of antenna
CO 7: To interpret the concepts of ground wave Propagation, Space-Wave Propagation, various factors affecting radio wave propagation. To explain Propagation effects of radio waves in atmosphere
CO 8: To interpret the concepts of sky wave Propagation

(A55028) ANALOG COMMUNICATIONS

CO 1: To describe various modulation techniques like AM, DSBSC and Variations among them in terms of power, modulation index, Band width
CO 2: To classify and experiment the functionality of modulators, demodulators of each modulation technique like AM, DSBSC and selection of appropriate filters
CO 3: Summarize various modulation techniques like SSB,VSB and apply applications in terms of Speech, Television
CO 4: To differentiate the spectrum of input message signals, different modulated outputs and resulting demodulated message signals for SSB,VSB
CO 5: To differentiate the spectrum of input message signals, different modulated outputs and resulting demodulated message signals for FM
CO 6: To classify the functionality of modulators, demodulators of each modulation technique like Narrow band, Wideband FM for selection of appropriate filters
CO 7: Summarize different Digital Coding of Analog Waveforms like PCM,DM,DPCM Assess different Receiver Models in Analog Modulation and Compare different Figure of Merits

(A55009) LINEAR IC APPLICATIONS

CO 1: To Summarize the basics of linear integrated circuits and explain operational amplifiers with applications
CO 2: Be able to explain the characteristics of op-amp
CO 3: Able to explain the comparator circuits like Schmitt trigger, a stable multi vibrator etc
CO 4: Able to construct filter circuits for particular application
CO 5: To describe analog to digital converters (ADC), and digital to analog converters (DAC) with its Specifications

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CO 6: Be able to explain stable voltage regulators
CO 7: To construct and explain the timer circuits
CO 8: To interpret the applications of PLL and special ICs like 565,566.

PROFESSIONAL ELECTIVE - I

(A55029) ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

CO 1: Able to calculate the basic parameters like voltage, resistance etc. And predict the behavior of the instrument.
CO 2: Able to compose the instruments based on desired application with desired accuracy Able to differentiate working and design the different digital voltmeters and signal generators
CO 3: Able to explain signal analyzers
CO 4: Able to design different types of bridges and unknown components are determined
CO 5: Able to interpret working and design the CRO and Able to calculate the frequency and time by using CRO
CO 6: Able to explain the different types of special purpose Oscilloscopes
CO 7: Explain the different types of transducers and basic working principle.
CO 8: Able to measure physical parameters by using different methods

(A55030) ARTIFICIAL NEURAL NETWORKS

CO 1: Explain the function of artificial neural networks of the Back-prop, Hopfield and SOM type
CO 2: Explain the difference between supervised and unsupervised learning
CO 3: Describe the assumptions behind, and the derivations of the ANN algorithms dealt with in the course
CO 4: Give an example of design and implementation for small problems
CO 5: Implement ANN algorithms to achieve signal processing, optimization, classification and process modeling

(A55031) ELECTROMAGNETIC INTERFERENCE & COMPATIBILITY

CO 1: Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems.
CO 2: Analyze various sources of EMI and various possibilities to provide EMC.
CO 3: Understand and analyze possible EMI prevention techniques such as grounding, shielding, filtering and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.

(A55208) ANALOG COMMUNICATIONS LAB

CO 1: Should be able to explain modulation and demodulation technique techniques in various communications
CO 2: Should be able to understand the operations of different types of detectors.
CO 3: Should be able to analyze the signal transmission and receiving fundamental concepts.
CO 4: Should be able to describe the operation of Multiplexing techniques.

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(A55207) PC & IC LAB

CO 1: Understand, design and analyze the linear wave shaping.
CO 2: Understand, and evaluate various logic gates
CO 3: Able to explain the comparator circuits like Schmitt trigger, a stable multivibrator etc
CO 4: Able to construct filter circuits for particular application
CO 5: To describe analog to digital converters (ADC), and digital to analog converters (DAC) with its Specifications
CO 6: Be able to explain stable voltage regulators
CO 7: To construct and explain the timer circuits
CO 8: To interpret the applications of PLL and special ICs like 565,566

III YEAR II SEMESTER

(A56022) MANAGEMENT SCIENCE

CO 1: On completion of the course, the student should be able to discuss the main techniques and methods used within management science.
CO 2: Critically appraise the strengths and limitations of these techniques and methods.
CO 3: Carry out simple exercises using such techniques and methods themselves.

(A56023) MICROPROCESSORS AND MICROCONTROLLERS

CO 1: The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
CO 2: The student will learn hardware and software interaction and integration.
CO 3: The students will learn the design of microprocessors/microcontrollers-based systems.

(A56024) DIGITAL COMMUNICATIONS

CO 1: Describe the process of Sampling, Quantization and PCM techniques
CO 2: Determine the error rate due to noise in the Baseband Pulse transmission
CO 3: Understand the Pass band transmission model and detection of signals in noise
CO 4: Describe the generation and detection of various shift keying techniques and determine their performance in terms of BER
CO 5: Understand and Implement the concepts of information theory for source coding and discrete memory less channels
CO 6: understand channel coding theorem and Information capacity theorem
CO 7: Implement linear block codes and Convolution codes for error detection and correction
CO 8: Understand and implement the decoding of different channel codes

(A56025) DIGITAL SIGNAL PROCESSING

CO 1: Perform time frequency and Z transform analysis on signals and systems
CO 2: Understanding the inter-relationship between DFT and various transforms
CO 3: Understand the significance of various filter structures and effects of round-off errors.

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CO 4: Design a digital filter for a given specification.
CO 5: Understand the fast computation of DFT and appreciate the FFT processing.

PROFESSIONAL ELECTIVE - II
(A56026) TELECOMMUNICATION SWITCHING SYSTEMS

CO 1: Describe the Elements of switching systems.
CO 2: Calculate network traffic load and parameters
CO 3: Classify different switching systems
CO 4: Interpret the switching network configurations
CO 5: Explain subscriber loop systems and routing
CO 6: Explain the signaling techniques
CO 7: Summarize LAN, WAN and MAN
CO 8: Describe network architectures and protocol for ISDN & SONET

(A56027) SATELLITE COMMUNICATIONS

CO 1: Understand the communication satellite mechanics
CO 2: Know about the satellite internal sub systems for communication applications
CO 3: Design the power budget for satellite links
CO 4: Know about the principles of GPS
CO 5: Understand various constellations of satellites and their applications

(A56020) NANOTECHNOLOGY

CO 1: Appreciate the importance of Nano dimensional materials and their applications.
CO 2: Realize and explain that the properties of Nano materials are size dependent and vary from corresponding bulk materials
CO 3: Demonstrate the skills required to prepare some of the nano materials in the laboratory
CO 4: Characterize and study the properties with respect to their size and shapes.
CO 5: Appreciate the applications of nano electronic devices and understand their basic principles.

OPEN ELECTIVE - I
(A56301) Construction Materials(CE)

On successful completion of this course, it is expected that
CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
CO 4: Students are Gain About Basic Knowledge on Timber And Other Materials
CO 5: Students are get knowledge on Modern construction materials.

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(A56302) WASTE MANAGEMENT (CE)

At the end of the course student will be able to,

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.

CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.

CO 3: Understand the working procedure in various industries, sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.

CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.

CO 5: Understand the waste disposal methods and requirement of treatment plants.

(A56303) SOLAR PHOTO VOLTAIC SYSTEMS (EEE)

After this course, the student will be able to

CO 1: Identify photovoltaic system components and system types and calculate electrical energy and power

CO 2: Correctly size system components, design considerations of solar equipment

CO 3: Design a basic grid-tied PV system.

(A56304) MAINTAINANCE OF ELECTRICAL SYSTEMS (EEE)

After this course, the student will be able to

CO 1: Identify the Engineering materials and testing of domestic appliances.

CO 2: Know the use of UPS and SMPS and maintenance of power devices.

CO 3: Rescue a person met with Electric shock.

(A56305)ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of advanced materials

CO 2: Understand the basic concepts of ferrous and non ferrous metals and alloys.

CO 3: Understand the ceramics and composite materials

CO 4: To understand the application of super alloys and inter metallic

CO 5: Understand the basic methods of manufacturing various types of composite

(A56306)MECHATRONICS (ME)

At the end of the course, the student will be able to,

CO 1: Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product.

CO 2: Develop PLC programs for a given task.

CO 3: Evaluate the performance of mechatronic systems.

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(A56307) PRINCIPLES OF COMMUNICATION SYSTEMS(ECE)

By completing this subject, the student can be able to

CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems

(A56308) ELECTRONIC MEASURING INSTRUMENTS (ECE)

By completing this subject, the student can be able to

CO 1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
CO 2: Measure various physical parameters by appropriately selecting the transducers
CO 3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals

(A56309) Java Programming (CSE)

CO 1: Understanding of OOP concepts and basics of Java programming (Console and GUI based).
CO 2: The skills to apply OOP and Java programming in problem solving.
CO 3: Should have the ability to extend his/her knowledge of Java programming further on his/her own.

(A56310) Computer Networks (CSE)

CO 1: Analyze TCP/IP and OSI models and various protocols
CO 2: Identify suitable multiple access protocol for different networks
CO 3: Analyze various error handling mechanisms
CO 4: Use of various devices in connecting different types of LANs
CO 5: Compare and contrast ipv4 and ipv6

(A56207) MICROPROCESSORS & MICROCONTROLLERS LAB

CO1: Apprehend the internal architecture of 8086 microprocessor and develop assembly language program for small applications.
CO2: Conceive SDK architecture of 8086 and use it for required applications.
CO3: Design & Develop application based programs using digital interfacing.
Interpret & design application using DAC & ADC & memory chip interfacing..

(A56208) DIGITAL SIGNAL PROCESSING LAB

CO1: Understanding the inter-relationship between DFT and various transforms
CO2: Understand the fast computation of DFT and
CO3: Appreciate the FFT processing

IV YEAR I SEMESTER

(A57033) COMPUTER NETWORKS

CO 1: Explain the hierarchical, layered structure of typical network architecture.
CO 2: Perform Data correction and error detection techniques due to problems in the medium.

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CO 3: Explain data link layer protocols like Stop and wait HDLC and PPP.
CO 4: Improving the performance in MAC using techniques like Random access and controlled access etc.
CO 5: Explain the Theory involved in network, transport and application layers and protocols.

(A57029) MICROWAVE ENGINEERING

CO 1: Learn the applications and advantages of microwaves and study the characteristics of waveguide and their mode patterns etc.
CO 2: Ability to describe the characteristics of cavities and microstrip lines.
CO 3: Develop an ability to assess reciprocal and nonreciprocal devices at microwave frequencies (attenuators, circulators Power dividers, Phase shifters etc).
CO 4: Describe and derive the waveguide multiport networks and their Scattering parameters
CO 5: Learn the principle of operation of klystron theory for microwave signal generation and amplification
CO 6: Learn the principle of operation of the magnetron and TWT for microwave signal generation and amplification
CO 7: Differentiate the principle of operation of solid state devices and Interpret the theory for microwave signal generation and amplification
CO 8: Ability to do experiments for the measurement of RF power, Impedance, Attenuatio, Frequency, VSWR etc

(A57030) VLSI DESIGN

CO 1: Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
CO 2: Choose an appropriate inverter depending on specifications required for a circuit.
CO 3: Draw the layout of any logic circuit which helps to understand and estimate parasitic of any circuit.
CO 4: Design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
CO 5: Provide design concepts required to design building blocks of data path using gates.
CO 6: Design simple memories using MOS transistors and can understand the design of large memories.
CO 7: Design simple logic circuit using PLA, PAL, FPGA and CPLD.
CO 8: Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of a system.

PROFESSIONAL ELECTIVE - III
(A57031) EMBEDDED SYSTEMS DESIGN

CO 1: Understand and design embedded systems.
CO 2: Learn basic of OS and RTOS

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CO 3: Understand types of memory and interfacing to external world.
CO 4: Understand task synchronization techniques, device drivers and how to choose an RTOS

(A57032) BIOMETRIC SYSTEM

CO 1: Describe the principles of the selected physical and behavioral biometric methods, and know how to deploy them in authentication scenarios,
CO 2: Organize and conduct biometric data collection processes, and understand how to use biometric databases in system evaluation,
CO 3: Understand the differences between a biometric method and a biometric system,
CO 4: temize the most up-to-date examples of real biometric applications in human authentication.

(A57028) OPTICAL COMMUNICATIONS

CO 1: Posses and understanding various fiber optic components used in optical fiber communication systems. Evaluate and design analog and digital optical fiber communication system..
CO 2: Summarize the optical fiber waveguide transmission through SM & MM fibers
CO 3: Ability to analyze the Types of Dispersions
CO 4: Understand the basics of LASER Diodes & LEDs and study their characteristics. Ability to analyze characteristics of optical fiber
CO 5: Ability to Understand how to Launch the Power into Optical Fiber
CO 6: Understand the basics of Optical Detectors and their characteristics
CO 7: To gain the Knowledge of Optical System Design
CO 8: Explain the WDM concepts

PROFESSIONAL ELECTIVE - IV

(A57034) DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES

CO 1: Be able to distinguish between the architectural features of General purpose processors and DSP processors.
CO 2: Understand the architectures of TMS320C54xx and ADSP 2100 DSP devices.
CO 3: Be able to write simple assembly language programs using the instruction set of TMS320C54xx. Can interface various devices to DSP Processors.

(A57035) DIGITAL IMAGE PROCESSING

CO 1: Apply to current technologies and issues that are specific to image processing systems.
CO 2: Leverage the student's knowledge of image processing to a practical system.
CO 3: Compress the Digital image which is required for storage and transmission of digital images.

(A57036) TV ENGINEERING

CO 1: Expected to understand the concept of TV transmission and reception.
CO 2: Acquired knowledge about complete TV receiver.

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CO 3: Expected to learn about color separation, color coding etc.,

OPEN ELECTIVE- II

(A57301) DISASTER MANAGEMENT AND MITIGATION (CE)

CO 1: Application of different approaches , human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(A57003) GEOLOGICAL INFORMATION SYSTEM & REMOTE SENSING (CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(A57303) ENERGY STORAGE SYSTEMS (EEE)

After this course, the student
CO 1: Can analyze the characteristics of energy from various sources and need for storage
CO 2: Can classify various types of energy storage and various devices used for the purpose
CO 3: Can apply the same concepts to real time problems.

(A57304) ELECTRICAL ENGINEERING MATERIALS (EEE)

Will be able to
CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Evaluate magnetic materials and their behavior.
CO 3: Evaluate semiconductor materials and technologies.
CO 4: Understand different types of materials used in electrical engineering and applications

(A57022) POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine power plant.
CO 3: To know the concept of a gas turbine power plant.
CO 4: To know the concept of hydroelectric power plant.
CO 5: To know the concept of power from non-conventional sources.
CO 6: To know the concept of nuclear power stations and its types.

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CO 7: Understand the power plant economics and environmental considerations.

(A57304) INDUSTRIAL ROBOTICS (ME)

At the end of the course, the student will be able to understand the

CO 1: Basic components of robots.
CO 2: Differentiate types of robots and robot grippers.
CO 3: Model forward and inverse kinematics of robot manipulators.
CO 4: Analyze forces in links and joints of a robot.
CO 5: Programme a robot to perform tasks in industrial applications.
CO 6: Design intelligent robots using sensors.

(A55021)COMPUTER ORGANIZATION (ECE)

At the end of the course, the student will be able to understand the

CO 1: Student will learn the concepts of computer organization for several engineering applications.
CO 2: Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.
CO 3: An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principles

(A57035) PRINCIPLES OF SIGNAL PROCESSING (ECE)

At the end of the course, the student will be able to understand the

CO 1: Apply to current technologies and issues that are specific to image processing systems.
CO 2: Leverage the student's knowledge of image processing to a practical system.
CO 3: Compress the Digital image which is required for storage and transmission of digital images.

(A57307) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Demonstrate the basic elements of a relational database management system.
CO 2: Ability to identify the data models for relevant problems.
CO 3: Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
CO 4: Apply normalization for the development of application soft wares

(A57308) WEB TECHNOLOGIES (CSE)

CO 1: Design static web pages and provide client side authentication.
CO 2: Prepare Static Web pages With Validations.
CO 3: Develop new tag sets using XML mechanism.
CO 4: Design and develop web applications using JSP and MVC architecture
CO 5: Understand database connectivity and retrieving data using client/server database

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(A57210) ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

CO 1: It is expected that there would be a change in perception of the learners towards language since the learners are exposed to the advanced mechanics of language pertaining to career- oriented communication.

CO 2: The exposure to items like varieties of interaction and processes of argumentation etc. develop certain intrinsic linguistic refinement in the learners.

CO 3: Confidence levels of the learners pertaining to the language use are expected to increase since items of functionality get covered in the course.

(A57211) MICROWAVE ENGINEERING & DIGITAL COMMUNICATIONS LAB

CO 1: Gain knowledge and understanding of microwave analysis methods.

CO 2: Be able to apply analysis methods to determine circuit properties of passive/active microwave devices.

CO 3: Know how to model and determine the performance characteristics of microwave circuit or system using computer aided design methods.

CO 4: Have knowledge of basic communication link design; signal power budget, noise evaluation and link carrier to noise ratio.

CO 5: Have knowledge of how transmission and waveguide structures and how they are used as elements in impedance matching and filter circuits.

IV YEAR II SEMESTER

PROFESSIONAL ELECTIVE-V

(A58019) CELLULAR AND MOBILE COMMUNICATIONS

CO 1: Understanding the cellular and frequency reuse concept

CO 2: Understanding of wireless propagation of Electromagnetic wave (reflection, diffraction, and scattering) and associated losses

CO 3: Understanding and application of trunking theory and application of Erlang B, and Erlang C formulas

CO 4: Basic Design and Planning of a wireless cellular system

CO 5: Understanding some of the contemporary issues in the cellular communications engineering profession

CO 6: Applying analog and digital communications principles to cellular and wireless Communications

CO 7: Successfully conduct and present term project

CO 8: Differentiate the generations of cellular communications

(A58020) RADAR SYSTEMS

CO 1: Explain principles of navigation, in addition to approach and landing aids as related to navigation

CO 2: Derive and discuss the Range equation and the nature of detection.

CO 3: Describe about the navigation systems using the satellite.

(A58021) NETWORK SECURITY

CO 1: Demonstrate knowledge of cryptography and network security concepts and applications.

CO 2: Ability to apply security principles in system design.
CO 3: Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

(A58022) WIRELESS COMMUNICATIONS AND NETWORKS

CO 1: Understand the Principles of wireless communications.
CO 2: Understand fundamentals of wireless networking.
CO 3: Understand cellular system design concepts.
CO 4: Analyze various multiple access schemes used in wireless communication.
CO 5: Understand wireless wide area network and their performance analysis.
CO 6: Demonstrate wireless local area networks and their specifications.
CO 7: Familiar with some of the existing and emerging wireless standards.
CO 8: Understand the concept of orthogonal frequency division multiplexing.

PROFESSIONAL ELECTIVE-VI
(A58023) INTERNET OF THINGS

CO 1: Design a portable IoT using Arduino/ equivalent boards and relevant protocols.
CO 2: Develop web services to access/control IoT devices.
CO 3: Deploy an IoT application and connect to the cloud.
CO 4: Analyze applications of IoT in real time scenario

(A58024) SCRIPTING LANGUAGES

CO 1: Ability to create and run scripts using PERL/TCI/Python in IC design flow.
CO 2: Ability to use Linux environment and write programs for automation of scripts in VLSI tool design flow.

OPEN ELECTIVE-III
(A58301) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT (CE)

After successfully completion of this course, the student will be able to

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
CO 2: Use the mechanized construction equipments at different situations or any huge projects
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management , estimation and project planning techniques
CO 5: Use the CPM – PERT Problems in project scheduling

(A58302) SAFETY ENGINEERING (CE)

After successfully completion of this course, the student will be able to

CO 1: Know how to Handle and Protect the Machine and himself while working on it
CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment

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CO 3: Understand the knowledge of safety rules and regulations of working at construction industry
CO 4: Understand the knowledge about working at all stages in different heights at construction site
CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(A58303) ENERGY CONSERVATION AND AUDIT (EEE)

By the end of this course the students are able to analyze
CO 1: Principles of thermodynamics and heat exchange theory.
CO 2: Energy conservation and energy auditing.
CO 3: Thermal insulation and heat recovery systems.

(A58304) ARTIFICIAL NEURAL NETWORKS (EEE)

After this course, the student will be able to understand the
CO 1: Basics and models of Neural Networks and its architectures.
CO 2: Operation of feed forward and propagation networks.
CO 3: Associative memories and the applications of Neural Networks.

(A58305) RENEWABLE ENERGY SOURCES (ME)

After this course, the student will be able to understand the
CO 1: The student will be able analyze.
CO 2: Solar thermal and photovoltaic systems and related technologies for energy conversion.
CO 3: Wind energy conversion, Biomass conversion, Geo thermal energy conversion and principles and technologies.
CO 4: Power from oceans and conversion, Fundamentals of direct energy conversion systems.

(A58306)AUTOMOBILE ENGINEERING (ME)

After this course, the student will be able to understand the
CO 1: Understand the basic lay-out of an automobile.
CO 2: Understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.
CO 3: Understand the principles of transmission, suspension, steering and braking systems.
CO 4: Understand automotive electronics. Study latest developments in automobiles

(A56023) NANOTECHNOLOGY (ECE)

After successfully completion of this course, the student will be able to
CO 1: Appreciate the importance of Nano dimensional materials and their applications.
CO 2: Realize and explain that the properties of Nano materials are size dependent and vary from corresponding bulk materials
CO 3: Demonstrate the skills required to prepare some of the Nano materials in the laboratory

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CO 4: Characterize and study the properties with respect to their size and shapes.
CO 5: Appreciate the applications of Nano electronic devices and understand their basic principles

(A58308) BIOMETRIC SYSTEM (ECE)

After successfully completion of this course, the student will be able to
CO 1: Describe principles of the selected physical and behavioral biometric methods, and know how to deploy them in authentication scenarios
CO 2: Organize and conduct biometric data collection processes, and understand how to use biometric databases in system evaluation
CO 3: Understand differences between a biometric method and a biometric system
CO 4: Itemize the most up-to-date examples of real biometric applications in human authentication

(A58309) GAME THEORY WITH ENGINEERING APPLICATIONS (CSE)

CO 1: Students should able to understand the Equilibrium and Non-Equilibrium strategies in gaming.
CO 2: Students should able to learn mixed strategies and rationalizability in gaming domain.
CO 3: Students should able to develop knowledge on Electronic mail game
CO 4: Students should able to develop the idea of repeated games

(A58310) SOFTWARE ENGINEERING (CSE)

After successfully completion of this course, the student will be able to
CO 1: Ability to identify the minimum requirements for the development of application.
CO 2: Ability to develop, maintain, efficient, reliable and cost effective software solutions.
CO 3: Ability to critically thinking and evaluate assumptions and arguments.

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ANURAG
ENGINEERING ENGINEERS

M.TECH.

VLSI SYSTEM DESIGN

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	Graduates shall be capable of building their career in related industries, R&D establishments as well as in Teaching with their scholarly knowledge with respect to advanced topics in VLSI Design.
PEO II	:	Graduates shall be capable of conceptualizing and analyzing engineering problems of societal importance related to Design, implement verification of Integrated circuit, conduct independent research leading to technology solutions and communicate the outcomes through verbal and written mechanisms.
PEO III	:	Graduates shall be able to collaborate, manage and execute projects in teams using appropriate tools/technologies with utmost professionalism and acceptable good practices.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	Identify, formulate and analyze technical problems in areas like semiconductor technologies, VLSI Signal verification and Design verification and testing.
PSO 2	:	Design and implementation of VLSI architectures using FPGA.
PSO 3	:	Use the techniques, skills, modern Electronic Design Automation (EDA) tools to evaluate and analyze the performance of the systems in VLSI domain

PROGRAM OUTCOMES		
PO 1:	:	Apply acquired knowledge from undergraduate engineering and other disciplines to identify, formulate and present solutions to technical problems related to various areas of VLSI.
PO 2	:	Learn advanced technologies and analyze complex problems in the fields of VLSI.

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PO 3	:	Design and implementation of VLSI architecture using FPGA/CPLD.
PO 4	:	Addressing specific problems in the field of VLSI system design in the form of mini projects, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO 5	:	Use the techniques, skills, modern Electronic Design Automation (EDA) tools, software and equipment necessary to evaluate and analyze the systems in VLSI design environments.
PO 6	:	Understand and commit to professional ethics, social responsibilities and norms of engineering practice.
PO 7	:	Develop confidence for self-education and imbibe professional values for lifelong learning.
PO 8	:	Demonstrate effective oral and written communication skills in accordance with technical standards.
PO 9	:	Become knowledgeable about contemporary developments.
PO 10	:	Ability to correct the mistakes effectively and learn from them to become good leaders.
PO 11	:	Understand the scenario of global business.
PO 12	:	An ability to recognize the need for, and engage in lifelong learning in the broadest context of technological change.

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ANURAG
ENGINEERING ENGINEERS

M.TECH.

VLSI SYSTEM DESIGN

R15 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

Course Code	Category	Course Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A31034	Core Course I	VLSI Technology and Design	4	0	4	25	75	100
A31035	Core Course II	CMOS Analog Integrated Circuit Design	4	0	4	25	75	100
A31036	Core Course III	CMOS Digital Integrated Circuit Design	4	0	4	25	75	100
A31037	Core Elective-I	Digital System Design	4	0	4	25	75	100
A31038		Hardware Software Co-Design						
A31039		Device Modeling						
A31040	Core Elective-II	Advance Operating Systems	4	0	4	25	75	100
A31041		Micro Controllers for Embedded System Design						
A31042		Advanced Computer Architecture						
A31043	Open Elective I	CPLD and FPGA Architectures and Applications	4	0	4	25	75	100
A31044		Image and Video processing						
A31045		Software Defined Radio						
A31207	Lab	VLSI Laboratory – I	--	4	2	25	75	100
A31208	Seminar	Seminar-I	--	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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I YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A32034	Core Course V	Low Power VLSI Design	4	0	4	25	75	100
A32035	Core Course VI	CMOS Mixed Signal Circuit Design	4	0	4	25	75	100
A32036	Core Course VII	Design for Testability	4	0	4	25	75	100
A32037	Core Elective-III	Scripting Languages for VLSI	4	0	4	25	75	100
A32038		Digital Signal Processors and Architectures						
A32039		VLSI Signal Processing						
A32040	Core Elective-IV	Optimization Techniques in VLSI Design	4	0	4	25	75	100
A32041		System On Chip Architecture						
A32042		Semiconductor Memory Design and Testing						
A32043	Open Elective II	CAD for VLSI Circuits	4	0	4	25	75	100
A32044		Coding Theory and Techniques						
A32045		Adhoc Wireless Networks						
A32207	Lab	VLSI Laboratory – II	0	4	2	25	75	100
A32208	Seminar	Seminar-II	-	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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II YEAR I SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A33207		Comprehensive Viva-Voce	--	--	4	--	100	100
A33208		Project work Review I	--	24	12	50	--	50
Total			**--**	**24**	**16**	**50**	**100**	**150**

II YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A34207		Project work Review II	--	8	4	50	--	50
A34208		Project Evaluation (Viva-Voce)	--	16	12	--	150	150
Total			**--**	**24**	**16**	**50**	**150**	**200**

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COURSE OUTCOMES

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I YEAR I SEMESTER

(A31034) VLSI TECHNOLOGY AND DESIGN

CO 1: Apply fundamental knowledge of Fabrication process, Relations between the Vds and Ids, Gm,, Gds, Threshold voltage Vth.
CO 2: Learned about Various Design rules, Stick Diagrams and tools, Layout Design tools.
CO 3: Understand or become aware of Static Complementary gates, Switch logics.
CO 4: Learned interconnect design, clocking disciplines, floor planning methods, how to Test different circuits.

(A31035) CMOS ANALOG INTEGRATED CIRCUIT DESIGN

CO 1: Analyze how the simplified device models can be developed.
CO 2: Analyze and design current mirrors and differential amplifiers.
CO 3: Analyze and design advanced operational amplifiers.
CO 4: Analyze and design of comparators

(A31036) CMOS DIGITAL INTEGRATED CIRCUIT DESIGN

CO 1: Be able to create models of moderately sized CMOS circuits that realize specified digital functions.
CO 2: Have an understanding of the characteristics of CMOS circuit construction.
CO 3: To introduce the concepts and techniques of modern integrated circuit design and testing (CMOS VLSI).
CO 4: Be able to design static CMOS combinational and sequential logic at the transistor level.
CO 5: Design for higher performance or lower area using alternative circuit families.
CO 6: Compare the tradeoffs of sequencing elements including flip-flops, transparent latches, and pulsed latches.
CO 7: Know memory units SRAMs, Flash Memory- NOR flash and NAND flash.

ELECTIVE – I
(A31037) DIGITAL SYSTEM DESIGN

CO 1: Create understanding of the fundamental concepts of PLDs, design of FPGAs, logic's for sequence detectors.
CO 2: Learn basic techniques for designing circuits in electronic, communication and software systems.
CO 3: Develop skills in modeling and evaluating fault-modeling and test pattern generation. Architectures in terms of reliability, availability and safety.

(A31038) HARDWARE - SOFTWARE CO-DESIGN

CO 1: Gain knowledge of contemporary issues and algorithms used.
CO 2: Understand the use of modern hardware/software tools for building prototypes of embedded systems
CO 3: Demonstrate practical skills in the construction of prototypes.

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CO 4: Apply embedded software techniques to satisfy functional and response time requirements.
CO 5: Know the interfacing components, different verification techniques and tools.
CO 6: Understand different specification languages and integrate embedded hardware, software, and operating systems to meet the functional requirements of embedded applications.

(A31039) DEVICE MODELLING

CO 1: Describe why the electrical conductivity is different for different materials
CO 2: Account for and calculate how the electrical conductivity varies with temperature, light and doping concentration for the semiconductors Si and GaAs
CO 3: formulate the basic principles and give examples of process technology that is used for fabricating semiconductor devices
CO 4: Analyze and describe the charge distribution in the PN diode and the MOS
Transistor for different bias voltages
CO 5: Analyze how different physical phenomena influence the current in Semiconductor devices
CO 6: Calculate the current in the PN diode, the MOS transistor and the bipolar Transistor using simplified device models based on the physical phenomena that influence the current
CO 7: Exemplify how the simplified device models can be developed to more complex models that deviate less from experimental data
CO 8: Describe how a complex device model can be implemented in a computer Simulation
CO 9: Analyze the validity and determine the complexity that is needed in a computer model of a semiconductor devices for a certain application.

ELECTIVE – II

(A31040) ADVANCED OPERATING SYSTEMS

CO 1: Outline the potential benefits of distributed systems
CO 2: Summarize the major security issues associated with distributed systems along with the range of techniques available for increasing system security
CO 3: Apply standard design principles in the construction of these systems
CO 4: Select appropriate approaches for building a range of distributed systems, including some that employ middleware.
CO 5: Read and critique research papers
CO 6: Students will be familiar with current operating systems literature
CO 7: Students will make substantial contributions to a large operating systems project that can be submitted for publication.

(A31041) MICROCONTROLLERS FOR EMBEDDED SYSTEM DESIGN

CO 1: Select appropriate embedded software to design an embedded system.
CO 2: Design an embedded system using various microcontrollers.
CO 3: Design various device drivers for designing an embedded system.

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(A31042) ADVANCED COMPUTER ARCHITECTURE

CO 1: Comparing different types of instruction sets
CO 2: Know the parallelism concepts used for increasing the efficiency of the computer and how it affects the cost of the system.
CO 3: Know the different types of networks, their interconnection and its components for interconnection.
CO 4: Understand the different types of storage devices and its internal structure.
CO 5: Apply all the ACA concepts to design the system efficiently.

OPEN ELECTIVE – I

(A31043) CPLD AND FPGA ARCHITECTURES AND APPLICATIONS

CO 1: Classify programmable architectures.
CO 2: Comprehending FPGA and CPLD technologies
CO 3: Know how to minimize chip area, interconnect wire length, delays.
CO 4: Learn tools for implementing digital logic using a FPGA device.
CO 5: Build FPGA-based digital system.

(A31044)IMAGE AND VIDEO PROCESSING

CO 1: Describe the fundamentals of image and video processing and their applications
CO 2: Develop familiarity and implement basic image and video processing algorithms.
CO 3: Select and apply appropriate technique to real problems in image and video analysis.

(A31045)SOFTWARE DEFINED RADIO

CO 1: An ability to make system-level decisions for software-defined radio technology and products
CO 2: Understanding of analog RF components
CO 3: An ability to implement smart antenna algorithms
CO 4: An ability to implement modern wireless system such as systems based on OFDM
CO 5: Knowledge of digital hardware architectures and understanding of development methods
CO 6: Understanding of middleware in SDR and the SCA

(A31207) VLSI LABORATORY – I

CO 1: Design digital circuits in front end design in Xilinx software
CO 2: Verify behavioral and RTL models to digital circuits
CO 3: Implement RTA models on FPGA and testing & verification

I YEAR II SEMESTER

(A32034) LOW POWER VLSI DESIGN

CO 1: Know the different power dissipation sources in VLSI circuits and their significance in the system performance.
CO 2: Analyze the different Low-Power Design Approaches.
CO 3: Design the low power logic circuits and adders.

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CO 4: Design the systems low power and low voltage multipliers.
CO 5: Analyze the performance of the digital systems in terms of low power and low voltage memories.

(A32035) CMOS MIXED SIGNAL CIRCUIT DESIGN

CO 1: Analyze the switched capacitor circuits and PLL and its practical applications.
CO 2: Understand the design issues and challenges involved in data converters such as offset, noise, gain, bandwidth etc.
CO 3: Analyze and design different types of data converter architectures such as Nyquist Rate.
CO 4: A/D Converters and Oversampling Converters.

(A32036) DESIGN FOR TESTABILITY

CO 1: Create understanding of the fundamental concepts of Testing.
CO 2: Learn basic techniques for achieving fault-testing in electronic, communication and software systems.
CO 3: Develop skills in modeling and evaluating fault-testing architectures in terms of reliability, availability and safety.

(A32037)SCRIPTING LANGUAGES FOR VLSI

CO 1: Explain the differences between typical scripting languages and typical system and application programming languages.
CO 2: Create software systems using scripting languages, including Perl and Python.
CO 3: Write server-side scripts using Perl and Python's CGI facilities.

(A32038) DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES

CO 1: Understand concepts of Digital signal processor, like its architecture, registers etc
CO 2: Writing programs using the instruction set of DSP processor
CO 3: Interfacing different devices to the processor.
CO 4: Understand all the peripherals existing on the DSP processor.
CO 5: Apply DSP processors in real time.
CO 6: Ability to analyze the DSP algorithm.

(A32039) VLSI SIGNAL PROCESSING

CO 1: Design the systems by using the appropriate DSP algorithms and Filter techniques.
CO 2: Analyze and design the folding and unfolding techniques in real time application.
CO 3: Design the systems by using systolic architectures.
CO 4: Design the systems by using various fast convolution algorithms
CO 5: Evaluate the performance of various digital signal processors in terms of low power dissipation.

ELECTIVE – IV

(A32040) OPTIMIZATION TECHNIQUES IN VLSI DESIGN

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CO 1: Apply the appropriate design practices, emerging technologies, state-of-the-art design techniques, software tools, and research methods for IC design.
CO 2: Design the systems by using concepts of High level statistical, Gate level statistical analysis methods.
CO 3: Design the low power digital systems by applying appropriate partitioning and Floor planning algorithms.
CO 4: Design the real time applications using optimization techniques like Genetic Algorithms.

(A32041) SYSTEM ON CHIP ARCHITECTURE

CO 1: Apply fundamental knowledge of digital logic design to modeling and analysis of low power problem in processor design.
CO 2: Write a program with ARM Instruction set and in 'C' Language for developing an application.
CO 3: Interface ARM with memory, peripheral systems and use the required operating system for designing an embedded system.

(A32042) SEMICONDUCTOR MEMORY DESIGN AND TESTING

CO 1: Describe the applications various memory architectures.
CO 2: Analyze the need of non-volatile memories and their applications.
CO 3: Design the fault free memory systems by fault modeling techniques.
CO 4: Analyze and design the memory architectures by considering the radiation affects.
CO 5: Design the advanced memory architectures.

OPEN ELECTIVE - II
(A32043) CAD FOR VLSI CIRCUITS

CO 1: Apply fundamental knowledge of mathematics to modeling and analysis of CAD problems in VLSI circuits.
CO 2: Implement CAD algorithms using computer programming in FPGAs and conduct and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports.
CO 3: Become familiar with the critical challenges in the physical design on VLSI circuits implement the System by using MCM technologies.

(A32044)CODING THEORY AND TECHNIQUES

CO 1: Upon completing this course, the student will be able to
CO 2: Learn measurement of information and errors.
CO 3: Obtain knowledge in designing various source codes and channel codes.
CO 4: Design encoders and decoders for block and cyclic codes.
CO 5: Understand the significance of codes in various applications

(A32045) ADHOC AND WIRELESS SENSOR NETWORKS

On completion of this course student will be able to
CO 1: Students will be able to understand the basis of Ad-hoc wireless networks.
CO 2: Students will be able to understand design, operation and performance of MAC layer protocols of Adhoc wireless networks.

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CO 3: Students will be able to understand design, operation and performance of routing protocol of Ad Hoc wireless network.
CO 4: Students will be able to understand design, operation and performance of transport layer protocol of Adhoc wireless networks.
CO 5: Students will be able to understand sensor network Architecture and will be able to distinguish between protocols used in Adhoc wireless network and wireless sensor networks.

(A32207) VLSI LABORATORY – II

CO 1: Design digital circuits in back end design in mentor environment
CO 2: Verify the schematic ,simulation ,layouts, LVS report, PEX report of digital circuits

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ANURAG
ENGINEERING ENGINEERS

B.TECH.

COMPUTER SCIENCE AND ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	Excel in professional career and/or higher education by acquiring knowledge in mathematical, computing and engineering principles
PEO II	:	Be able to analyse the requirements of the software, understand the technical specifications, design and provide novel engineering solutions and efficient product designs
PEO III	:	Adopt to professionalism, ethical attitude, communication skills, team work, lifelong learning in their profession.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	**Problem Solving Skills**: Ability to use mathematical abstraction, algorithmic design and appropriate data structures to solve real world problems using different programming paradigms.
PSO 2	:	**Professional Skills**: Ability to develop computing solutions for problems in multidisciplinary areas by applying software engineering principles.
PSO 3	:	**Successful Career and Entrepreneurship Skills**: Gain knowledge in diverse areas of computer science, and management skills for successful career, entrepreneurship and higher studies

PROGRAM OUTCOMES		
PO 1:	:	Gain an ability to apply knowledge of mathematics, science and engineering fundamentals appropriate to the discipline.
PO 2	:	Develop the competence to identify, analyze, formulate and solve engineering problems.

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PO 3	:	Acquire an ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
PO 4	:	Are capable to design and conduct experiments, analyze and interpret data in the field of computer science and engineering.
PO 5	:	Gain expertise to use the techniques, skills and modern engineering tools with proficiency in basic area of computer science and engineering.
PO 6	:	An ability to analyze the local and global impact of computing on individuals, organizations, and society.
PO 7	:	Knowledge of contemporary issues.
PO 8	:	Sensitive to engage in activities with conscious social responsibility adhering to ethical values.
PO 9	:	An ability to function effectively individually and on teams, including diverse and multidisciplinary, to accomplish a common goal.
PO 10	:	An ability to articulate professional ideas clearly and precisely in making written and oral presentations.
PO 11	:	Recognition of the need for and an ability to engage in continuing professional development.
PO 12	:	An understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects.

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ENGINEERING ENGINEERS

B.TECH.

COMPUTER SCIENCE AND ENGINEERING

R18 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA101BS	Mathematics - I	BS	3	1	0	4	25	75	100
2	AP102BS	Applied Physics	BS	3	1	0	4	25	75	100
3	EE103ES	Basic Electrical Engineering	ES	3	0	0	3	25	75	100
4	CS104ES	Programming for Problem Solving - I	ES	2	0	0	2	25	75	100
5	ME105ES	Engineering Graphics	ES	1	0	4	3	25	75	100
6	EN106HS	English Language Communication Skills Lab - I	HS	0	0	2	1	25	75	100
7	CS107ES	Programming for Problem Solving - I Lab	ES	0	0	2	1	25	75	100
8	AP108BS	Applied Physics Lab	BS	0	0	3	1.5	25	75	100
9	EE109ES	Basic Electrical Engineering Lab	ES	0	0	2	1	25	75	100
Total				**12**	**2**	**13**	**20.5**	**225**	**675**	**900**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA201BS	Mathematics - II	BS	3	1	0	4	25	75	100
2	CH202BS	Engineering Chemistry	BS	3	1	0	4	25	75	100
3	EN203HS	English	HS	2	0	0	2	25	75	100
4	CS204ES	Programming for Problem Solving - II	ES	2	0	0	2	25	75	100
5	CH205BS	Engineering Chemistry Lab	BS	0	0	3	1.5	25	75	100
6	ME206ES	Engineering Workshop	ES	0	0	3	1.5	25	75	100
7	CS207ES	Programming for Problem Solving - II Lab	ES	0	0	3	1.5	25	75	100
8	EN208HS	English Language Communication Skills Lab - II	HS	0	0	2	1	25	75	100
Total				**12**	**3**	**12**	**21**	**200**	**600**	**800**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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II YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MA301BS	Probability and Statistics	BS	3	0	0	3	25	75	100
2	EC302ES	Digital Logic Design	ES	3	0	0	3	25	75	100
3	EC303ES	Electronic Devices and Circuits	ES	3	0	0	3	25	75	100
4	CS304PC	Discrete Mathematical Structures	PC	3	0	0	3	25	75	100
5	CS305PC	Data Structures	PC	3	1	0	4	25	75	100
6	CS306PC	Object Oriented Programming	PC	3	0	0	3	25	75	100
7	EC307ES	Electronic Devices and Circuits Lab	ES	0	0	2	1	25	75	100
8	CS308PC	Data Structures & Object Oriented Programming Lab	PC	0	0	2	1	25	75	100
9	HS309MC	Gender Sensitization	MC	0	0	2	0	100	0	100
Total				**18**	**1**	**6**	**21**	**300**	**600**	**900**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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II YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	ES302BS/ ES401BS	Environmental Science	BS	3	0	0	3	25	75	100
2	CS402PC	Design and Analysis of Algorithms	PC	3	0	0	3	25	75	100
3	CS403PC	Computer Organization	PC	3	0	0	3	25	75	100
4	CS404PC	Formal Languages and Automata Theory	PC	3	0	0	3	25	75	100
5	CS405PC	Java Programming	PC	3	0	0	3	25	75	100
6	CS406PC	Database Management Systems	PC	3	0	0	3	25	75	100
7	CS407PC	Java Programming Lab	PC	0	0	2	1	25	75	100
8	CS408PC	Database Management Systems Lab	PC	0	0	2	1	25	75	100
9	HS409MC	Human Values And Professional Ethics	MC	0	0	2	0	100	0	100
Total				**18**	**0**	**6**	**20**	**300**	**600**	**900**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing C- Credits

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III YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	CS501PC	Computer Networks	PC	3	1	0	4	25	75	100
2	CS502PC	Operating Systems	PC	3	0	0	3	25	75	100
3	CS503PC	Compiler Design	PC	3	0	0	3	25	75	100
4	CS504PC	Software Engineering	PC	3	0	0	3	25	75	100
5	EC505PC	Microprocessors and Microcontrollers	PC	3	0	0	3	25	75	100
6	PROFESSIONAL ELECTIVE - I		PE	3	0	0	3	25	75	100
7	EN506HS	Advanced English Communication Skills Lab	HS	0	0	2	1	25	75	100
8	CS507PC	Operating Systems and Computer Networks Lab	PC	0	0	2	1	25	75	100
9	HS508MC	Constitution of India	MC	0	0	2	0	100	0	100
Total				**18**	**1**	**6**	**21**	**300**	**600**	**900**

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III YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	AE601HS	Managerial Economics and Financial Analysis	HS	3	0	0	3	25	75	100
2	CS602PC	Data Warehousing and Data Mining	PC	3	0	0	3	25	75	100
3	CS603PC	Object Oriented Analysis and Design	PC	3	0	0	3	25	75	100
4	CS604PC	Web Technologies	PC	3	1	0	4	25	75	100
5	PROFESSIONAL ELECTIVE - II		PE	3	0	0	3	25	75	100
6	OPEN ELECTIVE - I		OE	3	0	0	3	25	75	100
7	CS605PC	Data Mining and Object Oriented Analysis and Design Lab	PC	0	0	2	1	25	75	100
8	CS606PC	Web Technologies Lab	PC	0	0	2	1	25	75	100
9	HS607MC	Intellectual Property Rights	MC	0	0	2	0	100	0	100
Total				**18**	**1**	**6**	**21**	**300**	**600**	**900**

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IV YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	MS701HS	Management Science	HS	3	0	0	3	25	75	100
2	CS702PC	Linux Programming	PC	3	0	0	3	25	75	100
3	PROFESSIONAL ELECTIVE - III		PE	3	0	0	3	25	75	100
4	PROFESSIONAL ELECTIVE - IV		PE	3	0	0	3	25	75	100
5	OPEN ELECTIVE - II		OE	3	0	0	3	25	75	100
6	CS703PC	Linux Programming Lab	PC	0	0	2	1	25	75	100
7	CS704PW	Mini project Evaluation	PW	0	0	4	2	25	75	100
8	CS705PW	Project Stage-I	PW	0	0	8	4	100	0	100
Total				**15**	**0**	**14**	**22**	**275**	**525**	**800**

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C- Credits

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IV YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T	P / D	C	Int. Marks	Ext. Marks	Tot. Marks
1	PROFESSIONAL ELECTIVE - V		PE	3	0	0	3	25	75	100
2	PROFESSIONAL ELECTIVE - VI		PE	3	0	0	3	25	75	100
3	OPEN ELECTIVE - III		OE	3	0	0	3	25	75	100
4	CS801PW	Seminar	PW	0	0	4	2	100	0	100
5	CS802PW	Project Stage-II	PW	0	0	12	6	25	75	100
Total				**9**	**0**	**16**	**17**	**200**	**300**	**500**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

PROFESSIONAL ELECTIVE - I:

1. **CS511PE-** Human Computer Interaction
2. **CS512PE-** Advanced Databases
3. **CS513PE-** Programming with Python

PROFESSIONAL ELECTIVE - II:

1. **CS621PE-** Computer Graphics
2. **CS622PE-** Distributed Systems
3. **CS623PE-** Network Security

PROFESSIONAL ELECTIVE - III:

1. **CS731PE-** Multimedia Computing
2. **CS732PE-** Big Data Analytics
3. **CS733PE-** Software Testing

PROFESSIONAL ELECTIVE - IV:

1. **CS741PE-** PHP
2. **CS742PE-** Cloud Computing
3. **CS743PE-** Artificial Intelligence

PROFESSIONAL ELECTIVE - V:

1. **CS851PE-** R Programming
2. **CS852PE-** Internet of Things
3. **CS853PE-** Software Project Management

PROFESSIONAL ELECTIVE - VI:

1. **CS861PE-** Mobile Computing
2. **CS862PE-** Cyber Forensics
3. **CS863PE-** Machine Learning

LIST OF OPEN ELECTIVES

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OPEN ELECTIVE- I			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE611OE	Construction Materials	Civil Engineering
2	CE612OE	Waste Management	
3	EE611OE	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	EE612OE	Electrical Power Generation Systems	
5	ME611OE	Advanced Engineering Materials	Mechanical Engineering
6	ME612OE	Introduction to Automobile Engineering	
7	EC611OE	Principles of Communications	Electronics & Communication Engineering
8	EC612OE	Basic Electronic Circuits Simulation & Design	
9	CS611OE	Software Engineering	Computer Science & Engineering
10	CS612OE	Database Management Systems	

OPEN ELECTIVE- II			
S. No.	**Course Code**	**Name of the Course**	**Offering Department**
1	CE721OE	Disaster Management	Civil Engineering
2	CE722OE	Remote Sensing and Geographic Information System	
3	EE721OE	Maintenance of Electrical Systems	Electrical & Electronics Engineering
4	EE722OE	Renewable Energy Sources	
5	ME721OE	Fundamentals of Refrigeration & Air Conditioning	Mechanical Engineering
6	ME722OE	Industrial Robotics	
7	EC721OE	Principles of Signal Processing	Electronics & Communication Engineering
8	EC722OE	Nano Materials and Technology	
9	CS721OE	Object Oriented Analysis and Design	Computer Science & Engineering
10	CS722OE	Cyber Forensics	

OPEN ELECTIVE- III			
S. No	**Course Code**	**Name of the Course**	**Offering Department**
1	CE831OE	Project Management	Civil Engineering
2	CE832OE	Safety Engineering	
3	EE831OE	Electrical Engineering Materials	Electrical & Electronics Engineering
4	EE832OE	Fuzzy Logic and its Applications	
5	ME831OE	Power Plant Engineering	Mechanical Engineering
6	ME832OE	Nano Technology	
7	EC831OE	Fundamentals of Embedded Systems	Electronics & Communication Engineering
8	EC832OE	Biometric Systems	
9	CS831OE	Software Project Management	Computer Science & Engineering
10	CS832OE	Human Computer Interaction	

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B.TECH.

COMPUTER SCIENCE AND ENGINEERING

R18 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(MA101BS) MATHEMATICS – I

CO 1: Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
CO 2: Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
CO 3: Analyze the convergence of sequence and series.
CO 4: Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
CO 5: Find the extreme values of functions of two variables with / without constraints.

(AP102BS) APPLIED PHYSICS

CO 1: Apply the knowledge of basic Wave optics, to set up Experimental evidences for Interference, Diffraction and Polarization concepts.
CO 2: Design, characterization and study of properties of Lasers and Fiber Optics help the students to prepare new materials for various engineering applications.
CO 3: Implement the concepts of Quantum mechanics for research applications.
CO 4: Explain classification of materials in to conductors, semiconductors and insulators based on band theory.
CO 5: Explain construction and working of Semiconductor devices and their applications in engineering fields.

(EE103ES) BASIC ELECTRICAL ENGINEERING

CO 1: Understand the importance of DC circuits and analyze theorems.
CO 2: Understand the concept of AC circuits and resonance.
CO 3: Concept of Magnetic Circuits and Determine the losses and efficiency of single phase transformers.
CO 4: Analyze the performance of DC machines and Induction motors.
CO 5: Demonstrate the principle of operation of Synchronous generator and importance of Electrical installations.

(CS104ES) PROGRAMMING FOR PROBLEM SOLVING – I

CO 1: Design algorithms and flowcharts for real world applications
CO 2: Know the usage of various operators in Program development
CO 3: Design programs involving decision and iteration structures.
CO 4: Apply the concepts code reusability using Functions
CO 5: Analyse the concepts of Arrays and Strings for real world problems.

(ME105ES) ENGINEERING GRAPHICS

CO 1: Understand engineering drawing and its place in society.
CO 2: Visualize the different aspects of Points, Lines and Planes.
CO 3: Acquire knowledge on projections of solids.
CO 4: Draw sections of solids and plan the drawing for development of surfaces.

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CO 5: Understand the isometric views and projections. Exposure to computer-aided geometric design and creating working drawings.

(EN106HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

CO 1: Understand the importance of phonetics.
CO 2: Understand the variants in Pronunciation.
CO 3: Differentiate formal and informal English in different situations.
CO 4: Understand the Intonation of English Language in the global world.
CO 5: Participate in Mock Interviews.

(CS107ES) PROGRAMMING FOR PROBLEM SOLVING– I LAB

CO 1: Formulate the algorithms and flowcharts for simple problems.
CO 2: Apply fundamental programming concepts, to solve simple problems
CO 3: Enhance debugging skills.
CO 4: Exercise conditional and iterative statements to Write C programs.
CO 5: Modularize the code with functions so that they can be reused.
CO 6: Represent and manipulate data with arrays and strings.

(AP108BS) APPLIED PHYSICS LAB

CO 1: Apply the various procedures and techniques for the experiments.
CO 2: Use the different measuring devices and meters to record the data with precision
CO 3: Test optical components using principles of interference and diffraction of light.
CO 4: Apply the mathematical concepts/equations to obtain quantitative results.
CO 5: Develop the basic communication through working in the groups and performing the laboratory experiments and by interpreting the results.

(EE109ES) BASIC ELECTRICAL ENGINEERING LAB

CO 1: Verify the various electrical laws and theorems with DC Excitation.
CO 2: Determine the losses, efficiency and regulation of single phase transformer.
CO 3: Obtain the performance of induction motors.
CO 4: Control the speed of DC shunt motor.
CO 5: Obtain the OC & SC characteristics of Synchronous generator.

I YEAR II SEMESTER

(MA201BS) MATHEMATICS – II

CO 1: Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
CO 2: Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
CO 3: Evaluate the multiple integrals.
CO 4: Identify the vector differential operators physically in engineering problems.
CO 5: Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

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(CH202BS) ENGINEERING CHEMISTRY

CO 1: Apply the knowledge of atomic, molecular and electronic changes related to conductivity.
CO 2: Analyze the troubles caused by impure water and method of purification of water.
CO 3: Apply the knowledge of electrode potentials for the protection of metals from corrosion.
CO 4: Explain the concept of configurational and conformational analysis of molecules and reaction mechanism.
CO 5: Apply the knowledge of polymers in every day's life.

(EN203HS) ENGLISH

CO 1: Get inspiration and motivation from Dr. C.V. Raman.
CO 2: Understanding ancient architecture of India.
CO 3: Know about invention of Blue Jeans.
CO 4: Learn what type of diet to take and maintain good health.
CO 5: Understand the result of hard work and confidence.

(CS204ES) PROGRAMMING FOR PROBLEM SOLVING – II

CO 1: Develop programs with user defined data types.
CO 2: Use dynamic memory allocation functions with pointers.
CO 3: Apply various file handling techniques for better data management.
CO 4: Distinguish between stacks and queues.
CO 5: Analyze various dynamic data structures.

(CH205BS) ENGINEERING CHEMISTRY LAB

CO 1: Determination of parameters like hardness and alkalinity of water.
CO 2: Estimation of rate constant of a reaction from concentration – time relationships.
CO 3: Determination of physical properties like surface tension and viscosity.
CO 4: Calculation of strength of compound using instrumentation techniques.
CO 5: To impart fundamental knowledge in handling the equipment/glassware and chemicals in the chemistry laboratory

(ME206ES) ENGINEERING WORKSHOP

CO 1: Practice on manufacturing of components using workshop trades including Carpentry, Fitting, Tin-Smithy, Foundry, Welding Practice, House wiring and Black Smithy.
CO 2: Apply basic electrical engineering knowledge for house wiring practice.
CO 3: Identify and apply suitable tools for different trades of Engineering processes including Material removing, measuring and chiseling.
CO 4: Study and practice on Plumbing, Machine tools, Power tools, Wood working, Plastic Mounding and their operations.
CO 5: Learn how to analyze products and be able to improve their manufacture Ability and make the cost effectively.

(CS207ES) PROGRAMMING FOR PROBLEM SOLVING– II LAB

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CO 1: Develop applications on user defined data types
CO 2: Apply dynamic memory allocation through pointers
CO 3: Use different data structures for create/update basic data files
CO 4: Implement linear data structures through stacks and queues
CO 5: Implement various searching and sorting techniques, Linked lists.

(EN208HS) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB – II

CO 1: Understand the variants in Pronunciation.
CO 2: Differentiate Spoken and Written English in formal and informal situations.
CO 3: Understand the emphasis on Pronunciation of English Language in the global world.
CO 4: Apply strategies for Effective Communication in different situations.
CO 5: Participate in conversation, Public Speaking and Group Discussion.

II YEAR I SEMESTER

(MA301BS) PROBABILITY AND STATISTICS

CO 1: Understand a random variable that describes randomness or an uncertainty in certain realistic situation. It can be of either discrete or continuous type.
CO 2: Understand the definition of the sampling distribution of x-bar, and identify the mean, variance, and shape of the sampling distribution given the population information Compute probabilities for the normal distribution.
CO 3: Utilize curve fitting techniques for data representations and computation in engineering analysis.
CO 4: Accept or reject the population based on the sample.
CO 5: Test the significance difference between the sample means when more than two samples.

(EC302ES) DIGITAL LOGIC DESIGN

CO 1: Understand numeric information in different forms, e.g. different bases, signed integers, various course such as ASCII, gray and BCD.
CO 2: Postulates of Boolean algebra and to minimize combinational functions.
CO 3: Design and analyze combinational and sequential circuits.
CO 4: Design and application of synchronous state machines using flip-flops.
CO 5: Understand the concepts of FSM and ASM charts.

(EC303ES) ELECTRONIC DEVICES AND CIRCUITS

CO 1: Recognize the transport phenomena of charge carriers in a semiconductor and analyze the different types of diodes, operation and its characteristics
CO 2: Describe Bipolar Junction Transistors and Field Effect Transistors characteristics.
CO 3: Analyze the different biasing techniques used in BJTs and FETs.
CO 4: Analyze the BJT and FET Amplifiers
CO 5: Understand the concept of feedback amplifiers and oscillators.

(CS304PC) DISCRETE MATHEMATICAL STRUCTURES

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CO 1: To evaluate elementary mathematical arguments and identify fallacious reasoning (not just fallacious conclusions).
CO 2: Solve discrete mathematics problems that involve computing permutations and combinations of a set
CO 3: Analyze and deduce problems involving recurrence relations and generating functions.
CO 4: Perform operations on discrete structures such as sets, functions, relations, and sequences.
CO 5: Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction, for example, scheduling.

(CS305PC) DATA STRUCTURES

CO 1: Analyze the representation of various static, dynamic and, hierarchical data structures.
CO 2: Design and implement the mechanism of stacks, general tree data structures with their applications.
CO 3: Implement various algorithms on graph data structures, including finding the minimum spanning tree, shortest path with real time applications, etc.,
CO 4: Implementation of various advance concepts of binary trees and graphs with real time applications.
CO 5: Outline the concepts of hashing, collision and its resolution methods using hash function.

(CS306PC) OBJECT ORIENTED PROGRAMMING

CO 1: Able to understand the concepts of Object Oriented Programming.
CO 2: Ability to implement various concepts of Classes and Objects.
CO 3: Ability to implement Inheritance and Polymorphism.
CO 4: Ability to implement Templates and Exception handling.
CO 5: Ability to implement Streams.

(EC307ES) ELECTRONIC DEVICES AND CIRCUITS LAB

CO 1: Analyze the characteristics of different electronic devices such as Diodes, transistors etc...
CO 2: Operate simple circuits like Rectifiers.
CO 3: Understand the Input and output characteristics of the BJT and FET transistor configurations.
CO 4: Understand frequency response of amplifiers.
CO 5: Understand the characteristics of the SCR and UJT.

(CS308PC) DATA STRUCTURES & OBJECT ORIENTED PROGRAMMING LAB

CO 1: Develop the programs on stacks and its applications.
CO 2: Demonstrate the operations on trees.
CO 3: Demonstrate the implementation of various advanced trees.
CO 4: Design and implementation of programs on BST and Graph Traversals.
CO 5: Ability to demonstrate basic concepts of Object Oriented Programming in C++.
CO 6: Ability to demonstrate Inheritance, Polymorphism, Templates Exception handling and Streams.

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(HS309MC) GENDER SENSITIZATION (MANDATORY COURSE)

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economy.
CO 5: Men and women students and professionals will be better equipped to work and live together as equals

II YEAR II SEMESTER

(ES302BS / ES401BS) ENVIRONMENTAL SCIENCE

CO 1: The multidisciplinary nature of environment, essence of environment, biodiversity and its Conservation.
CO 2: About the natural resources and their protection.
CO 3: About the causes and effects of environmental pollution as well as environmental issues.
CO 4: About the management of environmental wastes, disasters and rules, regulations, policies for the protection of environment.
CO 5: About the sustainable development and natural functioning of ecosystems.

(CS402PC) DESIGN AND ANALYSIS OF ALGORITHMS

CO 1: Acquire the knowledge of algorithm analysis and its notations that are applied on the problems solved by divide and conquer paradigm.
CO 2: Apply the major graph algorithms for model engineering problems and knowledge of the greedy paradigm
CO 3: Apply the dynamic- programming paradigm and recite algorithms that employ this paradigm.
CO 4: Apply the concept of back tracking, branch and bound paradigm for real time problems.
CO 5: Analyze the complexity of problems and differentiate that in terms of P and NP problems with examples.

(CS403PC) COMPUTER ORGANIZATION

CO 1: Understand the basic organization of computer and different instruction formats and addressing modes.
CO 2: Analyze the concept of pipelining.
CO 3: Understand and analyze various issues related to memory hierarchy.
CO 4: Evaluate various modes of data transfer between CPU and I/O devices.
CO 5: Examine various inter connection structures of multiprocessors.

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(CS404PC) FORMAL LANGUAGES AND AUTOMATA THEORY

CO 1: Gain proficiency in classifying machines by their power in recognizing languages.
CO 2: Learn to employ finite state machines for modeling and solving computing problems.
CO 3: Comprehend the hierarchy of problems arising in computing.
CO 4: Master in context-free languages, push-down automata, and Turing recognizable.
CO 5: Be exposed to a broad overview of the theoretical foundation of computer science.

(CS405PC) JAVA PROGRAMMING

CO 1: Design, write and test a java program to implement a working understand the fundamental concepts of the object oriented paradigm and their implementation in the Java programming language.
CO 2: Write code to define classes and interfaces that uses class libraries such as java.lang, java.util, java.io.
CO 3: Use exception handling and multithreading in programs.
CO 4: Develop GUI applications.
CO 5: Give object oriented solutions for the complex and real world problems.

(CS406PC) DATABASE MANAGEMENT SYSTEMS

CO 1: Design Entity- Relationship Model for enterprise level databases.
CO 2: Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
CO 3: Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
CO 4: Use of suitable Indices and Hashing mechanisms for real time implementation.
CO 5: Ability to analyze various concurrency control protocols and working principles of recovery algorithms.

(CS407PC) JAVA PROGRAMMING LAB

CO 1: Familiarize with Java Environment and use of Java Development Kit for the creation and execution of java programs
CO 2: Develop programs on various concepts like data abstraction & data hiding, encapsulation, inheritance, polymorphism.
CO 3: Create and use threads, handle exceptions and write applets.
CO 4: Create and use of event handling.
CO 5: Develop the programs using interfaces, inner classes, wrapper classes and generics.
CO 6: Develop GUI applications.

(CS408PC) DATABASE MANAGEMENT SYSTEMS LAB

CO 1: Use the SQL commands such as DDL, DML, DCL, TCL to create, manipulate, access data from database objects and providing authorization to access database by different users.
CO 2: To apply various integrity Constraints on the database tables for

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preserving the integrity of the database.

CO 3: Design and implement PI/SQL programs which includes procedures, functions.

CO 4: Design and implement PI/SQL programs which includes, cursor and triggers.

(HS409MC) HUMAN VALUES AND PROFESSIONAL ETHICS

CO 1: Understood the core values that shape the ethical behavior of an Engineer.

CO 2: Exposed awareness on professional ethics and human values.

CO 3: An ability to communicate effectively.

CO 4: Known their role in technological development.

CO 5: An understanding of professional and ethical responsibility.

III YEAR I SEMESTER

(CS501PC) COMPUTER NETWORKS

CO 1: Analyze TCP/IP and OSI models and various protocols.

CO 2: Analyze various error handling mechanisms.

CO 3: Use of various devices in connecting different types of LANs.

CO 4: Compare and contrast IPv4 and IPv6.

CO 5: Describes the working of various networked applications such as DNS, Mail, File Transfer, WWW and HTTP.

(CS502PC) OPERATING SYSTEMS

CO 1: Summarize operating system and process management concepts

CO 2: Apply process scheduling and synchronization related issues.

CO 3: Analyze Deadlock prevention, avoidance, detection, recovery mechanisms and Disk Scheduling Algorithms.

CO 4: Analyze effectively memory management concepts .

CO 5: Illustrate various protection and security measures.

(CS503PC) COMPILER DESIGN

CO 1: Analyze different phases of compiler and different translators.

CO 2: Design top down parsers and bottom up parsers for the language constructs.

CO 3: Understand the role of symbol table and design various data structures for symbol table.

CO 4: Apply syntactic analysis and generate intermediate code for different programs.

CO 5: Apply different optimization techniques and code generation.

(CS504PC) SOFTWARE ENGINEERING

CO 1: Apply software engineering principles and techniques.

CO 2: Analyze software system requirements.

CO 3: Produce efficient, reliable, robust and cost-effective software solutions.

CO 4: Apply testing strategies.

CO 5: Ensure good quality software.

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(EC505PC) MICROPROCESSORS AND MICROCONTROLLERS

CO 1: In depth Architectural Knowledge of microprocessor and Fundamental programming using 8086.
CO 2: Various signals and interrupts of 8086 and their usage and Interfacing Various Devices and Working.
CO 3: In depth Architectural Knowledge of microcontroller
CO 4: Working and programming of microcontroller.
CO 5: Practical Programming application.

PROFESSIONAL ELECTIVE - I
(CS511PE) HUMAN COMPUTER INTERACTION

CO 1: Identify and formulate characteristics and components of graphical user interface.
CO 2: Apply an interactive design process and universal design principles to designing HCI systems
CO 3: Analyze & implement various design paradigms for human computer interaction.
CO 4: Apply the navigation schemes through window, device and screen based controls
CO 5: Use HCI in the software process.

(CS512PE) ADVANCED DATABASES

CO 1: Understand the concepts of Distributed databases.
CO 2: Design XML databases and querying.
CO 3: Understands NoSQL database concepts and their necessity and usage.
CO 4: Designing and querying the Cassandra database
CO 5: Designing and querying MongoDB database

(CS513PE) PROGRAMMING WITH PYTHON

CO 1: Use the Python IDLE to create and execute Python scripts.
CO 2: Learn how to write loops and decision statements in Python.
CO 3: Understand the concepts of strings and file manipulations.
CO 4: Learn how to use lists, tuples, and dictionaries in Python programs.
CO 5: Define the functions and using them in problem solving.

(EN506HS) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

CO 1: Understand the importance of vocabulary and using in real life situations.
CO 2: Apply reading strategies to enhance reading comprehension skills
CO 3: Compose different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing.
CO 4: Develop presentation skills to apply in professional life.
CO 5: Apply Techniques to clear group discussions and Interviews.

(CS507PC) OPERATING SYSTEMS AND COMPUTER NETWORKS LAB

CO 1: Understand system calls behavior and implement that can offer operating system services
CO 2: Implement CPU Scheduling algorithms and Multi-threading
CO 3: Implement the dead lock avoidance using banker's algorithm , the

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producer and consumerproblem and Page Replacement algorithms.
CO 4: Implement different data link layer framing methods.
CO 5: Analyze error control methods
CO 6: Implement topology and routing protocols using packet tracer software.

(HS508MC) CONSTITUTION OF INDIA

CO 1: Understand the meaning and historical perspective of constitution of India.
CO 2: Know fundamental rights of Indian citizen.
CO 3: Know structure, rights of federal and legislative bodies.
CO 4: president and parliament powers given by constitution.
CO 5: Know the local bodies' rights and limitations.

III YEAR II SEMESTER

(AE601HS) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

CO 1: The market dynamics namely demand, demand forecasting, elasticity of demand.
CO 2: Gain an insight in to how production function is carried out to achieve least cost combination of inputs and cost analysis.
CO 3: Know the types of markets and pricing methods and Strategies.
CO 4: Analyze how capital budgeting decisions are carried out.
CO 5: The importance of Accounting and know How to analyze and Interpret the Financial statements through Ratio Analysis

(CS602PC) DATA WAREHOUSING AND DATA MINING

CO 1: Design a data mart or data warehouse for any organization.
CO 2: Apply Association and classification knowledge to different data sets.
CO 3: Apply the clustering Techniques for different data sets.
CO 4: Identify the similar objects using clustering techniques.
CO 5: Explore recent trends in data mining such as web mining, spatial-temporal mining.

(CS603PC) OBJECT ORIENTED ANALYSIS AND DESIGN

CO 1: Demonstrate the concepts and principles of object oriented programming.
CO 2: Understand the purposes, major components and key mechanisms of Class and Object Diagram.
CO 3: Describe the basic resource management responsibilities of Interaction Diagram.
CO 4: Knowledge on State-chart Diagram.
CO 5: Applying the techniques for Component and Deployment Diagrams.

(CS604PC) WEB TECHNOLOGIES

CO 1: Design static web pages and provide client side authentication.
CO 2: Prepare Static Web pages With Validations.
CO 3: Develop new tag sets using XML mechanism.
CO 4: Design and develop web applications using JSP and MVC architecture.

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CO 5: Understand database connectivity and retrieving data using client/server database.

PROFESSIONAL ELECTIVE - II
(CS621PE) COMPUTER GRAPHICS

CO 1: Discriminate the various structures of Computer Graphics system.
CO 2: Analyze basic principles of implementing Computer Graphics primitives.
CO 3: Compare and contrast between implementation of 2D and 3D transformations.
CO 4: Differentiate the techniques for representing 3D geometrical objects.
CO 5: Analyze requirements and constraints for hidden surface removal and rendering methods.

(CS622PE) DISTRIBUTED SYSTEMS

CO 1: Attains the knowledge on Resource sharing and web, Architectural and Fundamental models.
CO 2: Understand Synchronizing Clocks, Elections, Consensus problems.
CO 3: Attains the knowledge on Inter Process Communication and Communication between Distributed Objects.
CO 4: Gain the knowledge on Name Services and the Domain Name System.
CO 5: Understand the concepts of transaction in distributed environment, Concurrency Control Distributed Deadlocks and Transaction Recovery.

(CS623PE) NETWORK SECURITY

CO 1: Analyze the importance of Network Security in real world.
CO 2: Designing and analysis of different encryption Algorithms.
CO 3: Designing and analysis of different Authentication Algorithms.
CO 4: Implementation of MAC and Hash functions, security at different layers of a network.
CO 5: Explore different types of intruders and viruses

OPEN ELECTIVE-I
(CE611OE) CONSTRUCTION MATERIALS (CE)

CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement, Aggregates and Mortar.
CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.
CO 4: Students are Gain About Basic Knowledge on Timber and Other Materials
CO 5: Students are get knowledge on Modern construction materials.

(CE612OE) WASTE MANAGEMENT (CE)

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.
CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.

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CO 3: Understand the working procedure in various industries sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.
CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.
CO 5: Understand the waste disposal methods and requirement of treatment plants.

(EE611OE)SOLAR PHOTOVOLTAIC SYSTEMS (EEE)

CO 1: Understand the basics of solar energy and its geometry.
CO 2: analyze the various topologies of solar photovoltaic cells.
CO 3: Understand the protection and measurement of solar photovoltaic system.
CO 4: Understand the design considerations of solar photovoltaic system.
CO 5: Analyze the various maximum power point tracking techniques.

(EE612OE) ELECTRICAL POWER GENERATION SYSTEMS (EEE)

CO 1: Understand the electrical power generation process from Thermal and Nuclear power stations.
CO 2: Analyze the electrical power generation from Hydro and Gas power stations.
CO 3: Analyze the electrical power generation by using solar energy.
CO 4: Understand the electrical power generation from wind energy & biomass energy.
CO 5: Know the working of fuel cells and ocean energy conversion.

(ME611OE) ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of Advanced materials
CO 2: Understand the basic concepts of ferrous and nonferrous metals and alloys.
CO 3: Understand the ceramics and composite materials
CO 4: To understand the application of super alloys and inter metallic
CO 5: Understand the basic methods of manufacturing various types of composite materials.

(ME612OE) INTRODUCTION TO AUTOMOBILE ENGINEERING (ME)

CO 1: Analyze the basic lay-out of automobile, working and other details about I.C Engines used in automobiles.
CO 2: To gain the knowledge on working of ignition, Electrical systems.
CO 3: Understand how the transmission system works and the working knowledge of various Components in transmission system.
CO 4: Students will able to explain working principle of various parts of automobile such as axles, steering system and Suspension System.
CO 5: Understand the various braking systems and pollution standards and its significance.

(EC611OE) PRINCIPLES OF COMMUNICATIONS (ECE)

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CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.

(EC612OE) BASIC ELECTRONIC CIRCUITS SIMULATION & DESIGN (ECE)

CO 1: Describe circuits for PSpice simulation.
CO 2: Understand the types of dc - ac and their output variables analysis
CO 3: Understand the response of Transient analysis and obtain their output variables.
CO 4: Students can able to analyze and develop simulation circuit for different applications.

(CS504PC/CS611OE) SOFTWARE ENGINEERING (CSE)

CO 1: Apply software engineering principles and techniques.
CO 2: Analyze software system requirements.
CO 3: Produce efficient, reliable, robust and cost-effective software solutions.
CO 4: Apply testing strategies.
CO 5: Ensure good quality software.

(CS406PC/CS612OE) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Design Entity- Relationship Model for enterprise level databases.
CO 2: Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
CO 3: Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
CO 4: Use of suitable Indices and Hashing mechanisms for real time implementation.
CO 5: Analyze various concurrency control protocols and working principles of recovery algorithms.

(CS605PC) DATA MINING AND OBJECT ORIENTED ANALYSIS AND DESIGN LAB

CO 1: The data mining process and important issues around data cleaning, pre-processing and integration.
CO 2: Theprinciplealgorithmsandtechniquesusedindatamining,suchasclustering, association mining, classification and prediction
CO 3: Classify the generic software development skill through various stages of software life cycle.
CO 4: Identify the quality of System Analysis through software development with various real times Environment.
CO 5: Implement test cases for Problem Design and Software Testing.
CO 6: Implement software development models through rational method.

(CS606PC) WEB TECHNOLOGIES LAB

CO 1: Design static web pages and provide client side authentication.
CO 2: Develop new tag sets using XML mechanism.

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CO 3: Understanddatabaseconnectivityandretrievingdatausingclient/serverdatabase.
CO 4: Design dynamic web pages and develop web applications using MVC architecture

(HS607MC) INTELLECTUAL PROPERTY RIGHTS (MANDATORY COURSE)

After completion of the course the student will be able to
CO 1: Understand the fundamentals of intellectual properties and its agencies.
CO 2: Know the trade mark registration process and its rights.
CO 3: Understand the fundamentals of copy rights and patent law.
CO 4: Know the trade secret determination and protection.
CO 5: Know the recent developments in protection of intellectual property rights.

IV YEAR I SEMESTER

(MS701HS) MANAGEMENT SCIENCE

CO 1: About management functions, theories and Organizational structures.
CO 2: About Production methods, Techniques under quality control and inventory control.
CO 3: About functions & importance of HRM, Marketing functions and product life cycle.
CO 4: About techniques in Networking for time required to complete the project.
CO 5: About Corporate strategy implementation methods and other few contemporary management practices.

(CS702PC) LINUX PROGRAMMING

CO 1: Understand the basic commands of linux operating system and can write shell scripts.
CO 2: Create file systems and directories and operate them.
CO 3: Create processes background and fore ground.
CO 4: Exercise interprocess communication.
CO 5: Design various client server applications using TCP or UDP protocols

PROFESSIONAL ELECTIVE - III
(CS731PE) MULTIMEDIA COMPUTING

CO 1: Analyze various data streams in multimedia.
CO 2: Analyze speech recognition in sound/ audio.
CO 3: Edit graphic files using graphics software to improve the images and analysis of image.
CO 4: Develop visual effects & rendering effects by using animation.
CO 5: Apply data compression techniques & tools in real time applications

(CS732PE) BIG DATA ANALYTICS

CO 1: Identify Big Data characteristics and its Business Implications.
CO 2: List the components of Hadoop and Hadoop Eco-System and Manage Job Execution in Hadoop Environment.
CO 3: Understand Zookeeper services and accessing HBase and Hive.

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CO 4: Interpret with Spark shell and configure machine learning algorithms.
CO 5: Infer the concepts of NoSQL database MongoDB and its language features.

(CS733PE) SOFTWARE TESTING

CO 1: Know the basics of software testing process.
CO 2: Apply Black box and White box testing techniques.
CO 3: Test software using various automated testing tools.
CO 4: Organize testing and develop test plan.
CO 5: Apply seven step process to test the software.

PROFESSIONAL ELECTIVE - IV
(CS741PE) PHP

CO 1: Have understanding of server side scripting with PHP language.
CO 2: Use function and arrays in PHP scripting.
CO 3: Implement Object-Oriented concepts in PHP.
CO 4: Handle exceptions and apply pattern matching using regular expressions.
CO 5: Validate Form Data, provide user authentication and handling file uploads.

(CS742PE) CLOUD COMPUTING

CO 1: Compare and contrast different cloud architecture.
CO 2: Learn & Implement Virtualization.
CO 3: Analyze and design storage mechanisms
CO 4: Apply security mechanism for the Cloud.
CO 5: Understand Disaster recovery in Cloud

(CS743PE) ARTIFICIAL INTELLIGENCE

CO 1: Formulate an efficient problem space for a problem expressed in natural language.
CO 2: Select a search algorithm for a problem and estimate its time and space complexities.
CO 3: Possess the skill for representing knowledge using the appropriate technique for a given problem
CO 4: Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and natural language processing.
CO 5: Develop self-learning and research skills to tackle a topic of interest on his/her own or as part of a team.

OPEN ELECTIVE-II
(CE721OE) DISASTER MANAGEMENT (CE)

CO 1: Application of different approaches, human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system

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CO 5: Apply emerging approaches in different types of disasters

(CE511PE/CE722OE) REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM
(CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitizing and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(EE721OE) MAINTENANCE OF ELECTRICAL SYSTEMS (EEE)

CO 1: Identify the Engineering materials, properties and applications.
CO 2: Test the domestic appliances.
CO 3: Know the use of UPS and SMPS and maintenance of power devices.
CO 4: Understand the maintenance of batteries, ups/inverter, motors and starters.
CO 5: Rescue a person met with Electric shock.

(EE511PE/EE722OE) RENEWABLE ENERGY SOURCES (EEE)

CO 1: Learn the principles of solar radiation and collection of solar energy.
CO 2: Understand the various solar energy storage methods and solar applications.
CO 3: Analyze the Wind energy conversion and Biomass energy conversion.
CO 4: Analyze the geothermal energy conversion and ocean energy conversion.
CO 5: Analyze the various direct energy conversion devices.

(ME721OE) FUNDAMENTALS OF REFRIGERATION & AIR CONDITIONING
(ME)

CO 1: Ability to understand various refrigeration systems.
CO 2: Ability to understand the operation of various devices of VCR system.
CO 3: Ability to demonstrate the working of refrigeration equipments.
CO 4: Ability to understand various psychometric processes.
CO 5: Ability to explain the air-conditioning equipment.

(ME722OE/ME851PE) INDUSTRIAL ROBOTICS (ME)

CO 1: Understand the basic components of Robots and differentiate types of robots and robot grippers.
CO 2: Model forward and inverse kinematics of robot manipulators.
CO 3: Analyze forces in links and joints of a robot.
CO 4: Programme a robot to perform tasks in industrial applications.
CO 5: Design intelligent robots using sensors.

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(EC721OE) PRINCIPLES OF SIGNAL PROCESSING (ECE)

CO 1: Perform Fourier transform and Z transform analysis on signals and systems
CO 2: Understanding the inter-relationship between DFT and various transforms
CO 3: Understand the Discrete Fourier series and various transforms
CO 4: Ability to design various IIR digital filter structures
CO 5: Ability to design a digital FIR filter for a given specification.

(EC722OE/ EC623PE) NANO MATERIALS AND TECHNOLOGY (ECE)

After completion of the course the student will be able to
CO 1: Understand the basic concepts of Nano technology.
CO 2: Understand the basic concepts of Nano materials
CO 3: Familiar with fabrication process of Nano Technology.
CO 4: Known the scaling and role of electrons in solids and Nanostructures.
CO 5: Understand the structures of Nan devices.

(CS603PC/CS721OE) OBJECT ORIENTED ANALYSIS AND DESIGN (CSE)

CO 1: Demonstrate the concepts and principles of object oriented programming.
CO 2: Understand the purposes, major components and key mechanisms of Class and Object Diagram.
CO 3: Describe the basic resource management responsibilities of Interaction Diagram.
CO 4: Knowledge on State-chart Diagram.
CO 5: Applying the techniques for Component and Deployment Diagrams.

(CS722OE/CS862PE) CYBER FORENSICS (CSE)

CO 1: Understand the fundamentals of computer forensics and various forensic technologies used for a wide variety of investigations.
CO 2: Apply digital evidence controls.
CO 3: Identify current practices for processing crime and incident scenes.
CO 4: Apply various computer forensics tools to solve the computer forensic cases.
CO 5: Understand whole disk encryption, windows registry and virtual systems.

(CS703PC) LINUX PROGRAMMING LAB

CO 1: Describe and use the LINUX operating system.
CO 2: Describe and use the fundamental LINUX system tools and utilities.
CO 3: Describe and write shell scripts in order to perform basic shell programming.
CO 4: Describe and understand the LINUX file system.

IV YEAR II SEMESTER

PROFESSIONAL ELECTIVE - V
(CS851PE) R PROGRAMMING

CO 1: Use and program in the programming language R
CO 2: Use R to solve statistical problems
CO 3: Implement and describe Monte Carlo the technology
CO 4: Minimize and maximize functions using R

CO 5: Expand knowledge in computation, graphics and modeling

(CS852PE) INTERNET OF THINGS

CO 1: Understand the concepts of Internet of Things.
CO 2: Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
CO 3: Apply data analytics and use cloud offerings related to Internet of Things.
CO 4: Interpret the impact and challenges posed by Internet of Things leading to Industry perspective.
CO 5: Analyze applications of Internet of Things in real time scenario.

(CS853PE) SOFTWARE PROJECT MANAGEMENT

CO 1: Apply the practice of project management in delivering of projects.
CO 2: Evaluate the project against strategic, technical and economic criteria.
CO 3: Identify effort estimation and activity plan of a project.
CO 4: Categorize and prioritize actions for risk management.
CO 5: Evaluate the characteristics of various team structures

PROFESSIONAL ELECTIVE - VI
(CS861PE) MOBILE COMPUTING

CO 1: Understand the necessary knowledge of cellular Communication, infrastructure- less networks.
CO 2: Describe the main characteristics of mobile IP and how it differs from IP
CO 3: Analyze TCP, MAC protocols and their technical feasibility.
CO 4: Implement the hardware components/architectures/databases/operating system of mobile networks
CO 5: Describe current and emerging interests in wireless and mobile computing and current capabilities, limitations and potential of each.

(CS862PE) CYBER FORENSICS

CO 1: Understand the fundamentals of computer forensics and various forensic technologies used for a wide variety of investigations.
CO 2: Apply digital evidence controls.
CO 3: Identify current practices for processing crime and incident scenes.
CO 4: Apply various computer forensics tools to solve the computer forensic cases.
CO 5: Understand whole disk encryption, windows registry and virtual systems.

(CS863PE) MACHINE LEARNING

CO 1: To implement a neural network for an application of your choice using an available tool
CO 2: To implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results
CO 3: To use a tool to implement typical clustering algorithms for different types of applications
CO 4: To design and implement an HMM for a sequence model type of application
CO 5: To identify applications suitable for different types of machine learning

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with suitable Justification

OPEN ELECTIVE - III

(CE831OE) PROJECT MANAGEMENT (CE)

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods.
CO 2: Use the mechanized construction equipments at different situations or any huge projects.
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management, estimation and project planning techniques.
CO 5: Use the CPM – PERT Problems in project scheduling.

(CE832OE) SAFETY ENGINEERING (CE)

CO 1: Know how to Handle and Protect the Machine and himself while working on it
CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment
CO 3: Understand the knowledge of safety rules and regulations of working at construction industry
CO 4: Understand the knowledge about working at all stages in different heights at construction site
CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(EE831OE) ELECTRICAL ENGINEERING MATERIALS (EEE)

CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Understand the properties and importance of insulating and dielectric medium.
CO 3: Evaluate magnetic materials and their behavior.
CO 4: Evaluate semiconductor materials and technologies.
CO 5: Know the materials used in electrical engineering and applications.

(EE832OE) FUZZY LOGIC AND ITS APPLICATIONS (EEE)

CO 1: Operation and properties of crisp and fuzzy logic.
CO 2: Operation and properties of crisp relations and fuzzy relations.
CO 3: Laws and inference of classical propositional, predicate and fuzzy propositional logic.
CO 4: Membership value assignment.
CO 5: Methods of defuzzification and fuzzy rule based system.

(ME731PE/ME831OE) POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine and gas turbine power plant.
CO 3: To know the concept of hydroelectric power plant.

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CO 4: To know the concept of nuclear power stations and non-conventional power sources.
CO 5: Understand the power plant economics and environmental considerations.

(ME622PE/ME832OE) NANO TECHNOLOGY (ME)

CO 1: Apply engineering and physics concepts to the Nano-scale and non-continuum domain.
CO 2: Understand Carbon Nano Tubes structures and manufacturing process.
CO 3: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of Nano materials.
CO 4: Understand the principles and microelectronics fabrication.
CO 5: Understand the concept of Convective Heat Transfer in Nano fluids.

(EC831OE) FUNDAMENTALS OF EMBEDDED SYSTEMS (ECE)

CO 1: Summarize the different development tool for embedded system, features of advanced buses for distributed data transfer in system design.
CO 2: Develop the different processors on hardware and software for the development of embedded system design.
CO 3: Contrast the basics of embedded system Firmware.
CO 4: Implement the concepts of RTOS in real time programming
CO 5: Understand the development of distributed embedded system design.

(EC733PE/EC832OE) BIOMETRIC SYSTEMS (ECE)

CO 1: Understand differences between a biometric method and a biometric system.
CO 2: Organize and conduct biometric data collection processes.
CO 3: Understand the concepts of IRIS recognition.
CO 4: Understand the concepts of FACE recognition.
CO 5: Understand how to use biometric databases in system evaluation.

(CS853PE/CS831OE) SOFTWARE PROJECT MANAGEMENT (CSE)

CO 1: Apply the practice of project management in delivering of projects.
CO 2: Evaluate the project against strategic, technical and economic criteria.
CO 3: Identify effort estimation and activity plan of a project.
CO 4: Categorize and prioritize actions for risk management.
CO 5: Evaluate the characteristics of various team structures

(CS511PE/CS832OE) HUMAN COMPUTER INTERACTION (CSE)

CO 1: Identify and formulate characteristics and components of graphical user interface.
CO 2: Apply an interactive design process and universal design principles to designing HCI systems
CO 3: Analyze & implement various design paradigms for human computer interaction.
CO 4: Apply the navigation schemes through window, device and screen based controls
CO 5: Use HCI in the software process.

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ANURAG
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B.TECH.

COMPUTER SCIENCE AND ENGINEERING

R15 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A51001	English- I	HS	2	0	2	25	75	100
2	A51002	Mathematics - I	BS	3	1	3	25	75	100
3	A51003	Engineering Physics- I	BS	2	1	2	25	75	100
4	A51005	Computer Programming -I	ES	3	1	3	25	75	100
5	A51010	Engineering Chemistry	BS	3	1	3	25	75	100
6	A51011	Basic Electrical Engineering	ES	3	1	3	25	75	100
7	A51201	English Language Communication Skills Lab - I	HS	0	3	2	25	75	100
8	A51202	Computer Programming Lab - I	ES	0	3	2	25	75	100
9	A51207	Engineering Chemistry Lab	BS	0	3	2	25	75	100
10	A51208	IT Work shop	ES	0	3	2	25	75	100
Total				**16**	**17**	**24**	**250**	**750**	**1000**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing C- Credits

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I YEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A52001	English- II	HS	2	0	2	25	75	100
2	A52002	Mathematics - II	BS	3	1	3	25	75	100
3	A52003	Engineering Physics- II	BS	2	1	2	25	75	100
4	A52006	Computer Programming - II	ES	3	1	3	25	75	100
5	A52008	Mathematics - III	BS	3	1	3	25	75	100
6	A52011	Engineering Graphics	ES	3	3	3	25	75	100
7	A52201	English Language Communication Skills Lab - II	HS	0	3	2	25	75	100
8	A52202	Computer Programming Lab - II	ES	0	3	2	25	75	100
9	A52208	Engineering Physics Lab	BS	0	3	2	25	75	100
10	A52209	Engineering Workshop	ES	0	3	2	25	75	100
Total				**16**	**19**	**24**	**250**	**750**	**1000**

CC – Course Category L – Lectures T – Tutorial P – Practical D – Drawing
C- Credits

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IIYEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A53021	Probability & Statistics	BS	4	0	4	25	75	100
2	A53022	Discrete Mathematics	BS	4	0	4	25	75	100
3	A53023	Data Structures	PC	3	0	3	25	75	100
4	A53009	Electronic Devices & Circuits	ES	3	1	3	25	75	100
5	A53024	Digital Logic Design	ES	3	1	3	25	75	100
6	A53025	Object Oriented Programming	PC	3	0	3	25	75	100
7	A53213	Electronic Devices and Electrical Circuits Lab	ES	0	3	2	25	75	100
8	A53214	Data Structures Lab	PC	0	3	2	25	75	100
9	A53215	Gender Sensitization	MC	0	2	0	25	75	100
Total				**20**	**10**	**24**	**225**	**675**	**900**

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IIYEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A54006	Environmental Studies	HS	3	1	3	25	75	100
2	A54022	Design and Analysis of Algorithms	PC	4	0	4	25	75	100
3	A54023	Computer Organization	PC	3	1	3	25	75	100
4	A54024	Database Management Systems	PC	4	0	4	25	75	100
5	A54025	Software Engineering	PC	3	0	3	25	75	100
6	A54026	Java Programming	PC	3	0	3	25	75	100
7	A54213	Java Programming Lab	PC	0	3	2	25	75	100
8	A54214	Database Management Systems Lab	PC	0	3	2	25	75	100
9	A54215	Human Values and Professional Ethics	MC	0	2	0	25	75	100
Total				**20**	**10**	**24**	**225**	**675**	**900**

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IIIYEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A55032	Formal Languages and Automata Theory	PC	3	1	3	25	75	100
2	A55021	Managerial Economics and Financial Analysis	HS	3	1	3	25	75	100
3	A55033	Computer Networks	PC	4	0	4	25	75	100
4	A55034	Operating Systems	PC	4	0	4	25	75	100
5	A55035	Microprocessors and Microcontrollers	PC	3	0	3	25	75	100
6	PROFESSIONAL ELECTIVE - I								
	A55036	Human Computer Interaction	PE	3	0	3	25	75	100
	A55037	Advanced Databases	PE						
	A55038	Mobile Computing	PE						
7	A55209	Advance English Communication Skills Lab	HS	0	3	2	25	75	100
8	A55210	Operating Systems and Computer Networks Lab	PC	0	3	2	25	75	100
Total				**20**	**8**	**24**	**200**	**600**	**800**

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IIIYEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A56028	Compiler Design	PC	3	1	3	25	75	100
2	A56029	Data Warehousing and Data Mining	PC	4	0	4	25	75	100
3	A56030	Object Oriented Analysis and Designing	PC	4	0	4	25	75	100
4	A56031	Web Technologies	PC	3	0	3	25	75	100
5	PROFESSIONAL ELECTIVE - II								
	A56032	Machine Learning	PE	3	0	3	25	75	100
	A56033	Internet of Things	PE						
	A56034	Cyber Forensics	PE						
6	OPEN ELECTIVE-I		OE	3	0	3	25	75	100
7	A56209	Data Warehousing and Data Mining Lab	PC	0	3	2	25	75	100
8	A56210	Web Technologies Lab	PC	0	3	2	25	75	100
Total				**20**	**7**	**24**	**200**	**600**	**800**

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IVYEAR I SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	A57037	Information Security	PC	3	1	3	25	75	100
2	A57038	Unix Programming	PC	4	0	4	25	75	100
3	A57039	Management Science	HS	3	0	3	25	75	100
4	PROFESSIONAL ELECTIVE - III								
	A57040	Software Project Management	PE	3	0	3	25	75	100
	A57041	Cloud Computing	PE						
	A57042	Software Testing	PE						
5	PROFESSIONAL ELECTIVE - IV								
	A57043	Predictive Analytics with R Programming	PE	3	1	3	25	75	100
	A57044	Scripting Languages	PE						
	A57045	Programming with Python	PE						
6	OPEN ELECTIVE-II		OE	3	0	3	25	75	100
7	A57213	Information Security Lab	PC	0	3	2	25	75	100
8	A57214	UNIX Programming Lab	PC	0	3	2	25	75	100
9	A57215	Mini Project	PW	0	3	2	- -	100	100
Total				**19**	**11**	**25**	**200**	**700**	**900**

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IVYEAR II SEMESTER

S. No.	Course Code	Course	CC	L	T / P / D	C	Internal Marks	External Marks	Total Marks
1	PROFESSIONAL ELECTIVE - V								
	A58025	Big Data Analytics	PE	3	0	3	25	75	100
	A58026	Distributed Systems	PE						
	A58027	Operations Research	PE						
2	PROFESSIONAL ELECTIVE - VI								
	A58028	Design Patterns	PE	3	1	3	25	75	100
	A58029	Artificial Intelligence	PE						
	A58030	Multimedia Computing	PE						
3	OPEN ELECTIVE-III		OE	3	0	3	25	75	100
7	A58213	Seminar	PW	0	6	2	100	- - -	100
8	A58214	Project work	PW	0	15	10	50	150	200
9	A58215	Comprehensive Viva Voce	PW	0	0	2	100	- - -	100
Total				**9**	**22**	**23**	**325**	**375**	**700**

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LIST OF OPEN ELECTIVES

OPEN ELECTIVE- I			
S.No	**Course code**	**Course**	**Offering Department**
1	A56301	Construction Materials	Civil Engineering
2	A56302	Waste Management	
3	A56303	Solar Photovoltaic Systems	Electrical & Electronics Engineering
4	A56304	Maintenance of Electrical Systems	
5	A56305	Advanced Engineering Materials	Mechanical Engineering
6	A56306	Mechatronics	
7	A56307	Principles of Communication Systems	Electronics & Communication Engineering
8	A56308	Electronic Measuring Instruments	
9	A56309	Java Programming	Computer Science & Engineering
10	A56310	Computer Networks	

OPEN ELECTIVE- II			
S.No.	**Course code**	**Subject**	**Offering Department**
1	A57301	Disaster Management and Mitigation	Civil Engineering
2	A57003	Geological Information System & Remote Sensing	
3	A57302	Energy Storage Systems	Electrical & Electronics Engineering
4	A57303	Electrical Engineering Materials	
5	A57022	Power Plant Engineering	Mechanical Engineering
6	A57304	Industrial Robotics	
7	A57305	Computer Organization	Electronics & Communication Engineering
8	A57306	Principles of Signal Processing	
9	A57307	Database Management Systems	Computer Science & Engineering
10	A57308	Web Technologies	

OPEN ELECTIVE- III			
S.No	**Course code**	**Subject**	**Offering Department**
1	A58301	Construction Technology and Project Management	Civil Engineering
2	A58302	Safety Engineering	
3	A58303	Energy conservation and Audit	Electrical & Electronics Engineering
4	A58304	Artificial Neural Networks	
5	A58305	Renewable Energy Sources	Mechanical Engineering
6	A58306	Automobile Engineering	
7	A58307	Nanotechnology	Electronics & Communication Engineering
8	A58308	Biometric System	
9	A58309	Game Theory with EngineeringApplications	Computer Science & Engineering
10	A58310	Software Engineering	

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B.TECH.

COMPUTER SCIENCE AND ENGINEERING

R15 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(A51001) ENGLISH – I

CO 1: Narrate the stories and knowthe significance of humour.
CO 2: Promote awareness amongst students how visvesvaraya became role model to others.
CO 3: Create awareness in students the development & security features of polymer banknotes.
CO 4: How to utilize organs &know the importance of life. Awareness on every day is new day Every day is last day.
CO 5: Students know about accidents often happen because of carelessness. If we take care can avoid Accidents.

(A51002) MATHEMATICS – I

CO 1: Understand Rolle's and the Mean value theorems and to verify the Mean value theorems and Apply partial derivatives to study maxima and minima of functions of two variables.
CO 2: Define rank and elementary transformations of a matrix and Discuss Non homogeneous and homogeneous system of equations.
CO 3: Compute eigen values and corresponding eigen vectors of a square matrix.
CO 4: Specify standard methods for solving differential equations and their applications in geometrical and physical problems.
CO 5: Identify different types of higher order differential equations and their applications in engineering problem solving.

(A51003) ENGINEERING PHYSICS – I

CO 1: Understand the intensity variation of light due to interference, diffraction and polarization.
CO 2: Employ the knowledge of crystallography and X-Rays to understand the structure-property relationship of materials.
CO 3: Implement the concept of various distributions and statistical mechanics for research applications.
CO 4: Understand the classification of Magnetic materials, Superconductors and their applications in various fields.
CO 5: Acquire basic knowledge of dielectrics and the applications of piezo, pyro and Ferro electric materials.

(A51005) COMPUTER PROGRAMMING – I

CO 1: Ability to design algorithmic solutions to problem
CO 2: Ability to convert algorithms to C- Programs
CO 3: Ability to write, compile and debug programs in C Language
CO 4: Ability to write Programs using selection and repetition statements
CO 5: Ability to write programs using Arrays and Strings
CO 6: Ability to design structured programming.

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(A51010) ENGINEERING CHEMISTRY

CO 1: Impart the importunate& importance of portable water, Industrial demand and the modern Techniques to upkeep
CO 2: Outline the crisp aspect of ionics and electrodies, various conductance their units and Drill to work out Problems
CO 3: Outline the crisp aspect of ionics and electrodies, various conductance their units and Drill to work out Problems
CO 4: Enumerate the magnitude of corrosion, Future Drastic Measures to abate Corrosion Gingerly Bring forth the top notch necessity of Engineering Materials and their ineluctable position in the present era
CO 5: Demonstrate immense significance of Engineering Materials technical methods of compounding are reiterated.

(A51011) BASIC ELECTRICAL ENGINEERING

CO 1: To know about the types of circuit elements, their type of connections and solving techniques of all types of electrical circuits.
CO 2: To know about the A.C quantities, their representation and analysis of single phase and three phase circuits.
CO 3: To know about the D.C machines principle of operation, types, losses and efficiency calculations.
CO 4: To know about the transformers and A.C machines principle of operation, constructional details, losses and efficiency calculations.
CO 5: To know about the measuring instruments principle of operation, classifications and simple problems.

(A51201) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB – I

CO 1: Get familiarity with vowels and consonants and speak with pronunciation. Learn to communicate in individual activates.
CO 2: Learn to reduce mother tongue influence for intelligibility. Gaining confidence using language in conversations and dialogues
CO 3: Better understanding of pronunciation through syllables and clusters. Learning etiquette in different situations make the students more professional.
CO 4: Mastering supra segmental features of phonetics thereby improving correct pronunciation. Improve presentation skill.
CO 5: Neutralization of accent for intelligibility. Improve employability skills of the students.

(A51202) COMPUTER PROGRAMMING LAB – I

CO 1: Ability to handle possible errors during program execution.
CO 2: Ability to work with operators.
CO 3: Exercise conditional and iterative statements to write C programs.
CO 4: Implement Programs with arrays.
CO 5: Design C programs that are modular.

(A51207) ENGINEERING CHEMISTRY LAB

CO 1: Determination of parameters like hardness and alkalinity of water.
CO 2: Estimation of rate constant of a reaction from concentration – time relationships.
CO 3: Determination of physical properties like surface tension and viscosity.

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CO 4: Calculation of strength of compound using instrumentation techniques.
CO 5: To impart fundamental knowledge in handling the equipment /glassware and chemicals in the chemistry laboratory

(A51208) IT WORKSHOP

CO 1: Able to understand &identify the components and peripherals of computer.
CO 2: Gains Knowledge on Assembling and dissembling the PC.
CO 3: Attains Knowledge on installation of MS Windows & Linux Operating Systems
CO 4: Gains Knowledge on MS OFFICE-2007.

I YEAR II SEMESTER

(A52001) ENGLISH – II

CO 1: Understand the social behavior of the current society.
CO 2: Promote awareness regarding how India achieved success with human values.
CO 3: Create awareness regarding the key for success through Narayana Murthy words.
CO 4: Realize the hardship in the life of Sachin Tendulkar to reach success.
CO 5: Know about the secret of success and happiness in the words of swami Vivekananda quoting from the Bhagavathgeetha.

(A52002) MATHEMATICS – II

CO 1: Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
CO 2: Apply Laplace transform to solve differential equations which will be converted to algebraic
CO 3: Evaluate double integrals by changing variables, changing order and triple integration Calculate line integrals along piecewise smooth paths, interpret such quantities as work done by a force
CO 4: Apply Green's theorem to evaluate line integrals along simple closed contours on the plane, Stoke's theorem to give physical interpretation of the curl of a vector field and Divergence theorem to give physical interpretation of the divergence of a vector field
CO 5: Develop Fourier series of periodic functions.

(A52003) ENGINEERING PHYSICS – II

CO 1: Implement the concepts of Quantum mechanics for research applications.
CO 2: Explain the electrical conductivity of the metals and classification of materials in to conductors, semiconductors and insulators.
CO 3: Understand the construction and working of semiconducting devices and fiber optics to their applications in various fields.
CO 4: Understand the construction and working of different kinds of Lasers to their applications in various fields.
CO 5: Acquire Basic knowledge of synthesis of nonmaterial and their applications in the field of medicine, data storage devices and electronics.

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(A52006) COMPUTER PROGRAMMING – II

CO 1: Ability to design various sorting and searching techniques
CO 2: Ability to design user defined data types to solve real world problems
CO 3: Ability to manage heap memory
CO 4: Ability to implement and use data structures like stacks, queues and linked lists
CO 5: Ability to create and use various types of files in 'C' Language.

(A52008) MATHEMATICS- III

CO 1: Determination of roots of an equation and calculate some simple methods of obtaining approximate roots of algebraic and transdental equations.
CO 2: Interpolate the values using the techniques of newton's forward and backward, Gauss forward and backward, lagranges and splines interpolations.
CO 3: Analyze and calculate numerical differentiation and numerical integration methods.
CO 4: Calculate sol of ODE using Taylor's, Euler's, Picard's, Rungi-Kutta and Predictor-Corrector method.
CO 5: Evaluate the sol of PDE and calculate boundary value problems.

(A52011) ENGINEERING GRAPHICS

CO 1: To Know the importance of Engineering Graphics and to represent the various Polygons, Curves, Conic Sections, Cycloids and Involutes used in Engineering Graphics.
CO 2: To Draw and understand the Principles involved in Orthographic Projections and to represent the Principles involved in Points, Lines and Traces.
CO 3: To Draw and understand the construction Principles involved in Planes and Solids.
CO 4: To Draw and understand the construction Principles involved in Isometric Projections.
CO 5: To Draw and understand about Conversion of Orthographic Views to Isometric Views and also represent its Transformation of Projections.

(A52201) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II

CO 1: The students become aware of different pronunciations. Gain confidence in using language in different contexts.
CO 2: Equip with good listening skills Enrichment of fluency there by students becomes confidence.
CO 3: Better understanding of intonation and sentence stress for intelligibility. Mastering functions of language.
CO 4: Familiarize with nuances of pronunciation. Giving speeches make students more confident and get rid of stage fear.
CO 5: Improve analytical thinking and written language. Speaking with clarity and fluency in group activities

(A52202) COMPUTER PROGRAMMING LAB – II

CO 1: To make the student to implement various sorting and searching techniques

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CO 2: To introduce the student to structures, unions, and enumeration types and operations on them
CO 3: To introduce the student dynamic memory management using pointers.
CO 4: To introduce basic data structures such as stacks, queues and linked lists.
CO 5: To make the student to create various types of files in 'C' Language.

(A52208) ENGINEERING PHYSICS LAB

CO 1: Develop skills to impart practical knowledge in real timesolution.
CO 2: Understand principle, concept, working and application of new technology and comparison of results with theoreticalcalculations.
CO 3: Design new instruments with practicalknowledge.
CO 4: Gain knowledge of new concept in the solution of practical oriented problems and to understand more deep knowledge about the solution to theoreticalproblems.
CO 5: Understand measurement technology, usage of new instruments and real time applications in engineeringstudies.

(A52209) ENGINEERING WORKSHOP

CO 1: To make a lap joint
CO 2: To make a dovetail- joint
CO 3: To make a T-briddle joint
CO 4: To prepare a flat filing
CO 5: To prepare a step cutting
CO 6: To prepare an angular cutting
CO 7: To prepare an open scoop
CO 8: To prepare a rectangular tray
CO 9: To prepare a squEare tin
CO 10: To understand and to give the connections for one light point control by one single pole switch.
CO 11: To understand and to give the connections for one light point control by two-two way switches (parallel connections)
CO 12: To understand and to give the connections for to-connect an electrical bell by using bell push
CO 13: To understand and to give the connections for two light point controlled by one single pole switch.
CO 14: To prepair a pipe joint, tap- connections by using pluming
CO 15: To apply different operations to be performed on the lathe machines.

II YEAR I SEMESTER

(A53021) PROBABILITY & STATISTICS

CO 1: Understand Chance causes and random variable that describes randomness or an uncertainty in certain realistic situation. It can be of either discrete or continuous type.
CO 2: In the discrete case, study of the binomial and the Poisson random variables and the Normal random variable for the continuous case predominantly describe important probability distributions. Important statistical properties for these random variables provide very good insight and are essential for industrial applications.

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CO 3: The student would be able to calculate mean and proportions (small and large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations. It is mainly useful for non-circuit branches of engineering.
CO 4: The student would be able to calculate the types of sampling, Sampling distribution of means, Sampling distribution of variance.
CO 5: Understanding the Experiment and the design of experiment.

(A53022) DISCRETE MATHEMATICS

CO 1: To evaluate elementary mathematical arguments and identify fallacious reasoning (not just fallacious conclusions).
CO 2: Solve discrete mathematics problems that involve computing permutations and combinations of a set
CO 3: Analyze and deduce problems involving recurrence relations and generating functions.
CO 4: Perform operations on discrete structures such as sets, functions, relations, and sequences.
CO 5: Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction, for example, scheduling.

(A53023) DATA STRUCTURES

CO 1: Analyze the representation of various static, dynamic and, hierarchical data structures.
CO 2: Design and implement the mechanism of stacks, general tree data structures with their applications.
CO 3: Implement various algorithms on graph data structures, including finding the minimum spanning tree, shortest path with real time applications, etc.,
CO 4: Implementation of various advance concepts of binary trees and graphs with real time applications.
CO 5: Outline the concepts of hashing, collision and its resolution methods using hash function

(A53009) ELECTRONICS DEVICES & CIRCUITS

CO 1: Understand and analyze the different types of diodes operation and its characteristics.
CO 2: Design and analyze the DC bias circuitry of BJT and FET.
CO 3: Design Biasing Circuit Using Diodes and transistors.
CO 4: To analyze and design diode application circuits amplifier circuits and oscillators employing BJT, FET devices.

(A53024) DIGITAL LOGIC DESIGN

CO 1: After this course student could able to design understand the number systems, combinational sequential circuits and they should be in a position to continue with computer organization.
CO 2: Identifying and analyze logic gates and their operation
CO 3: Identifying and apply appropriate technique to simplify Boolean function.
CO 4: Analyze moderately complex arithmetic and logical design combinational circuits.

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(A53025) OBJECT ORIENTED PROGRAMMING

CO 1: Describe the important concepts of object oriented programming like object and class, Encapsulation, inheritance and polymorphism
CO 2: Develop the applications using object oriented programming with C++.
CO 3: Implement the concept of inheritance and polymorphism.
CO 4: Apply I/O streams and files to develop programs for real time problems.
CO 5: Apply advance features like templates and exception handling to make programs supporting reusability and sophistication

(A53213) ELECTRONIC DEVICES AND ELECTRIC CIRCUITS LAB

CO 1: Able to understand and compare Theoretical values and practical values of KVL, KCL and Theorems.
CO 2: Able to understand different tests and their performance characteristics of DC and AC machines.
CO 3: Analyse the diode and transistor characteristics.
CO 4: Design rectifier circuits using diodes and implement them using hardware.

(A53214) DATA STRUCTURES LAB

CO 1: Develop the programs on stacks and its applications.
CO 2: Demonstrate the operations on trees.
CO 3: Demonstrate the implementation of various advanced trees.
CO 4: Design and implementation of programs on BST and Graph Traversals.

(A53215) GENDER SENSITIZATION (MANDATORY COURSE)

CO 1: Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
CO 3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economy.
CO 5: Men and women students and professionals will be better equipped to work and live together as equals.
CO 6: Students will develop a sense of appreciation of women in all walks of life.
CO 7: Through providing accounts of studies and movements as well as new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence

II YEAR II SEMESTER

(A54006) ENVIRONMENTAL STUDIES

CO 1: Conservation of natural resources.
CO 2: Understand Requirement to conserve environment.
CO 3: Understand the National and international efforts to save globe.

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CO 4: Know importance of sustainable development.
CO 5: Impart basic knowledge, awareness & Skills for solving real life environmental problems in order to improve the quality of life.

(A54022) DESIGN AND ANALYSIS OF ALGORITHMS

CO 1: Acquire the knowledge of algorithm analysis and its notations that are applied on the problems solved by divide and conquer paradigm.
CO 2: Apply the major graph algorithms for model engineering problems and knowledge of the greedy paradigm
CO 3: Apply the dynamic- programming paradigm and recite algorithms that employ this paradigm.
CO 4: Apply the concept of back tracking, branch and bound paradigm for real time problems.
CO 5: Analyze the complexity of problems and differentiate that in terms of P and NP problems with examples.

(A54023) COMPUTER ORGANIZATION

CO 1: Understand the basic organization of computer and different instruction formats and addressing modes.
CO 2: Analyze the concept of pipelining, segment registers and pin diagram of CPU.
CO 3: Understand and analyze various issues related to memory hierarchy.
CO 4: Evaluate various modes of data transfer between CPU and I/O devices.
CO 5: Examine various inter connection structures of multi processors.

(A54024) DATABASE MANAGEMENT SYSTEMS

CO 1: Design Entity- Relationship Model for enterprise level databases.
CO 2: Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
CO 3: Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
CO 4: Use of suitable Indices and Hashing mechanisms for real time implementation.
CO 5: Ability to analyze various concurrency control protocols and working principles of recovery algorithms

(A54025) SOFTWARE ENGINEERING

CO 1: Choose a process model to apply for given project requirements.
CO 2: Analyze and apply the framework activities for a given project.
CO 3: Design various system models for a given scenario.
CO 4: Design and apply various testing techniques.
CO 5: Understand metrics for Process and Products.

(A54026) JAVA PROGRAMMING

CO 1: Design, write and test a java program to implement a working understand the fundamental concepts of the object oriented paradigm and their implementation in the Java programming language.
CO 2: Write code to define classes and interfaces that uses class libraries such as java.lang, java.util, java.io.

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CO 3: Use exception handling and multithreading in programs.
CO 4: Develop GUI applications.
CO 5: Give object oriented solutions for the complex and real world problems.

(A54213) JAVA PROGRAMMING LAB

CO 1: Familiarize with Java Environment and use of Java Development Kit for the creation and execution of java programs.
CO 2: Develop programs on various concepts like data abstraction & data hiding, encapsulation, inheritance, polymorphism.
CO 3: Create and use threads, handle exceptions and write applets.
CO 4: Develop the programs using interfaces, inner classes, wrapper classes and generics.
CO 5: Develop GUI applications.

(A54214) DATABASE MANAGEMENT SYSTEMS LAB

CO 1: Use the SQL commands such as DDL, DML, DCL, TCL to create, manipulate, access data from database objects and providing authorization to access database by different users.
CO 2: To apply various integrity Constraints on the database tables for preserving the integrity of the database.
CO 3: Design and implement PI/SQL programs which includes procedures, functions, cursor and triggers.

(A54215) HUMAN VALUES AND PROFESSIONAL ETHICS (MANDATORY COURSE)

CO 1: Students should be able to inculcate the values and skills in modern life.
CO 2: Students would practice the value based living in natural way
CO 3: Student should adopt ethics and code of conduct in the society

III YEARI SEMESTER

(A55032) FORMAL LANGUAGES AND AUTOMATA THEORY

CO 1: Gain proficiency in classifying machines by their power in recognizing languages.
CO 2: Learn to employ finite state machines for modeling and solving computing problems.
CO 3: Comprehend the hierarchy of problems arising in computing.

(A55021) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

CO 1: By the end of this course the students will be able to assess the costs useful for managerial decision making and
CO 2: Determine Break Even Point (BEP) of an enterprise, the process & principles of accounting and Prepare Journal, Ledger, Trial Balance and
CO 3: Analyze, interpret & comment on the financial statements of a business enterprise by using ratios.

(A55033) COMPUTER NETWORKS

CO 1: Analyze TCP/IP and OSI models and various protocols.
CO 2: Identify suitable multiple access protocol for different networks.

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CO 3: Analyze various error handling mechanisms.
CO 4: Use of various devices in connecting different types of LANs.
CO 5: Analyze different routing protocols.
CO 6: Compare and contrast IPv4 and IPv6.

(A55034) OPERATING SYSTEMS

CO 1: Summarize operating system and process management concepts
CO 2: Apply process scheduling and synchronization related issues.
CO 3: Understand Deadlock prevention, avoidance, detection, recovery mechanisms.
CO 4: Analyze effectively memory management concepts Illustrate various protection and security measures

(A55035) MICROPROCESSORS AND MICROCONTROLLERS

CO 1: The student will learn the internal organization of popular 8086/805 microprocessors /microcontrollers.
CO 2: The student will learn hardware and software interaction and integration.
CO 3: The students will learn the design of microprocessors/microcontrollers-based systems.

(A55036) HUMAN COMPUTER INTERACTION

CO 1: Identify and formulate characteristics and components of graphical user interface.
CO 2: Analyze various design paradigms for human computer interaction.
CO 3: Design & implement human computer interaction using various design techniques.
CO 4: Support Design rules to use HCI in the software process.

(A55037) ADVANCED DATABASES

CO 1: Understand the concepts of Distributed databases.
CO 2: Design XML databases and querying.
CO 3: Understands NoSQL database concepts and their necessity and usage.
CO 4: Designing and querying the Cassandra and MongoDB databases.

(A55038) MOBILE COMPUTING

CO 1: Understand the necessary knowledge of cellular Communication, infrastructure- less networks.
CO 2: Describe the main characteristics of mobile IP and how it differs from IP
CO 3: Analyze TCP, MAC protocols and their technical feasibility.
CO 4: Implement the hardware components/architectures/databases/operating system of mobile networks
CO 5: Describe current and emerging interests in wireless and mobile computing and current capabilities, limitations and potential of each.

(A55209) ADVANCED ENGLISH COMMUNICATION SKILLS LAB

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CO 1: Upon the completion of this course the pupil will have an ability to speak and communicate fluently in English, through a well developed vocabulary.
CO 2: Ability to use variety of vocabulary like one word substitutes and idioms and phrases in different socio-cultural and professional contexts.
CO 3: Ability to read and guess the meaning and able to comprehend a passage.
CO 4: Ability to recognizing / coherence sequencing of sentences.
CO 5: Ability to participate, negotiate, convince and advocate among the group in a formal as well as informal situations.
CO 6: Ability to face formal interviews confidently with verbal and non-verbal communication skills.

(A55210) OPERATING SYSTEM AND COMPUTER NETWORKS LAB

PART- A

CO 1: Understand system calls behaviour and implement that can offer operating system services
CO 2: Implement operating system concepts
CO 3: Implement the producer and consumer problem
CO 4: Implement the dead lock avoidance using banker's algorithm

PART- B

CO 1: Implement different data link layer farming methods
CO 2: Analyze error control methods
CO 3: Implement topology using packet tracer software
CO 4: Implement different routing protocols

III YEAR II SEMESTER

(A56028) COMPILER DESIGN

CO 1: Analyze different phases of compiler and different translators.
CO 2: Design top down parsers and bottom up parsers for the language constructs.
CO 3: Understand the role of symbol table and design various data structures for symbol table.
CO 4: Apply syntactic analysis and generate intermediate code for different programs.
CO 5: Apply different optimization techniques and code generation.

(A56029) DATA WAREHOUSING AND DATA MINING

CO 1: Design a data mart or data warehouse for any organization
CO 2: Apply Association and classification knowledge to different data sets
CO 3: App the clustering Techniques for different data sets
CO 4: Explore recent trends in data mining such as web mining, spatial-temporal mining

(A56030) OBJECT ORIENTED ANALYSIS AND DESIGN

CO 1: Recognize the concepts and principles of object oriented programming concepts.

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CO 2: Understand the purposes, major components and key mechanisms of Class and Object Diagram.
CO 3: Describe the basic resource management responsibilities of Interaction Diagram.
CO 4: Knowledge on State-chart Diagram.
CO 5: Applying the techniques for Component and Deployment Diagrams.

(A56031) WEB TECHNOLOGIES

CO 1: Design static web pages and provide client side authentication.
CO 2: Prepare Static Web Pages with Validations.
CO 3: Develop new tag sets using XML mechanism.
CO 4: Design and develop web applications using JSP and MVC architecture.
CO 5: Understand database connectivity and retrieving data using client/server database.

(A56032) MACHINE LEARNING

CO 1: To implement a neural network for an application of your choice using an available tool
CO 2: To implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results
CO 3: To use a tool to implement typical clustering algorithms for different types of applications
CO 4: To design and implement an HMM for a sequence model type of application
CO 5: To identify applications suitable for different types of machine learning with suitable Justification

(A56033) INTERNET OF THINGS

CO 1: Explain in a concise manner how the general Internet as well as Internet of Things work.
CO 2: Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
CO 3: Use basic measurement tools to determine the real-time performance of packet based networks.
CO 4: Analyses trade-offs in interconnected wireless embedded sensor networks.

(A56034) CYBER FORENSICS

CO 1: Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
CO 2: It gives an opportunity to students to continue their zeal in research in computer forensics.

OPEN ELECTIVE - I

(A56301) CONSTRUCTION MATERIALS (CE)

CO 1: Students are get knowledge of various Materials Like Stones, Bricks and Concrete Blocks.
CO 2: Students are Gain Basic Knowledge on Materials like Lime, Cement,

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Aggregates and Mortar.

CO 3: Students are known About Concrete Ingredients, Manufacturing Process and Tests on It.

CO 4: Students are Gain About Basic Knowledge on Timber and Other Materials

(A56302) WASTE MANAGEMENT (CE)

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.

CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.

CO 3: Understand the working procedure in various industries, sources, characteristics and effects of waste, also the treatment methods depending upon the type of waste.

CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.

CO 5: Understand the waste disposal methods and requirement of treatment plants.

(A56303)SOLAR PHOTO VOLTAIC SYSTEMS (EEE)

CO 1: Identify photovoltaic system components and system types and calculate electrical energy and power

CO 2: Correctly size system components, design considerations of solar equipment

CO 3: Design a basic grid-tied PV system.

(A56304) MAINTAINANCE OF ELECTRICAL SYSTEMS (EEE)

CO 1: Identify the Engineering materials and testing of domestic appliances.

CO 2: Know the use of UPS and SMPS and maintenance of power devices.

CO 3: Rescue a person met with Electric shock.

(A56305) ADVANCED ENGINEERING MATERIALS (ME)

CO 1: Acquire an understanding of the main concepts related to the structure and properties of advanced materials

CO 2: Understand the basic concepts of ferrous and nonferrous metals and alloys.

CO 3: Understand the ceramics and composite materials

CO 4: To understand the application of super alloys and intermetallic

CO 5: Understand the basic methods of manufacturing various types of composite materials.

(A56306) MECHATRONICS (ME)

CO 1: Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behaviour of a process or product.

CO 2: Develop PLC programs for a given task.

CO 3: Evaluate the performance of mechatronic systems.

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(A56307) PRINCIPLES OF COMMUNICATION SYSTEMS (ECE)

CO 1: Work on various types of modulations.
CO 2: Should be able to use these communication modules in implementation.
CO 3: Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.

(A56308) ELECTRONIC MEASURING INSTRUMENTS (ECE)

CO 1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
CO 2: Measure various physical parameters by appropriately selecting the transducers.
CO 3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.

(A56309) JAVA PROGRAMMING (CSE)

CO 1: Understanding of OOP concepts and basics of Java programming (Console and GUI based).
CO 2: The skills to apply OOP and Java programming in problem solving.
CO 3: Should have the ability to extend his/her knowledge of Java programming further on his/her own.

(A56310) COMPUTER NETWORKS (CSE)

CO 1: Analyze TCP/IP and OSI models and various protocols
CO 2: Identify suitable multiple access protocol for different networks
CO 3: Analyze various error handlingmechanisms
CO 4: Use of various devices in connecting different types ofLANs
CO 5: Compare and contrast ipv4 andipv6

(A56209) DATA WAREHOUSE AND DATA MINING LAB

CO 1: The data mining process and important issues around data cleaning, pre-processing and integration.
CO 2: The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction

(A56210) WEB TECHNOLOGIES LAB

CO 1: Design static web pages and provide client side authentication.
CO 2: Develop new tag sets using XML mechanism.
CO 3: Understand database connectivity and retrieving data using client/server database.
CO 4: Design dynamic web pages and develop web applications using MVC architecture.

IV YEAR I SEMESTER

(A57037) INFORMATION SECURITY

CO 1: Analyze the importance of information Security in real world.
CO 2: Designing and analysis of different encryption Algorithms.
CO 3: Implementation of MAC and Hash functions, security at different layers of a network.

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CO 4: Explore different types of intruders and viruses

(A57038) UNIX PROGRAMMING

CO 1: Will be able to describe and use the UNIX operating system.
CO 2: Will be able to describe and use the fundamental UNIX system tools and utilities.
CO 3: We will able to describe and write shell scripts in order to perform basic shell programming.
CO 4: Will be able to describe and understand the UNIX file system

(A57039) MANAGEMENT SCIENCE

CO 1: On completion of the course, the student should be able to discuss the main techniques and methods used within management science.
CO 2: Critically appraise the strengths and limitations of these techniques and methods.
CO 3: Carry out simple exercises using such techniques and methods themselves.

(A57040) SOFTWARE PROJECT MANAGEMENT

CO 1: Apply the practice of project management in delivering of projects.
CO 2: Evaluate the project against strategic, technical and economic criteria.
CO 3: Identify effort estimation and activity plan of a project.
CO 4: Categorize and prioritize actions for risk management.
CO 5: Evaluate the characteristics of various team structures

(A57041) CLOUD COMPUTING

CO 1: Compare and contrast different cloud architecture
CO 2: Learn & Implement Virtualization
CO 3: Analyze and design storage mechanisms
CO 4: Apply security mechanism for the Cloud.
CO 5: Understand Disaster recovery in Cloud

(A57042) SOFTWARE TESTING

CO 1: Prioritize & categorize the bugs and take necessary measures.
CO 2: Apply Path, Transaction, and Dataflow& Domain testing Strategies.
CO 3: Identify Number of test cases by applying node reduction algorithm.
CO 4: Apply logic & state testing strategies. Understand various automated testing tools

(A57043) PREDICTIVE ANALYTICS WITH R PROGRAMMING

CO 1: Understand and describe the R Programming in-detail.
CO 2: Being able to utilize and apply the Data Analytics lifecycle to Big Data analytics projects
CO 3: Apply appropriate techniques (such as ML) and tools (models) to analyze Big Data problems and recognize insights that lead to actionable work items.

(A57044) SCRIPTING LANGUAGES

CO 1: Ability to understand the differences between scripting languages.

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CO 2: Ability to apply your knowledge of the weaknesses of scripting languages to select implementation.
CO 3: Master an understanding of python especially the object oriented concepts.

(A57045) PROGRAMMING WITH PYTHON

CO 1: Master the Basic Concepts of Python
CO 2: Understand Python Scripts on UNIX/Windows, Python Editors and IDEs
CO 3: Master the Concepts of Sequences and File operations
CO 4: Learn how to use and create functions, sorting different elements, Lambda function, error handling techniques and Regular expressions and using modules in Python

OPEN ELECTIVE - II

(A57301) DISASTER MANAGEMENT AND MITIGATION (CE)

CO 1: Application of different approaches, human ecology in geographical researches
CO 2: Have the knowledge on planetary hazards/disasters
CO 3: Know the principles and measures to control various disasters/exogenous hazards
CO 4: Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
CO 5: Apply emerging approaches in different types of disasters

(A57003) GEOLOGICAL INFORMATION SYSTEM & REMOTE SENSING(CE)

CO 1: To apply photogrammetry in different aspects in basic remote sensing elements.
CO 2: Analyze the Energy interaction in the atmosphere in earth surface features.
CO 3: Application of GIS data, data representation in various elements like manual digitiring and scanning.
CO 4: Analyze spatial & attribute data for solving spatial problems.
CO 5: Use the RS & GIS applications in various aspects.

(A57302) ENERGY STORAGE SYSTEMS (EEE)

CO 1: Can analyze the characteristics of energy from various sources and need for storage
CO 2: Can classify various types of energy storage and various devices used for the purpose
CO 3: Can apply the same concepts to real time problem.

(A57303) ELECTRICAL ENGINEERING MATERIALS (EEE)

CO 1: Understand various types of dielectric materials, their properties in various conditions.
CO 2: Evaluate magnetic materials and their behavior.
CO 3: Evaluate semiconductor materials and technologies.

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CO 4: Understand different types of Materials used in electrical engineering and applications.

(A57022) POWER PLANT ENGINEERING (ME)

CO 1: Understand the principle of various sources of energy, resources and development of power.
CO 2: To know the concept of internal combustion engine power plant.
CO 3: To know the concept of gas turbine power plant.
CO 4: To know the concept of hydroelectric power plant.
CO 5: To know the concept of power from non-conventional sources.
CO 6: To know the concept of nuclear power stations and its types.
CO 7: Understand the power plant economics and environmental considerations.

(A57304) INDUSTRIAL ROBOTICS (ME)

CO 1: Able to understand the basic components of robots.
CO 2: Differentiate types of robots and robot grippers.
CO 3: Model forward and inverse kinematics of robot manipulators.
CO 4: Analyze forces in links and joints of a robot. Programme a robot to perform tasks in industrial applications.
CO 5: Design intelligent robots using sensors.

(A57305) COMPUTER ORGANIZATION (ECE)

CO 1: Student will learn the concepts of computer organization for several engineering applications.
CO 2: Student will develop the ability and confidence to use the fundamentals of computer organization as a tool in the engineering of digital systems.
CO 3: An ability to identify, formulate, and solve hardware and software computer engineering problems using sound computer engineering principles

(A57306)PRINCIPLES OF SIGNAL PROCESSING (ECE)

CO 1: Apply to current technologies and issues that are specific to image processing systems.
CO 2: Leverage the student's knowledge of image processing to a practical system.
CO 3: Compress the Digital image which is required for storage and transmission of digital images.

(A57307) DATABASE MANAGEMENT SYSTEMS (CSE)

CO 1: Demonstrate the basic elements of a relational database management system.
CO 2: Ability to identify the data models for relevant problems.
CO 3: Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
CO 4: Apply normalization for the development of application soft wares
Graduate will be able to understanding the pre-requisites to the course compiler.

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(A57308) WEB TECHNOLOGIES (CSE)

CO 1: Design static WebPages and provide client side authentication.
CO 2: Prepare Static Web Pages with Validations.
CO 3: Develop new tag sets using XML mechanism.
CO 4: Design and develop web applications using JSP and MVC architecture
CO 5: Understand database connectivity and retrieving data using client/server database

(A57213) INFORMATION SECURITY LAB

CO 1: Implements port scanning.
CO 2: Performs security scanning and network exploration
CO 3: Analysis of packet protocols, IP spoofing.
CO 4: Implements various encryption algorithms.
CO 5: Illustrates PGP and digital signature.

(A57214) UNIX PROGRAMMING LAB

CO 1: Will be able to describe and use the LINUX operating system.
CO 2: Will be able to describe and use the fundamental LINUX system tools and utilities.
CO 3: We will able to describe and write shell scripts in order to perform basic shell programming.
CO 4: Will be able to describe and understand the LINUX file system.

IV YEAR II SEMESTER

(A58025) BIG DATA ANALYTICS

CO 1: Know about sources of Big Data and Analysing Tools.
CO 2: Map statistical methods to analyze huge data.
CO 3: Know the other frameworks in Distributed File Systems.
CO 4: Know to create cluster in Hadoop distributed file system.
CO 5: Apply Map Reduction in HDFS.

(A58026) DISTRIBUTED SYSTEMS

CO 1: Able to understand the need of distributed systems and their applications.
CO 2: Able to understand peer to peer systems
CO 3: Able to understand concurrency
CO 4: To understand the concepts of remote procedure calls, remote file systems, distributed agreement, clock synchronization, and security

(A58027) OPERATIONS RESEARCH

CO 1: Formulate and solve mathematical model (linear programming problem) for a physical situation like production, Inventory and distribution of goods
CO 2: Apply the concept of simplex method and its extensions to dual simplex algorithms.
CO 3: Solve the problem of LP, DP and transporting the products from origins to destinations with least transportation cost
CO 4: Convert and solve the practical situations into sequencing, queuing non-linear problem

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(A58028) DESIGN PATTERNS

CO 1: Apply design patterns to create object-oriented programs that are simple to modify
CO 2: Apply structural design patterns for better class and object composition
CO 3: Apply behavioural patterns for better organization and communication between the objects
CO 4: Identify implemented design patterns
CO 5: Assess which design patterns that are appropriate in different solutions

(A58029) ARTIFICIAL INTELLIGENCE

CO 1: Ability to formulate an efficient problem space for a problem expressed in natural language.
CO 2: Select a search algorithm for a problem and estimate its time and space complexities
CO 3: Possess the skill for representing knowledge using the appropriate technique for a given problem
CO 4: Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and natural language processing.

(A58030) MULTIMEDIA COMPUTING

CO 1: Analyze various data streams in multimedia
CO 2: Analyze speech recognition in sound/ audio
CO 3: Edit graphic files using graphics software to improve the images and analysis of image
CO 4: Develop visual effects & rendering effects by using animation
CO 5: Apply data compression techniques & tools in real time applications

OPEN ELECTIVE- III

(A58301) CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT (CE)

CO 1: Handle the Project work with Proper Planning Scheduling including construction methods
CO 2: Use the mechanized construction equipments at different situations or any huge projects
CO 3: Have the knowledge of ISC -9000 Quality systems and environmental protection.
CO 4: To classify the contact management, estimation and project planning techniques
CO 5: Use the CPM – PERT Problems in project scheduling

(A58302) SAFETY ENGINEERING (CE)

CO 1: Know how to Handle and Protect the Machine and himself while working on it
CO 2: Know the Knowledge of lifting and carrying the materials and also maintenance of mechanical material handling equipment
CO 3: Understand the knowledge of safety rules and regulations of working at construction industry

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CO 4: Understand the knowledge about working at all stages in different heights at construction site
CO 5: Know the knowledge of different types of noise and vibration, its causes, effects and controlling measures

(A58303)ENERGY CONSERVATION AND AUDIT(EEE)

CO 1: Principles of thermodynamics and heat exchange theory
CO 2: Energy conservation and energy auditing
CO 3: Thermal insulation and heat recovery systems

(A58304)ARTIFICIAL NEURAL NETWORKS (EEE)

CO 1: Basics and models of Neural Networks and its architectures.
CO 2: Operation of feed forward and propagation networks.
CO 3: Associative memories and the applications of Neural Networks.

(A58305) RENEWABLE ENERGY SOURCES (ME)

CO 1: Solar thermal and photovoltaic systems and related technologies for energy conversion.
CO 2: Wind energy conversion, Biomass conversion, Geo thermal energy conversion and principles and technologies.
CO 3: Power from oceans and conversion, Fundamentals of direct energy conversion systems.

(A58306) AUTOMOBILE ENGINEERING (ME)

CO 1: Understand the basic lay-out of an automobile.
CO 2: Understand the operation of engine cooling, lubrication, ignition, electrical and air conditioning systems.
CO 3: Understand the principles of transmission, suspension, steering and braking systems.
CO 4: Understand automotive electronics. Study latest developments in automobiles.

(A58307) NANOTECHNOLOGY (ECE)

CO 1: Appreciate the importance of Nano dimensional materials and their applications.
CO 2: Realize and explain that the properties of Nano materials are size dependent and vary from corresponding bulk materials
CO 3: Demonstrate the skills required to prepare some of the Nano materials in the laboratory
CO 4: Characterize and study the properties with respect to their size and shapes.
CO 5: Appreciate the applications of nano electronic devices and understand their basic principles

(A58308) BIOMETRIC SYSTEM (ECE)

CO 1: Describe principles of the selected physical and behavioural biometric methods, and know how to deploy them in authentication scenarios,
CO 2: Organize and conduct biometric data collection processes, and understand how to use biometric databases in system evaluation,

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CO 3: Understand differences between a biometric method and a biometric system
CO 4: Itemize the most up-to-date examples of real biometric applications in human authentication

(A58309) GAME THEORY WITH ENGINEERING APPLICATIONS (CSE)

CO 1: Students should able to understand the Equilibrium and Non-Equilibrium strategies in gaming.
CO 2: Students should able to learn mixed strategies and rationalizability in gaming domain
CO 3: Students should able to develop knowledge on Electronic mail game
CO 4: Students should able to develop the idea of repeated games

(A58310) SOFTWARE ENGINEERING (CSE)

CO 1: Choose a process model to apply for given project requirements.
CO 2: Analyze and apply the framework activities for a given project.
CO 3: Design various system models for a given scenario.
CO 4: Design and apply various testing techniques.
CO 5: Understand metrics for process and products.

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ENGINEERING ENGINEERS

M.TECH.

COMPUTER SCIENCE AND ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PRORAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	Implement fundamental/advanced domain knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning.
PEO II	:	Pursue a successful career in Industry/academia/research/ government/entrepreneurship driven by strong foundations in updated technologies to the engineering sphere as a competent professional.
PEO III	:	Conduct research among computing professional as per market needs.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	Develop, test, and maintain Software Systems for business applications
PSO 2	:	Ability to use knowledge of various domains to identify research gaps and to provide solution to new ideas and innovations.

PROGRAM OUTCOMES		
PO 1:	:	Apply knowledge of mathematics and algorithm in solving complex Computer engineering problems
PO 2	:	Generate solutions by conducting experiments and applying techniques to analyze and interpret data
PO 3	:	Design component, or processes to meet the needs within realistic constraints

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PO 4	:	Identify, formulate, and solve Software Engineering, Networking and Data Mining problems
PO 5	:	Comprehend professional and ethical responsibility in computing profession
PO 6	:	Express effective communication skills
PO 7	:	Participate in global, economic, environmental, and societal context
PO 8	:	Recognize the need for, and an ability to engage in life-long learning
PO 9	:	Knowledge of current issues and emerging developments in computing profession
PO 10	:	Utilize the techniques, skills and modern computer Engineering tools for Engineering practices.
PO 11	:	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings
PO 12	:	Design research problems and conduct research in computing environment

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ANURAG

ENGINEERING ENGINEERS

M.TECH.

COMPUTER SCIENCE AND ENGINEERING

R15 REGULATION

COURSE STRUCTURE

HOD CSE
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I YEAR I SEMESTER

Course Code	Category	Course Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A31046	Core Course I	Advanced Data Structures and Algorithms	4	0	4	25	75	100
A31047	Core Course II	Computer System Design	4	0	4	25	75	100
A31040	Core Course III	Advanced Operating Systems	4	0	4	25	75	100
A31048	Core Elective-I	Software Process and Project Management	4	0	4	25	75	100
A31049		Natural language Processing						
A31050		Pattern Recognition						
A31051	Core Elective-II	Machine Learning	4	0	4	25	75	100
A31052		Parallel and Distributed algorithms						
A31053		Software Architecture and Design Patterns						
A31054	Open Elective I	Distributed Systems	4	0	4	25	75	100
A31055		Social Media Intelligence						
A31056		Entrepreneurship						
A31209	Lab	Advanced Data Structures and Algorithms Lab	--	4	2	25	75	100
A31210	Seminar	Seminar-I	--	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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I YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A32046	Core Course V	Advanced Network Programming	4	0	4	25	75	100
A32047	Core Course VI	Advanced Databases	4	0	4	25	75	100
A32048	Core Course VII	Web Services and Service Oriented Architecture	4	0	4	25	75	100
A32049	Core Elective-III	Advanced Data Mining	4	0	4	25	75	100
A32050		Storage Area Networks						
A32051		Database Security						
A32052	Core Elective-IV	Semantic Web and Social Networks	4	0	4	25	75	100
A32053		Wireless Networks and Mobile Computing						
A32054		Information Retrieval Systems						
A32055	Open Elective II	Grid and Cloud Computing	4	0	4	25	75	100
A32056		Computer Forensics						
A32057		E-Commerce						
A32209	Lab	Web Services Lab	0	4	2	25	75	100
A32210	Seminar	Seminar-II	-	4	2	50	--	50
Total			**24**	**8**	**28**	**225**	**425**	**650**

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II YEAR I SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A33209		Comprehensive Viva-Voce	--	--	4	--	100	100
A33210		Project work Review I	--	24	12	50	--	50
Total			**--**	**24**	**16**	**50**	**100**	**150**

II YEAR II SEMESTER

Course Code	Category	Subject Name	L	P	C	Int. Marks	Ext. Marks	Total Marks
A34209		Project work Review II	--	8	4	50	--	50
A34210		Project Evaluation (Viva-Voce)	--	16	12	--	150	150
Total			**--**	**24**	**16**	**50**	**150**	**200**

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COURSE OUTCOMES

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I YEAR I SEMESTER

(A31046) ADVANCED DATA STRUCTURES AND ALGORITHMS

CO 1: Attains the knowledge on Time complexity, space complexity, singly linked list, double linked list, circular lists.
CO 2: Gain the knowledge on Array and linked list representation, Dequeue ADT, implementation using Heap, vector classes.
CO 3: Attains the knowledge on Linear and binary search methods, Hashing in java.util-HashMap, Hash Set.
CO 4: Gain the knowledge on Trees, Properties of Binary trees, recursive and non recursive traversals, Graphs.
CO 5: Able to understand Binary search tree-Binary search tree ADT, Balanced search trees, AVL trees-Definition and examples, B-Trees-definition.

(A31047) COMPUTER SYSTEM DESIGN

CO 1: Attains the knowledge on Von-Neumann architecture – case study. IA -32 Pentium, registers and addressing, interrupts, DMA, Buses.
CO 2: Gain the knowledge on Execution of a complete instruction, multiple bus organization, data hazards, and instruction hazards
CO 3: Attains the knowledge on model level organization, cache memory, swapping, paging, segmentation, replacement policies.
CO 4: Gain the knowledge on processes, threads, inter process communication, classical IPC problems.
CO 5: Able to understand Files, directories, Threats, intruders, accident data loss.

(A31040) ADVANCED OPERATING SYSTEMS

CO 1: Attains the knowledge on Design issues, principles and case study.
CO 2: Gain the knowledge on Design issues, features and principles of working.
CO 3: Attains the knowledge on Design issues, working principles and characteristic features.
CO 4: Gain the knowledge on Issues and development principles, case study.
CO 5: Able to understand protection, privacy, access control and security issues.

CORE ELECTIVE-I

(A31048) SOFTWARE PROCESS AND PROJECT MANAGEMENT

CO 1: Attains the knowledge on Principles of Software Process Change, Software Process Assessment and The Repeatable Process.
CO 2: Gain the knowledge on Evolution of Software Economics, inception phase, elaboration phase, construction phase, and transition phase.
CO 3: Attains the knowledge on Software process workflows, Iteration workflows, cost and schedule estimating process.
CO 4: Gain the knowledge on project organizations, quality indicators, life-cycle expectations, metrics automation.
CO 5: Able to understand Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

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(A31049) NATURAL LANGUAGE PROCESSING

CO 1: Attains the knowledge on linguistic concepts, Natural language and variability.
CO 2: Able to understand of machine learning techniques which are applied to language.
CO 3: Able to understand the implementation of N-gram Models.

(A31050) PATTERN RECOGNITION

CO 1: Able to understand the fundamental problems in pattern recognition system design.
CO 2: Attains the knowledge on probability and statistical decision making.
CO 3: Gains the knowledge on clustering transformation and non parametric decision making.
CO 4: Able to understand entropy minimization implementation.

CORE ELECTIVE-II
(A31051) MACHINE LEARNING

CO 1: Able to understand issues in machine learning.
CO 2: Able to design learning system perspectives.
CO 3: Attains the knowledge on decision tree learning and artificial neural networks.
CO 4: Gains the knowledge on application of machine learning algorithms to solve moderate complexity problems.
CO 5: Able to understand instance based learning and analytical learning.
CO 6: Gains the knowledge on learning set of rules and genetic algorithms.

(A31052) PARALLEL AND DISTRIBUTED ALGORITHMS

CO 1: Able to understand the development techniques of parallel and distributed algorithms for shared memory.
CO 2: Attains Knowledge on pipelining concepts.
CO 3: Gains the knowledge on complexity and correctness models for parallel algorithms.
CO 4: Able to understand the main classes of parallel algorithms.

(A31053) SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

CO 1: Attains the knowledge on What is Software Architecture , Architectural patterns, Achieving qualities, Architectural styles and patterns.
CO 2: Gain the knowledge on Architecture design decision making, ATAM, CBAM.
CO 3: Attains the knowledge on Selection and usage, prototype, singleton, adapter, composite.
CO 4: Gain the knowledge on Interpreter, iterator, mediator, memento, observer.
CO 5: Able to understand The World Wide Web, a case study in designing for high availability.

OPEN ELECTIVE-I
(A31054) DISTRIBUTED SYSTEMS

CO 1: Attains the knowledge on Resource sharing and web, challenges, Architectural and Fundamental models.

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CO 2: Gain the knowledge on OS layer, Protection, Processes and Threads, Name Services and the Domain Name System.
CO 3: Attains the knowledge on Peer to Peer middleware, Routing overlays, events and Process states, Elections.
CO 4: Gain the knowledge on Transactions, Nested Transactions, Locks, Replication- Introduction, System model and group communication.
CO 5: Able to understand Overview of Security techniques, Cryptographic algorithms, CORBA RMI, CORBA Services.

(A31055) SOCIAL MEDIA INTELLIGENCE

CO 1: Able to understand the importance of social media investigations and intelligence gathering.
CO 2: Attains knowledge on opinions, social media monitoring and metrics.
CO 3: Gains the knowledge on advance search techniques for social media and intelligence integration on social media.
CO 4: Able to understand the management of social media communities.

(A31056) ENTREPRENEURSHIP

CO 1: Able to understand Entrepreneurial mindset.
CO 2: Attains the knowledge on resources and organizational matters of new venture creation process.
CO 3: Gains knowledge on management and growth of new ventures.

(A31209) ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

CO 1: Attains the knowledge on implementing linear search, binary search, stacks, and queues.
CO 2: Gain the knowledge on implementing sorting techniques-Btrees.

I YEAR II SEMESTER

(A32046) ADVANCED NETWORK PROGRAMMING

CO 1: Attains the knowledge on Networking utilities, Filters, Text processing utilities and Backup utilities.
CO 2: Gain the knowledge on File and Directory management – Directory contents, Scanning Directories- Directory file APIs
CO 3: Attains the knowledge on Network Programming in Java-Network basics, TCP sockets.
CO 4: Gain the knowledge on Message Queues- Kernel support for messages, UNIX system V APIs for messages.
CO 5: Able to understand Network IPC - Introduction to Unix Sockets, IPC over a network, Client-Server model

(A32047) ADVANCED DATABASES

CO 1: Attains the knowledge on ER Model, Relational Model, Basic SQL Queries.
CO 2: Gain the knowledge on The Memory Hierarchy, Distributed DBMS architectures, and Distributed transactions.
CO 3: Attains the knowledge on BCNF –Properties of Decompositions.

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CO 4: Gain the knowledge on Data on External Storage, File Organization and Indexing.
CO 5: Able to understand Functional Dependencies, Dependency preserving Decomposition.

(A32048) WEB SERVICES AND SERVICE ORIENTED ARCHITECTURE

CO 1: Attains the knowledge on Distributed Computing, Web Service Architecture.
CO 2: Gain the knowledge on WSDL binding, WSDL tools, XML Document structure.
CO 3: Attains the knowledge on Structure of a SOAP message, Encoding, Error handling in SOAP.
CO 4: Gain the knowledge on Service discovery, UDDI Architecture, UDDI Data Model.
CO 5: Able to understand Web Service Management, Overview of .NET and J2EE, SOA and Web Service.

CORE ELECTIVE-III
(A32049) ADVANCED DATA MINING

CO 1: Attains the knowledge on cluster analysis, outlier analysis, mining quantitative association rules.
CO 2: Gain the knowledge on genetic algorithms, roughest approach.
CO 3: Attains the knowledge on Introduction, web mining, web content mining, web structure mining, we usage mining.
CO 4: Gain the knowledge on Time Series Analysis, Data Mining Applications.
CO 5: Able to understand advanced pattern mining in multilevel.

(A32050) STORAGE AREA NETWORKS

CO 1: Able to understand the characteristics and components of Storage area Networks
CO 2: Attains Knowledge on SAN Vendors &their products.
CO 3: Gains the knowledge on RAID Levels and its Components.
CO 4: Able to understand the Evolution of Networked Storage.
CO 5: Gains the knowledge on Fibre channel protocols, usage of SAN Components for their communication.
CO 6: Able to understand usage of all SAN-OS commands.

(A32051) DATABASE SECURITY

CO 1: Able to understand the security of databases.
CO 2: Gains knowledge on database security design techniques.
CO 3: Attains knowledge on secure software design
CO 4: Able to understand the models for protection of new generations on databases

CORE ELECTIVE-IV
(A32052) SEMANTIC WEB AND SOCIAL NETWORKS

CO 1: Attains the knowledge on UML, XML/XML Schema, The World Wide Web.
CO 2: Gain the knowledge on Semantic Web Applications, Services and Technology.

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CO 3: Attains the knowledge on Ontology Engineering, Rule and Inference Engines.
CO 4: Gain the knowledge on Semantic Bioinformatics, Knowledge Base ,XML Based Web Services.
CO 5: Able to understand Artificial Intelligence, Berners-Lee www.

(A32053) WIRELESS NETWORKS AND MOBILE COMPUTING

CO 1: Able to understand the importance of Wireless network Architecture and computing environment.
CO 2: Attains knowledge on GSM Architecture.
CO 3: Gains information about Mobile Network Layer.
CO 4: Able to understand the importance of Mobile transport Layer.

(A32054) INFORMATION RETRIEVAL SYSTEMS

CO 1: Able to understand the usage of different information retrieval techniques in various application areas.
CO 2: Attains Knowledge on application of IR Principles for location of relevant information of large collections of data.
CO 3: Gains Knowledge on analyzing the performance of retrieval systems, implementation of retrieval systems in web search tasks.

OPEN ELECTIVE-II
(A32055) GRID AND CLOUD COMPUTING

CO 1: Attains the knowledge on grid computing and cloud computing, distributed programming models.
CO 1: Gain the knowledge on Service oriented architecture and web services.
CO 2: Attains the knowledge on Virtualization- Characteristic features, Taxonomy Hypervisor.
CO 3: Gain the knowledge on Cloud programming Environmental.
CO 4: Able to understand Grid Architecture and Service modelling, Grid resource management.

(A32056) COMPUTER FORENSICS

CO 1: Able to understand the importance of cyberspace, professional Forensics Methodology.
CO 2: Gains Knowledge on Computer Forensics capturing process.
CO 3: Attains Knowledge on preservation of Digital Evidence.
CO 4: Gains information on computer Forensics analysis, tools.

(A32057) E – COMMERCE

CO 1: Able to understand the importance of categories and trends of e-commerce applications.
CO 2: Gains knowledge on Electronic Payment Systems and associated security risks.
CO 3: Attains Knowledge on various strategies used for Advertising and Marketing.
CO 4: Able to understand the importance of Multimedia concepts.

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(A32209) WEB SERVICES LAB

CO 1: Gains Knowledge on technologies like WSDL,UDDI
CO 2: Able to understand the implementation of web service client and server.
CO 3: Attains Knowledge on deployment of web service client and server

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ANURAG
ENGINEERING ENGINEERS

M.B.A.

[MASTER OF BUSINESS ADMINISTRATION]

PROGRAM EDUCATIONAL OBJECTIVES [PEO]

PROGRAM SPECIFIC OBJECTIVES [PSO]

PROGRAM OUTCOMES [PO]

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PROGRAM EDUCATIONAL OBJECTIVES		
PEO I	:	To teach the fundamental key elements of a business organization,theoretical knowledge and practical approach to various functional areas of management.
PEO II	:	To develop analytical skills, to identify the link between the management practices in the functional areas of an organization and business environment and develop research culture.
PEO III	:	To provide insights on latest technology, business communication, management concepts to build teamwork and leadership skills within them and creativeness aimed at self-actualization and realization of ethical practices.

PROGRAM SPECIFIC OUTCOMES		
PSO 1	:	Helped in designing with the objective of developing young men and women into highly adept professional managers to explore the practical application of the management concept
PSO 2	:	Empowers students to demonstrate the ability to innovate, the ability to execute the most daunting of challenges in the most trying of circumstances.
PSO 3	:	Providing a Strong analytical foundation in key functional areas and the other, enabling a high degree of academic flexibility, thereby allowing students to customize their MBA experience.

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PROGRAM OUTCOMES		
PO 1:	:	To have the knowledge on various concepts of business management and approaches.
PO 2	:	To understand and analyze the interconnections between the developments of key functional areas of business organization and the management thought process.
PO 3	:	To recognize and adapt to the opportunities available facing the challenges in national and global business environments.
PO 4	:	To possess analytical skills to carry out research in the field of management.
PO 5	:	To acquire team management skills and to become competent leader possessing complex and integrated real world skills.
PO 6	:	To ethically conscious and socially responsible managers, capable of contributing to the development of nation and quality of life.

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COURSE STRUCTURE

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I YEAR I SEMESTER

Code	Subject	Approach	L	T/P	C	Marks	
						INT	EXT
A91001	Management and Organizational Behaviour	Overview and Cases	4	1	3	25	75
A91002	Business Environment	Overview and Cases	4	1	3	25	75
A91003	Financial Accounting & Analysis	Overview and Cases	4	1	3	25	75
A91004	Managerial Economics	Overview & Problem Solving	4	1	3	25	75
A91005	Statistics For Management	Overview and Cases	4	1	3	25	75
A91006	Business Communication	Overview and Cases	4	1	3	25	75
A91007	Computer Applications in Business	MS Office (Lab)	0	3	2	25	75
OPEN ELECTIVE-I		Theory	4	0	3	25	75
A91008	Cross Cultural Management						
A91009	WTO & IPR						
A91010	Total Quality Management						
A91011	Project Management						
TOTAL			**28**	**9**	**23**	**200**	**600**
TOTAL CREDITS AND MARKS			**23**			**800**	

L: Lecture T: Tutorial P: Practical, C: Credits

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I YEAR II SEMESTER

Code	Subject	Approach	L	T/P	C	Marks	
						INT	EXT
A92001	Human Resource Management	Overview and Cases	4	1	3	25	75
A92002	Quantitative Analysis for Business Decision	Overview and Cases	4	1	3	25	75
A92003	Financial Management	Overview & Problem Solving	4	1	3	25	75
A92004	Marketing Management	Overview and Cases	4	1	3	25	75
A92005	Business Ethics and Corporate Governance	Overview and Cases	4	1	3	25	75
A92006	Management Information system	Overview and Cases	4	1	3	25	75
OPEN ELECTIVE-II		Theory	4	1	3	40	60
A92007	Banking, Insurance & Risk Management						
A92008	Foreign Trade						
A92009	Logistics & Supply Chain Management						
A92010	MSME Management						
A92201	Industry Analysis Report - **Seminar**	Using CMIE Prowess Database / Annual Reports of Companies, Industry SWOT, PEST and contribution to various areas like GDP etc. & MS-Excel and working in any organization during summer	0	3	2	50	--
TOTAL			**28**	**10**	**23**	**225**	**525**
TOTAL CREDITS AND MARKS			**23**			**750**	

L: Lecture T: Tutorial P: Practical, C: Credits

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II YEAR I SEMESTER

Code	Subject	Approach	L	T/P	C	Marks	
						INT	EXT
A93001	Production and Operations Management	Overview and Cases	4	1	3	25	75
A93002	Strategic Management	Overview and Cases	4	1	3	25	75
A93003	Research Methodology	Overview and Applications	4	1	3	25	75
Core Elective	Elective-1	Overview and Cases	4	1	3	25	75
Core Elective	Elective-2	Overview and Cases	4	1	3	25	75
Core Elective	Elective-3	Overview and Cases	4	1	3	25	75
A93201	Business Best Practices – **Seminar**	Internet & Interaction with Executives	--	3	2	50	--
TOTAL			**24**	**9**	**20**	**200**	**450**
TOTAL CREDITS AND MARKS			**20**			**650**	

L: Lecture T: Tutorial P: Practical, C: Credits

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II YEAR II SEMESTER

Code	Subject	Approach	L	T/P	C	Marks	
						INT	EXT
A94001	Entrepreneurship Concepts and Cases	Overview and Cases	4	1	3	25	75
Core Elective	Elective-4	Overview and Cases	4	1	3	25	75
Core Elective	Elective-5	Overview and Cases	4	1	3	25	75
Core Elective	Elective-6	Overview and Cases	4	1	3	25	75
A94201	Success Stories of Entrepreneurs-**Seminar**	Field Visit	--	3	2	50	--
Main Project Work							
A94202	**Stage-I** :Pre submission project seminar		--	--	2	50	--
A94203	**Stage-II:** Main project report & viva		--	--	4	40	60
A94204	Comprehensive Viva-Voce		--	--	2	--	100
Total			**16**	**7**	**22**	**240**	**460**
Total Credits and Marks			**22**			**700**	

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MARKETING ELECTIVES		
Core Electives	**Semester**	**Code**
Consumer Behavior	II Year I Semester	A93004/M
Sales and Distribution	II Year I Semester	A93005/M
Integrated Marketing Communications	II Year I Semester	A93006/M
Retailing Management	II Year II Semester	A94002/M
Services Marketing	II Year II Semester	A94003/M
International Marketing	II Year II Semester	A94004/M

FINANCE ELECTIVES		
Core Electives	**Semester**	**Code**
Strategic Management Accounting	II Year I Semester	A93004/F
Security Analysis and Portfolio Management	II Year I Semester	A93005/F
Financial Institutions, Markets & Services	II Year I Semester	A93006/F
Strategic Investment and Financing Decisions	II Year II Semester	A94002/F
International Financial Management	II Year II Semester	A94003/F
Financial Derivatives	II Year II Semester	A94004/F

HR ELECTIVES		
Core Electives	**Semester**	**Code**
Performance Management	II Year I Semester	A93004/H
Training and Development	II Year I Semester	A93005/H
Management of Industrial Relations	II Year I Semester	A93006/H
Compensation & Reward Management	II Year II Semester	A94002/H
International Human Resource Management	II Year II Semester	A94003/H
Leadership and Change Management	II Year II Semester	A94004/H

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COURSE OUTCOMES

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I YEAR I SEMESTER

(A91001) MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR

Students will be able to

CO 1: Discuss the Theories of Management.
CO 2: Explain the Problem solving, Decision making And Planning process.
CO 3: Explain The Organizing and Controlling Techniques.
CO 4: Describe Personality, Perception and Groups.
CO 5: Describe about Leadership Theories, Motivation and Organizational Structures

(A91002) BUSINESS ENVIRONMENT

Students will be able to

CO 1: Examine the law of contract 1872.
CO 2: Discuss the consumer protection law.
CO 3: Discuss the Industrial policy and regulatory structure.
CO 4: Discuss the Banking system and economic policies.
CO 5: Discuss about Trade and Exim policy.

(A91003) FINANCIAL ACCOUNTING AND ANALYSIS

Students will be able to

CO 1: Explain Principles of Accounting
CO 2: Describe Accounting process
CO 3: Examine Preparation, Analysis and interpretation of financial statements
CO 4: Examine Analysis of financial statements
CO 5: Discuss Inventory Valuation.

(A91004) MANAGERIAL ECONOMICS

Students will be able to understand

CO 1: Student will understand basic economic principles
CO 2: Application of demand analysis in business
CO 3: Managing production cost
CO 4: Relationship between cost and output
CO 5: Kinds of competitive markets then exist

(A91005) STATISTICS FOR MANAGEMENT

Students will be able to

CO 1: Elucidate the Concepts of Statistics
CO 2: Able to utilize the data and present it through tables, graphs and diagrams
CO 3: Discuss the various concepts statistical tools like measures central tendency, Dispersion, Skewness.
CO 4: Solve the problems arising in business by using small sample tests.
CO 5: Identify the relation between to variables, importance of time series and index numbers.

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(A91006) BUSINESS COMMUNICATION

Students will be able to understand

CO 1: The importance of Communication in Business
CO 2: skills developing business letters
CO 3: To develop writing skills and presentation
CO 4: Writing business proposals and letters
CO 5: Application of business communication in the self development process.

(A91007) COMPUTER APPLICATIONS IN BUSINESS (LAB)

Students will be able to understand

CO 1: Basic knowledge about MS word and MS power point presentation
CO 2: Basic of MS excel
CO 3: To understand the practicality of MS excel
CO 4: To teach advanced formulas and functions MS excel
CO 5: To understand statistical concepts and computation

(A91008) CROSS CULTURAL MANAGEMENT

Student will be able to understand:

CO 1: Importance of culture
CO 2: Organizational Values
CO 3: Culture and styles of Management
CO 4: Communication in different cultures
CO 5: Cross cultural team management

(A91009) WTO & IPR

Students will be able to

CO 1: Describe the GATT, Uruguay Round, TRIPS and TRIMS.
CO 2: Examine different conventions and Agreements.
CO 3: List out different types of patent applications, patentable and non patentable inventions.
CO 4: Outline the convention application and geographical indication.
CO 5: Illustrate about trademarks and copyrights

(A91010) TOTAL QUALITY MANAGEMENT

Students will be able to understand

CO 1: Importance of Quality
CO 2: Principles and Practices of TQM
CO 3: Exposure on QMS
CO 4: Quality by design
CO 5: Tools and techniques in Quality management.

(A91011) PROJECT MANAGEMENT

Students will be able to understand

CO 1: Importance of Project Management
CO 2: Project Planning
CO 3: Execution and implementation
CO 4: Significance of teams in projects
CO 5: Project evaluation techniques.

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I YEAR II SEMESTER

(A92001) HUMAN RESOURCE MANAGEMENT

Students will be able to understand

CO 1: List out the recent trends & Practices in HRM
CO 2: Overview about HR planning.
CO 3: Evaluate various Recruitment & Selection Approaches
CO 4: List out various training and development methods, performance appraisal techniques.
CO 5: Analyze the best practices and maintain cordial relationship among employees.

(A92002) QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS

Students will be able to

CO 1: Describe various origin and application of OR,
CO 2: Utilize Linear Programming Methods like Graphical and Simplex.
CO 3: Calculate the transportation cost and how to Assign jobs
CO 4: Find out Different decisions that exist for a business problem and identify the best one.
CO 5: List out various techniques to calculate waiting time.

(A92003) FINANCIAL MANAGEMENT

Students will be able to

CO 1: Explain the Goals of Finance Function
CO 2: Discuss Investment criteria and Decision Process
CO 3: Examine Capital Structure Decisions
CO 4: Categorize Dividend Decisions
CO 5: Examine Working Capital Management

(A92004) MARKETING MANAGEMENT

Students will be able to understand

CO 1: About marketing management and its role in business
CO 2: Evolution of consumer in the market
CO 3: Market strategies
CO 4: Design of distribution system and role of communication in the business
CO 5: About pricing Strategies and procedures to be practiced in the market.

(A92005) BUSINESS ETHICS AND CORPORATE GOVERNANCE

Students will be able to

CO 1: Importance of Ethics in Business.
CO 2: Explain Professional Ethics.
CO 3: Describe the Cybercrimes and Legal Aspects.
CO 4: Importance and role of board members in Corporate Governance.
CO 5: Codes and Committees in Corporate Governance.

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CO 2: Understand the key Issue while acquiring or developing systems for achieving goals.
CO 3: Security Issues
CO 4: Demonstrate a good understanding of basic issues in ERP systems.
CO 5: ERP Implementation and maintenance.

(A92007) BANKING, INSURANCE AND RISK MANAGEMENT

Students will be able to
CO 1: Discuss the Indian Banking system and Banking products.
CO 2: Discuss the reforms and regulations in banking industry.
CO 3: About the Insurance and its Importance.
CO 4: Discuss the Insurance and Regulatory Development Authority.
CO 5: Examine Risk Management.

(A92008) FOREIGN TRADE

Students will be able to
CO 1: Define foreign trade, theories and economic growth of international trade.
CO 2: Objectives of trade policy and promotions schemes.
CO 3: Types of Inco terms and terminology.
CO 4: Free trade zone SEZ and foreign trade statistics.
CO 5: Possibilities for Indian products in different markets.

(A92009) LOGISTICS & SUPPLY CHAIN MANAGEMENT

Students will be able to understand
CO 1: Growing importance of Supply Chain Management
CO 2: Exposure on Demand forecasting in aspects of Supply chain management
CO 3: Exposure on materials importance in supply chain management
CO 4: Awareness on Cross Functional Drivers in supply chain management
CO 5: Exposure on Global aspects in SCM

(A92010) MICRO SMALL MEDIUM ENTERPRISES (MSME) MANAGEMENT

Students will be able to understand
CO 1: Issues and challenges in MSMEs
CO 2: Setting up of MSMEs
CO 3: Management MSMEs
CO 4: Illustrate credit monitoring system and product management line
CO 5: Institution and government support

II YEAR I SEMESTER

(A93001) PRODUCTION AND OPERATIONS MANAGEMENT

Students will be able to understand
CO 1: The birth and development of productions and operations management
CO 2: How to optimize production with effective societies management
CO 3: About the scheduling of Machines manpower and material
CO 4: Procedure to design a job
CO 5: Report evaluation of project and its cost within the given time period.

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CO 4: Procedure to design a job
CO 5: Report evaluation of project and its cost within the given time period.

(A93002) STRATEGIC MANAGEMENT

Students will be able to understand
CO 1: Explain Strategic management concepts
CO 2: Mention Tools and Techniques for Strategic analysis
CO 3: Explain Strategies for competing in globalized markets
CO 4: Compare Strategy for Diversification and merger.
CO 5: Plan for Strategy Evaluation and Control.

(A93003) RESEARCH METHODOLOGY

Students will be able to
CO 1: List out various types of research and discuss the methods of data collection.
CO 2: Write the hypothesis and identify the errors in hypothesis testing.
CO 3: Discuss the steps in the Research process and utilize various techniques in collecting samples.
CO 4: Utilize various Parametric and Non Parametric tests to get accurate results.
CO 5: Elucidate about writing a research Report

(A93004/M) CONSUMER BEHAVIOR (MARKETING ELECTIVE)

Students will be able to
CO 1: Understand Consumer behaviour.
CO 2: Environmental influences on Consumer behaviour.
CO 3: Perception and attitude of consumers.
CO 4: Consumer decision making.
CO 5: Marketing ethics towards consumers.

(A93005/M) SALES AND DISTRIBUTION (MARKETING ELECTIVE)

Students will be able to
CO 1: Growing importance of sales management
CO 2: Exposure on sales and Budgeting
CO 3: Exposure on sales force management
CO 4: Awareness on characteristics of distribution channels and managing them.
CO 5: Managing the channel information system.

(A93006/M) INTEGRATED MARKETING COMMUNICATIONS (MARKETING ELECTIVE)

Students will be able to Understand
CO 1: Integrated marketing communication.
CO 2: Allocates the Marketing Communication Budget.

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CO 3: Evolution of marketing mix.
CO 4: Promoting activities through the media.
CO 5: Ethical aspects.

(A93004/F) STRATEGIC MANAGEMENT ACCOUNTING (FINANCE ELECTIVE)

Students will be able to
CO 1: Explain the Fundamentals of management accounting and cost accounting
CO 2: Discuss the cost analysis
CO 3: Explain the marginal costing
CO 4: Explain the product mix concepts.
CO 5: Examine the budget and budgetary controls

(A93005/F) SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT (FINANCE ELECTIVE)

Student will able to
CO 1: Explain Indian Investment environment
CO 2: Discuss Components of Security Analysis
CO 3: Examine the Bond valuation analysis and management
CO 4: Categorize Equity Valuation models
CO 5: Explain Portfolio analysis and performance evaluation of portfolios

(A93006/F) FINANCIAL INSTITUTIONS, MARKETS AND SERVICES (FINANCE ELECTIVE)

The students will be able to understand
CO 1: Indian Financial system and development
CO 2: structure of banking institutions
CO 3: Non-banking institutions
CO 4: functions of Financial and Securities Markets
CO 5: Fund and Fee based services.

(A93004/H) PERFORMANCE MANAGEMENT (HR ELECTIVE)

Student will able to understand
CO 1: About the performance management system
CO 2: About Measuring results and behaviors and implementing performance management system
CO 3: About 360o performance and skills required to assess the performance
CO 4: About reward system and legal issues and how manage team performance
CO 5: About the Performance related concepts

(A93005/H) TRAINING AND DEVELOPMENT (HR ELECTIVE)

Student will be able to understand
CO 1: The importance training and career opportunities in training
CO 2: About the need analysis and how to design a training programme

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CO 3: About different training methods to enhance employee skills
CO 4: About how to implement and evaluate training
CO 5: About different areas of organizational training.

(A93006/H) MANAGEMENT OF INDUSTRIAL RELATIONS (HR ELECTIVE)

Student will able to understand
CO 1: Importance of Industrial relations and trade unions
CO 2: Settlement machinery and its instruments
CO 3: Industrial Disputes and how to reduce industrial disputes
CO 4: wage fixation methods and payment of wages & bonus Act
CO 5: Different Acts which give support for increasing I.R.

II YEAR II SEMESTER

(A94001) ENTREPRENEURSHIP CONCEPTS AND CASES

Student will able to understand
CO 1: About how to establish a new business.
CO 2: To overcome stress by the businessman in the business.
CO 3: Modern trends in venture capital for entrepreneurs.
CO 4: Legal issues for new business and methods to overcome them.
CO 5: Strategic planning process for an entrepreneur.

(A94002/M) RETAILING MANAGEMENT (MARKETING ELECTIVE)

Student will able to understand
CO 1: The concept of effective retailing and know the recent trends in retailing in India.
CO 2: Shopping environment.
CO 3: Possess the knowledge of various retail formats.
CO 4: The concept of retail operation and promotion.
CO 5: The retail customer behavior.

(A94003/M) SERVICES MARKETING (MARKETING ELECTIVE)

Student will able to understand
CO 1: Characteristics of services marketing management of company offering services.
CO 2: Consumer behaviour in services.
CO 3: Align service design and standards.
CO 4: Delivery and performing services.
CO 5: Managing service promises.

(A94004/M) INTERNATIONAL MARKETING (MARKETING ELECTIVE)

Student will able to understand
CO 1: The global marketing management
CO 2: Environment of the global markets.

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CO 3: Assessing global marketing opportunities.
CO 4: Developing global marketing strategy.
CO 5: Implementing global marketing trades.

(A94002/F) STRATEGIC INVESTMENT AND FINANCING DECISIONS (FINANCE ELECTIVE)

Students will be able to
CO 1: Explain the Investment Decisions under Risk and uncertainty
CO 2: Examine the Strategic investment decisions
CO 3: Assess the Investment Appraisal Techniques
CO 4: Explain the lease Financing.
CO 5: Discuss the Financing Decisions

(A94003/F) INTERNATIONAL FINANCIAL MANAGEMENT (FINANCE ELECTIVE)

Students will be able to understand
CO 1: Explain International Financial Management
CO 2: Discuss components of Balance of Payments
CO 3: Classify Foreign Exchange Markets
CO 4: Examine Exchange Rates
CO 5: Describe Asset and Liability Management

(A94004/F) FINANCIAL DERIVATIVES (FINANCE ELECTIVE)

Students will be able to
CO 1: Explain the Concepts and Types of Derivatives Market.
CO 2: Intercept the structure and strategies of futures and forwards.
CO 3: Use the applications of option models in derivatives markets.
CO 4: Analyze The Option Strategies And Manage The Risk Using Options In Derivative Market.
CO 5: Value the swaps and Manage the risk using swaps.

(A94002/H) COMPENSATION & REWARD MANAGEMENT (HR ELECTIVE)

Student will able to understand
CO 1: About Job Analysis and job evaluation
CO 2: About designing pay levels and pay for performance
CO 3: About employee welfare and retirement Benefits
CO 4: About the compensation for special groups
CO 5: legal issues on compensation public sector pay management

(A94003/H) INTERNATIONAL HUMAN RESOURCE MANAGEMENT (HR ELECTIVE)

Student will able to understand
CO 1: about the importance of IHRM and differences between IHRM & HRM
CO 2: about the approaches to IHRM
CO 3: about the Virtual Organization
CO 4: about the HR Practices across the world

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CO 5: about the impact of IT on HRM

(A94004/H) LEADERSHIP AND CHANGE MANAGEMENT
(HR ELECTIVE)

CO 1: List out Leadership components, trait and skills approach to leadership.
CO 2: Describe the contingency theory & Path –Goal Theory of Leadership.
CO 3: Outline the Transformational leadership & Servant leader qualities.
CO 4: Relate the Organizational design and Change.
CO 5: Explain the importance of Change Management in business.

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ANURAG
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R15 REGULATION

COURSE STRUCTURE

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I YEAR I SEMESTER

Code	Subject	Approach	L	T/P	C	Marks	
						INT	EXT
A91001	Principles of Management	Concepts and Cases	4	1	3	40	60
A91002	Business Environment	Concepts and Cases	4	1	3	40	60
A91003	Financial Accounting & Analysis	Concepts & Problem Solving	4	1	3	40	60
A91004	Managerial Economics	Concepts and Cases	4	1	3	40	60
A91005	Marketing Management	Concepts and Cases	4	1	3	40	60
A91006	Research Methodology & Statistical Analysis	Concepts & Problem Solving	4	1	3	40	60
OPEN ELECTIVE-I		Theory	4	1	3	40	60
A91007	Business Communication						
A91008	WTO & IPR						
A91009	Total Quality Management						
A91010	Project Management						
A91201	Computer Applications for Business	MS Office (Lab)	0	3	2	40	60
Total			**28**	**9**	**23**	**320**	**480**
Total Credits and Marks			**23**			**800**	

L: Lecture T: Tutorial P: Practical, C: Credits

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I YEAR II SEMESTER

Code	Subject	Approach	L	T/P	C	Marks	
						INT	EXT
A92001	Human Resource Management	Concepts and Cases	4	1	3	40	60
A92002	Quantitative Analysis for Business Decision Making	Concepts & Problem Solving	4	1	3	40	60
A92003	Financial Management	Concepts Cases & Problem Solving	4	1	3	40	60
A92004	Management Information System	Concepts and Cases	4	1	3	40	60
A92005	Organizational Behavior	Concepts and Cases	4	1	3	40	60
OPEN ELECTIVE-II		Theory	4	1	3	40	60
A92006	Business Ethics & Corporate Governance						
A92007	Foreign Trade						
A92008	Banking, Insurance & Risk Management						
A92009	MSME Management						
A92007	Production & Operations Management	Concepts, Cases & Problem Solving	4	1	3	40	60
A92201	Industry Analysis Report - **Seminar**	Using CMIE Prowess Database / Annual Reports of Companies, Industry SWOT, PEST and contribution to various areas like GDP etc. & MS-Excel and working in any organization during summer	0	3	2	50	--
Total			**28**	**12**	**23**	**330**	**420**
Total Credits and Marks			**23**			**750**	

L: Lecture T: Tutorial P: Practical, C: Credits

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II YEAR I SEMESTER

Code	Subject	Approach	L	T/P	C	Marks	
						INT	EXT
A93001	Logistics & Supply Chain Management	Concepts and Cases	4	1	3	40	60
A93002	Strategic Management	Concepts and Cases	4	1	3	40	60
A93003	Cost and Management Accounting	Concepts and Cases	4	1	3	40	60
Core Elective	Elective 1	Concepts and Cases	4	1	3	40	60
Core Elective	Elective 2	Concepts and Cases	4	1	3	40	60
Core Elective	Elective 3	Concepts and Cases	4	1	3	40	60
A93201	Business Best Practices - **Seminar**	Internet & Interaction with Executives	--	3	2	50	--
TOTAL			**24**	**9**	**20**	**290**	**360**
TOTAL CREDITS AND MARKS			**20**			**650**	

L: Lecture T: Tutorial P: Practical, C: Credits

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II YEAR II SEMESTER

Code	Subject	Approach	L	T/P	C	Marks	
						INT	EXT
A94001	Entrepreneurship Concepts and Cases	Concepts and Cases	4	1	3	40	60
Core Elective	Elective 4	Concepts and Cases	4	1	3	40	60
Core Elective	Elective 5	Concepts and Cases	4	1	3	40	60
Core Elective	Elective 6	Concepts and Cases	4	1	3	40	60
A94201	Success Story of an Entrepreneur- **Seminar**	Field Visit	-	3	2	50	
Main Project Work							
A94202	**Stage-I** :Pre submission project seminar		-	-	2	50	
A94203	**Stage-II:** Main project report & viva		-	-	4	40	60
A94204	Comprehensive Viva-Voce		-	-	2		100
Total			**16**	**0**	**22**	**300**	**400**
Total Credits and Marks			**22**			**700**	

L: Lecture T: Tutorial P: Practical, C: Credits

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MARKETING ELECTIVES			
Core Elective	**Semester**	**Code**	**Subjects**
Elective 1	II Year I Semester	A93004/M	Consumer Behaviour
Elective 2 & Elective 3 (for Finance (or) HR)	II Year I Semester	A93005/M	Services and Retailing Marketing
Elective 4	II Year II Semester	A94002/M	International Marketing
Elective 5 & Elective 6 (for Finance (or) HR)	II Year II Semester	A94003/M	Sales and Distribution Management

FINANCE ELECTIVES			
Core Elective	**Semester**	**Code**	**Subjects**
Elective 1	II Year I Semester	A93004/F	Management of Derivatives
Elective 2 & Elective 3 (for Marketing (or) HR)	II Year I Semester	A93005/F	Security Analysis and Portfolio Management
Elective 4	II Year II Semester	A94002/F	Strategic Investment and Financing Decisions
Elective 5 & Elective 6 (for Marketing (or) HR)	II Year II Semester	A94003/F	International Financial Management

HR ELECTIVES			
Core Elective	**Semester**	**Code**	**Subjects**
Elective 1	II Year I Semester	A93004/H	Performance & Reward Management
Elective 2 & Elective 3 (for Marketing (or) Finance)	II Year I Semester	A93005/H	Training and Development
Elective 4	II Year II Semester	A94002/H	Management of Industrial Relations
Elective 5 & Elective 6 (for Marketing (or) Finance)	II Year II Semester	A94003/H	Leadership and Change Management

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ANURAG
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M.B.A.

[MASTER OF BUSINESS ADMINISTRATION]

R15 REGULATION

COURSE OUTCOMES

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I YEAR I SEMESTER

(A91001) PRINCIPLES OF MANAGEMENT

The students should be able to

CO 1: Learn the history of management and the contributions of important management researchers.
CO 2: Demonstrate basic knowledge of management and organization
CO 3: Understand the relevance of environmental scanning, planning and how to take decisions.
CO 4: Explain how organizations adapt to an uncertain environment and identify techniques managers
CO 5: use to influence and control the internal environment.

(A91002) BUSINESS ENVIRONMENT

Students will be able to understand

CO 1: About the Elements of Valid contract
CO 2: About the Consumer Protection law.
CO 3: About the Industrial policy & Regulatory Structure
CO 4: About Banking systems & Economic policies
CO 5: About Trade & EXIM Policy

(A91003) FINANCIAL ACCOUNTING AND ANALYSIS

Students will be able to understand

CO 1: Principles of Accounting,
CO 2: Accounting Process
CO 3: Inventory Valuation
CO 4: Preparation, Analysis and Interpretation of Financial Statements
CO 5: Discuss Inventory Valuation

(A91004)MANAGERIAL ECONOMICS

Students will be able to understand

CO 1: Economic Principles in Business
CO 2: Forecast Demand and Supply
CO 3: About the Production and Cost Estimates
CO 4: About the Market Structure and Pricing Practices
CO 5: About the Economic Policies.

(A91005) MARKETING MANAGEMENT

Students will be able to understand

CO 1: Concepts of marketing management
CO 2: To analyze markets
CO 3: To design customer driven strategies
CO 4: To communicate the decisions towards business development with superior customer value.
CO 5: To Identify the Distribution Channels and Promotions.

(A91006) RESEARCH METHODOLOGY & STATISTICAL ANALYSIS

Students will be able to

CO 1: Apply the principles of research methodology for the research design for the various mini and Major projects of the MBA programme.
CO 2: They will be able to analyse the data statistically.
CO 3: Understand some basic concepts of research and its methodologies
CO 4: Identify appropriate research topics.
CO 5: organize and conduct research (advanced project) in a more appropriate manner

OPEN ELECTIVE - I

(A91007) BUSINESS COMMUNICATION (Open Elective)

Students will be able to understand

CO 1: The importance of Communication in Business
CO 2: To develop writing skills and presentation
CO 3: To develop writing skills and presentation
CO 4: Writing business proposals and letters
CO 5: Application of business communication in the self-development process.

(A91008) WTO & IPR

Student will be able to understand

CO 1: The trade rules and regulations in International level
CO 2: How the WIPO encourages creative activity, to promote Intellectual property throughout the world.
CO 3: About the Patents
CO 4: Rights, terms and restrictions regarding Designs & Geographical Indication
CO 5: About Trademarks & Copyrights

(A91009)TOTAL QUALITY MANAGEMENT

Students will be able to understand

CO 1: Importance of Quality
CO 2: Principles and Practices of TQM
CO 3: Exposure on QMS
CO 4: Tools and Techniques in Quality management.
CO 5: About the Management Tools

(A91010) PROJECT MANAGEMENT

Students will be able to understand

CO 1: Importance of Project Management
CO 2: Project Planning
CO 3: Execution and implementation
CO 4: Significance of teams in projects
CO 5: Project evaluation techniques.

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(A91201) COMPUTER APPLICATIONS IN BUSINESS (LAB)

Student will be able to understand

CO 1: About the MS Word and Powerpoint presentation.
CO 2: About the uses of MS Excel
CO 3: About the use of Data Analysis using charts and Graphs.
CO 4: Advanced Data analysis using Pivot Charts & Pivot Tables.
CO 5: About Application of Statistical tools for Execution using EXCEL

I YEAR II SEMESTER

(A92001) HUMAN RESOURCE MANAGEMENT

Students will be able to understand

CO 1: Basic HR concepts
CO 2: Process of recruitment and selection
CO 3: Learning and development
CO 4: Performance Management and Compensation
CO 5: Importance of employee welfare and grievances.

(A92002) QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS

Students will be able to understand

CO 1: The course covers origin and application of OR
CO 2: Application of Linear Programming Method in Business
CO 3: How to reduce the Transportation Cost.
CO 4: Identifying the Right persons to carry the Job
CO 5: Decision Theory and queuing theory. These concepts help the student in taking decisions for a business.

(A92003) FINANCIAL MANAGEMENT

Students will be able to understand

CO 1: Goals of financial function
CO 2: Investment criteria and decision process
CO 3: capital structure and Dividend Decisions
CO 4: Asset Liability management
CO 5: Examine Working Capital Management

(A92004) MANAGEMENT INFORMATION SYSTEM

Students will be able to understand

CO 1: Concepts & applications of Management Information Systems.
CO 2: Information Systems Planning & Implementations.
CO 3: Cybercrime and information security.
CO 4: Identify the major management challenges to building and using information systems in Organizations.
CO 5: Identify managerial risks related to information system organization processing and utilizing.

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(A92005) Organizational Behavior

Students will be able to understand

CO 1: To understand how employees behave in organizations.
CO 2: Correct their individual behaviour and group behaviour.
CO 3: They will also be able to motivate and lead employees towards achievement of organizational mission and objectives.
CO 4: Develop a basic understanding of individual behavior
CO 5: Explore issues of motivation, communication, leadership, decision-making, careers, power and organizational change.

OPEN ELECTIVE –II

(A92006): BUSINESS ETHICS AND CORPORATE GOVERNANCE

Students will be able to understand

CO 1: Importance of Ethics in Business
CO 2: Cyber Crime and Legal Aspects.
CO 3: Need for Corporate Governance in India
CO 4: Codes and Committees in Corporate Governance
CO 5: Role of Board in Corporate Governance

(A92008) FOREIGN TRADE

Students will be able to understand

CO 1: Balance of Payments and Multilateral Trade agreements.
CO 2: About Import & Export Policies.
CO 3: About the rules & Responsibilities of Importers and Exporters
CO 4: About the Institutional set up for Export promotion.
CO 5: About the Assessment of Indian products in International markets.

(A92009) BANKING, INSURANCE & RISK MANAGEMENT

Students will be able to understand

CO 1: About the Indian Economy
CO 2: About the Reforms regarding Banking sectors in Regulations.
CO 3: About Insurance
CO 4: About the Insurance Regulatory Development Authority.
CO 5: About Risk Management.

(A92010) MICRO SMALL MEDIUM ENTERPRISES (MSME) MANAGEMENT

Students will be able to understand

CO 1: Issues and Challenges in MSMEs
CO 2: Setting up of MSMEs
CO 3: Management of MSMEs
CO 4: Illustrate credit monitoring system and product management line
CO 5: Institution and Government support.

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(A92007) PRODUCTION & OPERATIONS MANAGEMENT

Students will be able to understand

CO 1: Concepts of Operations management,
CO 2: Product & process design, analysis,
CO 3: Plant location and layout,
CO 4: Scheduling and Material Management.
CO 5: Report evaluation of project and its cost within the given time period.

II YEAR I SEMESTER

(A93001) LOGISTICS & SUPPLY CHAIN MANAGEMENT

Students will be able to understand

CO 1: Growing importance of Supply Chain Management
CO 2: Logistics and Its Importance in SCM
CO 3: Benchmarking in SCM
CO 4: Sourcing and transportation
CO 5: Global aspects in SCM

(A93002) Strategic Management

Students will be able to understand

CO 1: Strategic management concepts
CO 2: Tools and Techniques for Strategic analysis
CO 3: Strategies for competing in globalized markets
CO 4: Strategy Evaluation and Control.
CO 5: Plan for Strategy Evaluation and Control.

(A93003) Cost and Management Accounting

Students will be able to understand

CO 1: Fundamentals of Management accounting and Cost accounting
CO 2: Cost analysis
CO 3: Marginal costing
CO 4: Explain the product mix concepts
CO 5: Budget and Budgetary controls.

(A93004/M) CONSUMER BEHAVIOR (MARKETING ELECTIVE)

Student should be able to

CO 1: Understand consumer behavior
CO 2: Environmental influences on consumer behavior,
CO 3: Perception and attitude of consumers,
CO 4: Consumer decision making
CO 5: Marketing ethics towards consumers.

(A93005/M) Services and Retailing Marketing (MARKETING ELECTIVE)

The students will be able to understand

CO 1: The characteristics of services
CO 2: Understand consumer behaviour in services

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CO 3: Able to link it to cases to understand the present Retailing Trends.
CO 4: The students will be able to understand shopping environment
CO 5: Retail formats, functions, retail operation and promotion.

(A93004/F) Management of Derivatives (FINANCE ELECTIVE)

The students efficient in the area of
CO 1: Derivatives, giving them the knowledge of basics in Derivatives,
CO 2: Future Markets, Option Strategies, etc
CO 3: Commodity Market Derivatives
CO 4: Features of Swaps
CO 5: Value the swaps and Manage the risk using swaps

(A93005/F) SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT (FINANCE ELECTIVE)

Students will be able to understand
CO 1: Indian Investment Environment
CO 2: Portfolio Analysis
CO 3: Bond valuation and management
CO 4: Equity valuation of Cash market and derivatives
CO 5: Performance evaluation of Portfolios.

(A93004/H) PERFORMANCE AND REWARD MANAGEMENT (HR ELECTIVE)

The students can understand
CO 1: The importance of performance Management
CO 2: Performance Appraisals
CO 3: Reward System & Other performance related concepts
CO 4: The compensation for various levels of jobs in the organization
CO 5: Government and legal issues in compensation design

(A93005/H) TRAINING AND DEVELOPMENT (HR ELECTIVE)

The student after completing the course will be
CO 1: Familiar with how to do training need analysis
CO 2: Understand various training methods
CO 3: Design training programs,
CO 4: Implement training programs and evaluate effectiveness of training programs
CO 5: About different areas of organizational training

II YEAR II SEMESTER

(A94001) ENTREPRENEURSHIP CONCEPTS AND CASES

Students will be able to understand
CO 1: Mindset of the entrepreneurs,
CO 2: Identify ventures for launching,

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CO 3: Develop an idea on the legal framework and
CO 4: Strategic perspectives in entrepreneurship.
CO 5: Strategic planning process for an entrepreneur

(A94002/M) INTERNATIONAL MARKETING
(MARKETING ELECTIVE)

Students will be to get deeper insight into
CO 1: The Global Marketing Management,
CO 2: Environment of global markets,
CO 3: Assessing Global Market Opportunities,
CO 4: Developing and Implementing Global Marketing Strategies.
CO 5: Implementing global marketing trades.

(A94003/M) SALES AND DISTRIBUTION MANAGEMENT
(MARKETING ELECTIVE)

The student should be able to understand about
CO 1: The importance of Sales Management,
CO 2: Sales Planning and Budgeting
CO 3: Characteristics of distribution channels and managing them
CO 4: Reasons for Channel Conflicts, Managing Conflict.
CO 5: Managing the channel information system

(A94002/F) STRATEGIC INVESTMENT AND FINANCING DECISIONS
(FINANCE ELECTIVE)

Students will be able to understand
CO 1: Investment Decisions in Risk and uncertainty
CO 2: Strategic investment decisions
CO 3: Investment Appraisal Techniques
CO 4: Explain the lease Financing
CO 5: Financing Decisions

(A94003/F) INTERNATIONAL FINANCIAL MANAGEMENT
(FINANCE ELECTIVE)

Students will be able to understand
CO 1: International Financial Management
CO 2: Balance of Payments
CO 3: Foreign Exchange Markets
CO 4: Examine Exchange Rates
CO 5: Asset and liability Management.

(A94002/H) MANAGEMENT OF INDUSTRIAL RELATIONS
(HR ELECTIVE)

Students will be able to understand
CO 1: Importance of Industrial Relations

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CO 2: Collective Bargaining Mechanism
CO 3: Parties and role in Industrial Relations
CO 4: Labour Legislation aspects.
CO 5: Different Acts which give support for increasing I.R.

(A94003/H) LEADERSHIP AND CHANGE MANAGEMENT
(HR ELECTIVE)

Students will be able to understand
CO 1: Leadership, Role and function of a Leader
CO 2: Leadership theories and styles
CO 3: Organizational change concepts
CO 4: Perspectives of change
CO 5: Strategies for Managing change

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(HS309MC) GENDER SENSITIZATION

(Mandatory Course)

Course Objectives:

1. To develop students sensibility with regard to issues of gender in contemporary India.
2. To provide critical perspective or the socialization of men and women.
3. To introduce students to information about so0me key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender vigilance.

Unit-I:-

UNDERSTANDING GENDER:

Gender: Why shoud we Study it? (Towards a world of equals: Unit - 1)

Socialization: Making women, Making Men (Towards a world of equals: Unit – 2)

Introduction. Preparing for Womanhood Growing up male. First lessons in Cases. Different masculinities.

Just Relationships: Being Together as Equals (Towards a world of equals: Unit – 12)

Mary Kom and onles love and Acid just do not Mix. Love Letters, Mothers and Fathers. Furthur Reading: Rose Parks The Brave Heart.

Unit – II:

GENDER AND BIOLOGY:

Missing Women: Sex Selection and its consequences (Towards a world of equals: Unit 4)

Destining Sex Ratio, Demographic Consequences.

Gender Spectrum: Beyond the Binary (Towards a world of Equals unit – 10)

Two or Many? Struggles with Discrimination

Additional reading: Our Bodies, Our Health (Towards a world of equals: Unit – 13)

Unit – III:

GENDER AND LABOUR:

Housework: the Invisible Labour (Towards a world of equals: Unit – 3)

"My Mother doesn't Work." "Share the Load."

Women's Work: Its Politics and Economics (Towards a world of equals: Unit – 7)

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Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

Unit – IV:

ISSUES OF VOLENCE:

Sexual Ilarassment: Say Not (Towards a world of equals: Unit – 6)

Sexual Harassment: not Eve teasing Coping with Everyday Harassment Further Reading: "Chupalu".

Domestic Violence: Speaking Out (Towards a world of equals: Unit – 8)

Is home a safe place? – When women unite [Film]. Rebuilding lives Further Reading New Forums for Justice.

Thinking about Sexual Violence (Towards a world of equals: Unit – 11)

Blaming the Victim-"I fought for my life…." – Further Reading: The Caste Face of Violence

Unit – V:

GENDER STUDIES:

Knowledge: Through the Lens of Gender (Towards a world of equals: Unit – 5)

Point of view Gender and the structure of knowledge. Further Reading: Unacknowledged women Artists of Telangana.

Whose History? Questions for historians and others (Towards a world of equals: Unit – 9)

Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Essential Reading: All The Units In the Textbook, " Towards a World of Equals: A Billngual Textbook on Gneder" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, GoguShyamala, Deepa Sreenivas and Susie Thanu.

Note: Since it is interdisciplinary course, Resource Persons can be drawn form the fields of English Literature or Sociology or political science or any other qualified faculty who has expertise in this field.

REFERENCE BOOKS:

1. Sen, Amartya. "More than One Million Women are Missing." New York of books 37.20 (20 December 1990). Print. "we Were Making History…" Life Stories of Women in the Telangana People's Struggle. New Delhi: Kalifcr Women. 1989.
2. TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's Studies Journal (14 November 2012) Availbale online at : http:// blogs.wsj.com/india real time/2J12/11/14/by- The numbers-wehere-Indian-women-work/>
3. K.Satyanaraya and Susie Tharu (Ed.) Steel Nibs Are Sorouting: New Dalit Writing From South India, Dussier 2. Telugu And Khannada
4. Vimala. "Vartillu (the Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. SusicTharu and K.Lalits. Delhi:Oxford University Press, 1995. 599-601.

5. Shatruguna. VeanaAt . Women's Work and its Imapact on Child Health and Nutrition Hyderabad, National Institute of Nutrition . India council of research. 1993.
6. Stree Shakti Sangeetana. "We Were Making History ... 'Life Stories of women in the Telangana People's Struggle. New Delhi: Kai for Women. 1989.
7. Menon. Nivedita. Seeing Like a Feminist New Delhi: Zubaan-Penguin Books, 2012.
8. Yayaprabha, A. "Chupulu (states)". Women Writing in India: 500BC to the Present. Volume II: The 20th Century Ed. Susie Tharu and K.Lalita Delhi: Oxford University Press. 1995.596-597.
9. HaveedShayam and Anupam Maruhaar, "Women and Wage Discrimination in India: A Critical Analysis. " I International journal of Humanities and Social Science Invention 2.4(2013)
10. Gautam. Liela and Gita Ramaswamy. "A Conversation between a Daughter and a Mohter. " Eroadsheet on contemporary Politics. Special Issue on Sexually and Harassment: Gender Politics on Campus Today. Ed. Madhumeeta Sinha and Asma Rasheed. Hyderabad Anveshi Research Center for Women's Studies. 2014
11. Aodulali Sohaila. "I fought for My Life .. and Won. " Available online at http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand -won-sohala-abdula/
12. Jeganathan Pradeep. ParthaChattarjee (Ed). "Community, Gender and Violence Subaltern Studies XI". Parmanert Black and Ravi Dayal Publishers, New Delhi, 2000.
13. Kkapadia. The Violence of Development: The Plitics of Identity, Gender and Social Inequalities in india London: Zed Books. 2002
14. S.benhabib. Situaling the Self Gender, Community anaPostmoderism in Contemporary Ethics. London roullege. 1992
15. Virgnia Woolf. A Room of One's Own. Oxford Black Swan. 1992
16. T. Banuri and M. Mahmood, Just Development: Beyond Adjustment with a human Face, Karachi Oxford University Press, 1997

Course Outcomes:

CO 1 : Students will have developed a better understanding of important issues related to gender in contemporary India.
CO 2 : Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials from research, facts, everyday life, literature and film.
CO 3 : Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
CO 4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.
CO 5: Men and women students and professions a will be better equipped to work and live together as equals.

GS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1			√			√	√	√	√	√		
CO 2	√		√			√	√	√	√	√		
CO 3			√			√	√	√	√	√		
CO 4			√			√	√	√	√	√		
CO 5			√			√	√	√	√	√		

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(HS409MC) HUMAN VALUES AND PROFESSIONAL ETHICS

(MANDATORY COURSE)

Objectives:

1. To learn the basic guide lines, content and process for value Education .
2. To understand human being as co-existence of the sentient I and the material body
3. To know the harmony in the family and society will lead affection towards in the family and as well as in the society.
4. Is to get the knowledge about existing nature and their role in protecting of nature.
5. To impart competence in professional ethics.

UNIT - I:

Course Introduction - Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self exploration. Continuous Happiness and Prosperity - A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT - II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT - III:

Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; **Trust (Vishwas) and Respect (Samman) as the foundational values of relationship.** Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha) - from family to world family!

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UNIT - IV:

Understanding Harmony in the nature and Existence - Whole existence as Co-existence: Understanding the harmony in the Nature. Inter connected ness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT - V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order,
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order.

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.N. Tripathy, 2003, Human Values, New Age International Publishers.
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
8. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.

9. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

RELEVANT CDS, MOVIES, DOCUMENTARIES & OTHER LITERATURE:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IT Delhi, Modern Technology - the Untold Story

Course Outcomes:

1. Understood the core values that shape the ethical behavior of an Engineer.
2. Exposed awareness on professional ethics and human values.
3. An ability to communicate effectively.
4. Known their role in technological development.
5. An understanding of professional and ethical responsibility.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1							✓	✓	✓	✓		
CO 2							✓	✓	✓	✓		
CO 3							✓	✓	✓	✓		
CO 4							✓	✓	✓	✓		
CO 5							✓	✓	✓	✓		

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(HS508MC) CONSTITUTION OF INDIA

Course Objectives:

Students will be able to:

1. To understand the Indian constitution and its salient features.
2. To understand the fundamental rights and duties of Indian citizen.
3. To understand legal and legislative structure in india
4. To elaborate constitution of India and its amendments
5. To enlighten the scope of local - self government.

UNIT – I:

History of Making of the Indian Constitution:

- History.
- Drafting Committee, (Composition & Working).

Philosophy of the Indian Constitution:

- Preamble
- Salient Features.

UNIT – II:

Contours of Constitutional Rights &Duties:

- Fundamental Rights.
- Right to Equality.
- Right to Freedom.
- Right against Exploitation.
- Right to Freedom of Religion.
- Cultural and Educational Rights.
- Right to Constitutional Remedies.
- Directive Principles of State Policy.
- Fundamental Duties.

UNIT – III:

Organs of Governance:

- Parliament.
- Composition.

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- Qualifications and Disqualifications.
- Powers and Functions.

Executive:

- President.
- Governor.
- Council of Ministers.
- Judiciary, Appointment and Transfer of Judges, Qualifications.
- Powers and Functions.

UNIT – IV:

Local Administration:

- District's Administration head: Role and Importance.
- Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation.
- Pachayati raj: Introduction, PRI: ZilaPachayat.
- Elected officials and their roles, CEO ZilaPachayat: Position and role.
- Block level: Organizational Hierarchy (Different departments).
- Village level: Role of Elected and Appointed officials.
- Importance of grass root democracy.

UNIT – V:

Election Commission:

- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.

2. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

3. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution.

4. M. P. Jain, Indian Constitution Law, 7th Ed., Lexis Nexis, 2014.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

CO1: Understand the meaning and historical perspective of constitution of India.

CO2: Know fundamental rights of Indian citizen.

CO3: Know structure, rights of federal and legislative bodies.

C04: president and parliament powers given by constitution.

C05: Know the local bodies' rights and limitations.

CO – PO Mapping:

COl	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1			√			√		√	√	√		
CO 2			√			√		√	√	√		
CO 3			√			√		√	√	√		
CO 4			√			√		√	√	√		
CO 5			√			√		√	√	√		

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	3	**-/-/-**	**3**

(CE512PE) GREEN BUILDING MATERIALS AND TECHNOLOGIES

Course Objectives: To enable the student

1. To understand the basic principles of green building technologies and their significance.
2. To understand the judicial use of energy and its management.
3. To know about the Sun-earth relationship and its effect on climate.
4. To enhance awareness of end-use energy requirements in the society.
5. To know about the suitable technologies for energy management and audit procedures.

UNIT- I:

Overview of the significance of energy use and energy processes in building: Indoor activities and environmental control - Internal and external factors on energy use and the attributes of the factors - Characteristics of energy use and itsmanagement-Macroaspectofenergyuseindwellingsanditsimplications.

UNIT-II:

Indoor environmental requirement and management: Thermal comfort - Ventilation and air quality – Air-conditioning requirement - Visual perception - Illumination requirement - Auditory requirement.

UNIT-III:

Climate, solar radiation and their influences: Sun-earth relationship and the energy balance on the earth's surface-Climate, wind, solar radiation, and temperature- Sun shading and solar radiation on surfaces - Energy impact on the shape and orientation of buildings.

UNIT-IV:End-use,energyutilizationandrequirements: Lightinganddaylighting-End- use energy requirements-Status of energy use in buildings Estimation of energy use in a building - Heat gain and thermal performance of building envelope - Steady and non-steady heat transfer through the glazed window and the wall - Standards for thermal performance of building envelope - Evaluation of the overall thermal transfer

UNIT-V: Energy management options: Energy audit and energy targeting-Technological options for energy management.

Certification-Study of the LEE D and TERI (GRIHA) parameters and certification of Green Buildings

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Text Books:

1. CharlesJ.Kibert,"SustainableConstruction-GreenBuildingDesignandDelivery",JohnWiley&Sons,NewYork,2008
2. Norbert Lechner,"Heating, Cooling, Lighting - Sustainable Design MethodsforArchitects",Wiley,NewYork,2015.
3. JamesKachadorian,"ThePassiveSolarHouse:UsingSolarDesigntoHeatandCoolYourHome",ChelseaGreenPublishingCo.,USA, 1997.

REFERENCES:

1. Michael Bauer, Peter Mosel and MichaelSchwarz,"Green Building– Guidebook for Sustainable Architecture", Springer, Heidelberg, Germany,2010.
2. MikeMontoya,"GreenBuildingFundamentals",Pearson ,USA,2010.
3. Regina Leffers, "Sustainable Construction and Design", Pearson / PrenticeHall,USA,2009.

COURSE OUTCOMES:

At the end of the course, the student should

CO 1: Be able to identify the fundamentals of energy use and energy processes in building.

CO 2: Be able to identify the energy requirement and its management.

CO 3: Apply the knowledge about Sun-earth relationship vis-a-visits effect on climate.

CO 4: Be able to deal with the end-use energy requirements.

CO 5: Be familiar with the audit procedures of energy.

GBMT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	√	√	√	√		√		√	√	√	√	√
CO 2	√	√	√	√		√			√		√	√
CO 3	√	√	√	√		√			√	√	√	√
CO 4	√		√	√		√		√	√	√		√
CO 5	√		√	√		√		√	√			√

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ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

III Year B.Tech. CE II Semester	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(CE603PC) ENVIRONMENTAL ENGINEERING

Prerequisite: Environmental Studies

Course Objectives:

1. To make students conversant with basic principles of water supply Engineering.
2. To provide the knowledge of source of water and its distribution.
3. To impart the knowledge of various treatment required for potable water
4. To provide the knowledge of characteristics of sewage and its treatment.
5. To make the students in various designing of treatment unit operation system

UNIT I

Introduction: waterborne diseases – protected water supply – populations forecast, design period – water demand – types of demand – factors affecting – fluctuations – fire demand – storage capacity – water quality and testing – drinking water standards.

Sources of water: Selection of water source based on quality, quantity and other considerations – intakes – infiltration galleries, confined and unconfined aquifers distribution system – requirements – methods and layouts.

UNIT II

Layout and general outline of water treatment units – sedimentation, uniform settling velocity – Principles – design factors – surface loading – jar test - optimum dosage of coagulant – coagulation fluctuations clarifier design – coagulants – feeding arrangements

Theory of filtration– working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – types of disinfection theory of chlorination - chlorine demand other disinfection treatment methods.

UNIT III

Distribution systems – types of layouts of distribution systems – design of distribution System – Hardy cross and equivalent pipe methods and service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meter –laying and testing of pipe lines – pump house. Conservancy and water carriage systems – sewage and storm water estimation –time of concentration – storm water over flows combined flow. Layouts and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks –sedimentation tanks – principles and design of biological treatment – tricking filters –standard and high rate.

UNIT IV

Characteristics of sewage – cycle of decay – decomposition of sewage, examination of sewage – BOD – COD. Equations , design of sewers – shape and materials –sewer appurtenances man holes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses and house drainage – components requirements – sanitary fittings – traps – one pipe and two pipe systems of plumbing ultimate disposal of sewage – sewage farming – dilution.

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UNIT V

Waste water treatment plant- Flow diagram – primary treatment design of screens –grid chambers – skimming tanks –sedimentation tanks – principles of design –biological Treatments – trickling filters – standard and high rate - Construction and design of oxidation ponds. Sludge digestion tanks – factor affecting – design of digestion tanks – sludge disposal by drying – septic tanks working principles and design – soak pits.

TEXT BOOKS:

1. K.N. Duggal, Elements of Public Health Engineering, S Chand, 1988
2. P.N. Modi, Water Supply Engineering - Environmental Engineering (Vol I), Standard Book House, 2006

REFERENCE BOOKS:

1. S.K. Garg, Environmental Engineering Vol I: Water Supply Engineering, Khanna Publishers, 2004.
2. Gurucharan Singh Water Supply and Sanitary Engineering Vol, 1; Standard Publishers, Distributors, 2013.
3. J. Mark Hammer Water and Wastewater Technology; John Wiley and Sons, 2013.
4. Environmental Engineering I and II by BC Punmia, Std. Publications.
5. Manual on Water Supply and Treatment; CPH and EEO, Ministry of Urban Development; Govt, of India, New Delhi.
6. Environmental Pollution and Control Engineering CS Rao,Wiley Publications

COURSE OUTCOMES

At the end of the course students will be able to

CO 1: Apply procedures to forecast population and compute future water demand

CO 2: Develop on Environmental Management Systems for characteristics of water

CO 3: Explain different methodologies for collection and conveyance systems

CO 4: Examine layout and analyze water distribution systems

CO 5: Analysis and Design the various treatment plant units

EE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	√	√			√		√	√	√		√	√
CO 2	√	√			√		√	√	√		√	√
CO 3	√	√			√		√	√	√		√	√
CO 4	√	√			√		√	√	√		√	√
CO 5	√	√			√		√	√	√		√	√

ANURAG ENGINEERING COLLEGE

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III Year B. Tech. II Semester

L	T / P/D	C
3	0	3

(EE611OE) SOLAR PHOTOVOLTAIC SYSTEMS

(Open Elective-I)

Course Objectives: Objectives of this course are

1. To introduce solar energy and its geometry.
2. To deal with various technologies of solar PV cells.
3. To know about the protection and measurement of solar photovoltaic system.
4. To understand the design considerations of solar photovoltaic system.
5. To know about the various maximum power point tracking techniques.

Unit I: SOLAR ENERGY

Sun and Earth, Solar Spectrum, Solar Geometry, Solar radiation on horizontal and inclined planes, Instruments for measurement of solar radiation ,Solar cell, Equivalent circuit, V-I characteristics, Performance improvement.

Unit II: SOLAR CELLS

Manufacture of Solar Cells-Technologies, Design of Solar cells, Photovoltaic modules, Design requirements, encapsulation systems, manufacture, power rating, hotspot effect, Design qualifications.

Unit III: PROTECTION AND MEASUREMENTS

Flat plate arrays, support structures, module interconnection and cabling, lightning protection, Performance measurement – using natural sun light and simulator, determination of temperature coefficients, internal series resistance, curve correction factor.

Unit IV: PHOTOVOLTAIC SYSTEMS

Photovoltaic systems- types- general design considerations- system sizing-battery sizing-inverter sizing-design examples – Balance of PV systems.

Unit V: MAXIMUM POWER POINT TRACKERS

Maximum power point trackers-algorithms- perturb and observe-incremental conductance method, hill climbing method, , hybrid and complex methods, data based and other approximate methods, instrument design, other MPP techniques-Grid interactive PV system.

TEXT BOOKS:

1. F.C.Treble, "Generating electricity from Sun", Pergamon Press, 1991.
2. A.K.Mukherjee, Nivedita Thakur, "Photovoltaic systems: Analysis and design", PHI, 2011.

REFERENCE BOOKS:

1. C.S.Solanki, "Solar Photovoltaics: Fundamentals, Technologies and applications", PHI, 3 rd edition ,2015.
2. R.D.Begamudre, "Energy Conversion Systems", New Age International, 1st edition 2014.

Course Outcomes: After completion of this course, the student will be able to

CO 1: Understand the basics of solar energy and its geometry.
CO 2: Analyze the various topologies of solar photovoltaic cells.
CO 3: Understand the protection and measurement of solar photovoltaic system.
CO 4: Understand the design considerations of solar photovoltaic system.
CO 5: Analyze the various maximum power point tracking techniques.

SPS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	✔		✔	✔				✔				✔
CO 2	✔		✔	✔	✔			✔	✔		✔	✔
CO 3	✔	✔			✔							✔
CO 4	✔		✔									✔
CO 5	✔			✔	✔			✔		✔	✔	✔

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ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

IV Year B.Tech. CE I Semester	L	T/P/D	C
	3	-/-/-	3

(CE742PE) Solid Waste Management

Prerequisite: Environmental Engineering

Course Objectives:

1. To study about the Sources of solid waste and their properties
2. To provide the knowledge on types of hazardous waste and their disposal
3. To aware the legal aspects of hazardous waste management.
4. To impart the knowledge on environmental audits and pollution prevention
5. To provide the knowledge on site and sub surface characterization and remedial technologies.

UNIT I

Solid Wastes: sources, types, composition, physical, chemical, and biological properties of solid wastes / sources and types of hazardous and infectious wastes in municipal solid wastes.

Solid waste generation and collection: Handling, Storage, Processing, Transportation.

UNIT II

Disposal of Solid waste: materials separation and processing, thermal conversion, biological and chemical conversion, recycling of material in municipal solid wastes, Land-filling, Composting, gas generation, closure of land-fills.

Hazardous Wastes: Fundamentals, fate, and Transport of contaminants, Toxicology origin, quantity and quality parameters.

UNIT III

Biomedical / infectious Waste: Composition, Collection, Handling and Disposal.

Legal aspects of Hazardous Waste Management: Collection, Conveyance, Treatment and Disposal.

UNIT IV

Hazardous Waste Management Practices: Environmental Audits, Pollution Prevention.

Treatment and Disposal Methods: Physicochemical processes, Biological Methods, Stabilization & Solidification, Thermal Methods, Land Disposal.

UNIT V

Site Remediation: Site & Subsurface Characterization, Remedial Technologies.

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TEXT/REFERENCE BOOKS:

1. Integrated Solid Waste Management, Techobanglous, Thiesen and Vigil, McGraw Hill.

2. Hazardous Waste Management, Lagrega, Buckingham and Evans, McGraw Hill, N.Y.

3. Solid Waste Management in Developing Countries, A D Bhide, Nagpur Publications.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

CO 1: Know the various types of solid waste, their properties and treatment

CO 2: Know the various types of solid waste, their properties and treatment

CO 3: Understand the methods of solid and hazardous waste disposal

CO 4: Understand the hazardous waste management practices

CO 5: Aware the site remedial technology.

H&SWM	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	√	√	√	√	√			√	√	√		√
CO 2	√		√	√	√	√		√	√	√		√
CO 3	√		√		√	√		√	√	√	√	√
CO4	√	√			√			√		√	√	
CO5	√	√	√	√	√	√		√		√	√	√

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ANURAG ENGINEERING COLLEGE

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IV Year B.Tech. I Semester	L	T/P/D	C
	3	-/-/-	3

(EE722OE/ EE511PE) RENEWABLE ENERGY SOURCES

(Open Elective-II)

Prerequisite: Nil

Course Objectives:

1. Ability to learn the principles of solar radiation and collection of solar energy.
2. To introduce the various solar energy storage methods and applications.
3. To introduce the wind energy and biomass energy.
4. To introduce the geothermal energy and ocean energy.
5. To introduce the direct energy conversion devices.

UNIT – I

Principles of Solar Radiation & Solar Energy Collectors

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Solar Energy Collectors: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-II

Solar Energy Storage & Solar Applications

Solar Energy Storage: Different methods, Sensible, latent heat and stratified storage, solar ponds.

Solar Applications: solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind Energy & Bio-Mass

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

UNIT-IV

Geothermal Energy & Ocean Energy

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and Wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

Direct Energy Conversion

Need for DEC, Carnot cycle, limitations, principles of DEC. Seebeck effect, MHD generators.

TEXT BOOKS:

1. G.D. Rai,"Non-Conventional Energy Sources", Khanna Publishing House, 2011.
2. Ramesh & Kumar,"Renewable Energy Technologies", Narosa Publishing House, 1997.

REFERENCE BOOKS:

1. Tiwari and Ghosal, "Renewable energy resources", Narosa Publishing House, 2007.
2. Ashok V Desai,"Non-Conventional Energy", Wiley Eastern Ltd, New Delhi, 2003.
3. K Mittal, "Non-Conventional Energy Systems", Wheeler Publishing Co.,1999.
4. Sukhame, "Solar Energy", Tata McGraw-Hill Education, 3rd edition, 2008.

Course Outcomes:

The student will be able to

CO 1: Learn the principles of solar radiation and collection of solar energy.
CO 2: Understand the various solar energy storage methods and solar applications.
CO 3: Analyze the Wind energy conversion and Biomass energy conversion.
CO 4: Analyze the geothermal energy conversion and ocean energy conversion.
CO 5: Analyze the various direct energy conversion devices.

CO-PO Mapping:

RES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	√	√							√		√	
CO 2	√			√	√			√	√			
CO 3	√			√	√			√	V			
CO 4	√			√	√			√	√			
CO 5	√			√	√				√			

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ANURAG ENGINEERING COLLEGE

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II Year B. Tech. II Semester	L	T / P / D	C
	3	0	3

(ES302BS / ES401BS) ENVIRONMENTAL SCIENCE

Prerequisites: Have the basic knowledge of Biology and Chemistry.

Course Objectives:

- To explain the multidisciplinary nature of environment, essence of ecosystem, biodiversity and its conservation.
- To impart knowledge about natural resources and their protection.
- To explain about the causes and effects of environmental pollution as well as environmental issues.
- To discuss about the management of environmental wastes, disasters and rules, regulations, policies for the protection of environment.
- To make the students to understand about sustainable development and the natural functioning of ecosystems.

Unit – I:

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance A)**Ecosystems**: Definition, Classification of ecosystems, structure and function of ecosystems (Forest, Pond, Grass Land ecosystems), Energy flow in the ecosystem, Food chains, food webs and ecological pyramids, Ecological succession, Carrying capacity.

B) Biodiversity and its conservation: Introduction & Definition, Genetic, Species and Ecosystem diversities, Bio-geographical classification of India, Value(s) of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. IUCN categories of biodiversity and RED DATA book, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit – II:

Natural Resources : Renewable and non-renewable

Forest resources – Use and over – exploitation, deforestation

Water resources – Use and over utilization of surface and ground water, Rainwater Harvesting & watershed management, Floods, drought, Dams – benefits and problems

Mineral resources: Environmental effects of extracting mineral resources, sustainable mining activities

Energy resources: Growing energy needs, renewable (Solar, Wind) and non-renewable (Coal, Petroleum, Natural Gas) energy sources, use of alternate energy sources(waste to energy, Biofuels- Biodiesel and Bioethanol)

Land resources: Land degradation, soil salinity, man induced landslides, soil erosion and desertification. Overuse of fertilizers and pesticides, organic farming.

Unit – III:

(a) **Environmental Pollution**: Definition, Causes, effects of different kinds of pollution(Air, Water, Soil, Noise, Nuclear, e –Waste, Municipal solid waste, Biomedical waste, Hazardous waste).

(b) **Environmental Issues**: Bhopal Gas Tragedy, Climate Change(Global Warming), Earth Summit, Kyoto Protocol, Paris Agreement, NAPCC(National Action Plan on Climate Change), Ozone layer depletion- Montreal protocol.

Unit – IV:

(a) **Waste management technology:** Solid waste Management, Air pollution control techniques, Waste water treatment techniques: primary, secondary, tertiary treatments. Brief account on Bioremediation and Phyto-remediation of contaminated soils, Noise pollution control techniques. Disaster management: Cyclones, Floods, Earthquakes and Landslides.
Application of GIS and GPS system in environment.

(b) **Environmental policy, Rules and regulations:** Definition & overview of EIA (Environmental Impact Assessment), Environment Protection Act-1986, Air (Prevention and Control of Pollution) Act-1981, Water (Prevention and control of Pollution) Act-1974. Salient features of Municipal solid waste, Biomedical waste, Hazardous waste & e-waste rules.

Unit – V:

(a) **Towards sustainable future**: Concept of sustainable development, threats of sustainability, sustainable development goals(United Nations General Asembly-2015), population and its explosion, Environmental education, sustainable cities, Environmental effects of human health, Environmental ethics, concept of green building, Basic principles of Green engineering, Carbon foot print.

(b) **Field work:** Visit to a local polluted site, visit to water treatment plant/effluent treatment plant/sewage treatment plant, study of simple ecosystems-pond/river/hill slopes etc.

Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, University Press.
2. Environmental studies, From Crisis to cure by R.Rajagopalan, third edition.

Reference Books:

1. Environmental Science: towards a sustainable future by Richard T.Wright.2008 PHL Learning Private Ltd .New Delhi
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P.Ela.2008 PHI Learning Pvt. Ltd.

Course Outcomes:

After the completion of the course, the student will be able to understand

1. The multidisciplinary nature of environment, essence of environment, biodiversity and its conservation.
2. About the natural resources and their protection.
3. About the causes and effects of environmental pollution as well as environmental issues.
4. About the management of environmental wastes, disasters and rules, regulations, policies for the protection of environment.
5. About the sustainable development and natural functioning of ecosystems.

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CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1			✓				✓	✓	✓	✓		
CO 2			✓				✓	✓	✓	✓		
CO 3			✓				✓	✓	✓	✓		
CO 4			✓				✓	✓	✓	✓		✓
CO 5			✓				✓	✓	✓	✓		✓

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ANURAG ENGINEERING COLLEGE

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II Year B.Tech. EEE I Semester	**L**	**T/P/D**	**C**
	0	**-/2/-**	**0**

(ES309MC) ENVIRONMENTAL STUDIES
(Mandatory Course)

Prerequisites: Have the basic knowledge of Biology and Chemistry.

Course Objectives:

- To explain the Multidisciplinary nature of environment, essence of ecosystem, biodiversity and its conservation.
- To impart knowledge about the natural resources and their protection.
- To explain about the causes and effects of environmental protection as well as the environmental issues.
- To discuss about rules, regulations for the protection of environment.
- To impart knowledge about steps towards Sustainable Development.

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance **A)Ecosystems:** Definition, Classification of ecosystems, structure and function of ecosystems (Forest, Pond, ecosystems), Energy flow in the ecosystem, Food chains, food webs and ecological pyramids.

B)Biodiversity and its conservation: Introduction & Definition, Genetic, Species and Ecosystem diversities, Value(s) of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT - II

Natural Resources: Renewable and non-renewable

Forest resources – Deforestation

Water resources – Use and over utilization of surface and ground water, Rainwater Harvesting & Floods, drought

Mineral resources: Environmental effects of extracting mineral resources

Energy resources: Renewable (Solar, Wind) and non-renewable (Coal, Petroleum, Natural Gas) energy sources, use of alternate energy sources(waste to energy, Biofuels- Biodiesel and Bioethanol)

UNIT – III

(c) **Environmental Pollution**: Definition, Causes, effects of different kinds of pollution (Air, Water, Soil, Noise).
(d) **Environmental Issues**: Bhopal Gas Tragedy, Climate Change(Global Warming), Earth Summit, Paris Agreement, NAPCC(National Action Plan on Climate Change), Ozone layer depletion- Montreal protocol.

UNIT – IV:

Environmental policy, Rules and regulations: Definition & overview of EIA, Environment Protection Act-1986, Air (Prevention and Control of Pollution) Act-1981,Water (Prevention and control of Pollution) Act-1974, Wildlife Protection Act-1972, Salient features of Municipal solid waste, & e-waste rules.

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UNIT – V

Towards sustainable future: Concept of sustainable development, threats of sustainability, sustainable development goals(United Nations General Asembly-2015), population and its explosion, Environmental education, sustainable cities, Environmental effects of human health, Environmental ethics, concept of green building, Carrying capacity, Low Carbon Life cycle, Carbon foot print, Polluter Pays Principle.

Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, University Press.
2. Environmental studies, From Crisis to cure by R.Rajagopalan, third edition

Reference Books:

1. Environmental Science: towards a sustainable future by Richard T.Wright.2008 PHL Learning Private Ltd .New Delhi
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P.Ela.2008 PHI Learning Pvt. Ltd.

Course Outcomes:

After completion of the course, the student will be able to understand

CO 1: The Multidisciplinary nature of environment, essence of ecosystem, biodiversity and its conservation.
CO 2: About the natural resources and their protection.
CO 3: About the causes and effects of environmental pollution as well the environmental issues.
CO 4: About the rules, regulations for the protection of environment.
CO 5: About the steps towards Sustainable Development

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CO-PO Mapping:

PO'S / CO'S	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1			✔	✔		✔	✔		✔	✔	
CO 2			✔	✔		✔	✔	✔	✔	✔	
CO 3			✔	✔		✔	✔	✔	✔	✔	
CO 4			✔	✔		✔	✔	✔	✔	✔	
CO 5			✔	✔		✔	✔	✔	✔	✔	

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B.Tech III Year II Semester	L	T	P	C
	3	0	0	3

(CE612OE) WASTE MANAGEMENT

(Open Elective –I)

Course Objectives:

The objective of this course is to impart,

- The knowledge about quality standards of feed water and waste management theories.
- The knowledge about the problems that associated with waste water discharging into streams.
- The knowledge about the working processes and liquid waste origin in various industries.
- The knowledge about the manufacturing process and origin of liquid waste from various industries.
- The knowledge regarding waste disposal methods and requirement of treatment plants.

UNIT – I

Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing and Brewery Industries – Boiler and cooling water treatment methods. Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems.

UNIT – II

Industrial waste water discharges into streams. Lakes and oceans and problems. Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries.

UNIT-III

Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods.

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UNIT - VI

Manufacturing Process and design origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

Manufacturing Process and design origin of liquid waste from Sugar Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects and treatment methods.

UNIT – V

Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods.

TEXT BOOK:

1. Waste Water Treatment by M.N. Rao and Dutta, Oxford & IBH, New Delhi.

REFERENCES:

1. Liquid waste of Industry by Newmerow.

2. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr).

Course Outcomes:
At the end of the course student will be able to,

CO 1: Understand the standards for feed water in various industries and different theories in reducing the concentration of waste water.

CO 2: Understand the effects of discharging waste water into streams and the direct and indirect impacts on aquatic animals and humans.

CO 3: Understand the working procedure in various industries, sources , characteristics and effects of waste, also the treatment methods depending upon the type of waste.

CO 4: Know the combined treatment methods of liquid waste, effective methods of waste disposal and their limitations.

CO 5: Understand the waste disposal methods and requirement of treatment plants.

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CO-PO Mapping:

PO'S / CO'S	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
CO 1	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔
CO 2	✔		✔	✔	✔	✔	✔		✔		
CO 3		✔	✔				✔	✔	✔	✔	✔
CO 4	✔	✔	✔	✔				✔		✔	
CO 5	✔	✔		✔	✔	✔		✔	✔		✔

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IV Year B.Tech. II Semester	L	T/P/D	C
	3	-/-/-	3

(ME832OE)NANO TECHNOLOGY

Pre-requisites: Engineering physics, chemistry and Material science.

Course Objectives:

1. To understand fundamentals of Nano materials and technologies.
2. To get knowledge about carbon nano tubes and structures.
3. To understand the Characterization Techniques of nano scale.
4. To explore the Nano and Molecular Electronics.
5. To get knowledge on heat transfer in nano fluids.

Unit – I

Introduction to Nanotechnology: Importance of Nano Scale, Nanostructure Types, Electronic, Magnetic, Optical Properties of Nano Materials, Top-Down and Bottom – Up Approach to Nanostructures.

Unit – II

Carbon Nano Structures: Carbon Nano Tubes (CNT), Fullerenes, C60, C80 and C240 Nanostructures, Properties (Mechanical, Optical and Electrical) and Applications.

Fabrication Of Nano Materials: Physical Methods; Inert Gas Condensation, Arc Discharge, Rf Plasma, Plasma Arc Technique, Ion Sputtering, Laser Ablation, Laser Pyrolysis, Molecular Beam Epitaxy, Chemical Vapour Deposition Method.

Unit – III

Nano Scale Characterization Techniques: Scanning Probe Techniques (AFM, MFM, STM, SEM, TEM & XRD).

Nano devices and Nano medicine: Lab On Chip For Bio analysis, Core / Shell Nanoparticles In Drug Delivery Systems (Site Specific And Targeted Drug Delivery), Cancer Treatment, And Bone Tissue Treatment.

Unit- IV

Nano And Molecular Electronics: Resonant – Tunneling Structures, Single Electron Tunneling, Single Electron Transistors, Coulomb Blockade, Giant Magneto Resistance, Tunneling Magneto Resistance.

Unit – V

Properties of Nano fluids: Scientific and Engineering Significance - Possible Mechanisms of Thermal Conduction Enhancement. Convective Heat Transfer in Nanofluids - Thermo

physical Properties of Nano fluids - Heat Transfer Coefficients in Laminar Flow - Heat Transfer Coefficients in Turbulent Flow.

Course Outcomes:

CO 1: Apply engineering and physics concepts to the nano-scale and non-continuum domain.

CO 2: Understand Carbon Nano Tubes structures and manufacturing process.

CO 3: Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of nano materials

CO 4: Understand the principles and microelectronics fabrication.

CO 5: Understand the concept of Convective Heat Transfer in Nanofluids

Text Books:

1. Charles.P.Pode, Introduction To Nanotechnology, Springer Publications.
2. Heat Transfer Enhancementwith Nanofluids, Vincenzo Bianco, Oronzio Manca,Sergio Nardini, Kambiz Vafai CRC Press
3. Taylor & Francis Group Springer Handbook Of Nanotechnology – Bharat Bhusan

Reference Books:

4. Phani Kumar, Principles Of Nanotechnology, Scitech Publications.
5. David Ferry " Transport In Nano Structures" Cambridge University Press 2000
6. Nanobiotechnology; Ed. C.M.Niemeyer, C.A. Mirkin.
7. Nanofabrication Towards Biomedical Application, Techniques, Tools, Application And Impact – Ed. Challa S.S.R.Kumar, J.H.Carola.

CO-PO Mapping:

NT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	√		√	√		√		√		√		
CO 2	√		√	√		√		√		√		
CO 3	√		√	√		√				√		
CO 4	√		√	√		√		√		√		
CO 5	√		√	√		V		V		√		

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IV Year B.Tech. CE II Semester	L	T/P/D	C
	3	-/-/-	3

(CE862PE) DISASTER MANAGEMENT & MITIGATION

Course Objectives:

1. To provide the concept and characteristics of disaster management system.
2. To know the types of environmental hazards& disasters.
3. To have the knowledge of endogenous hazards and measures to control them.
4. To impart the knowledge of exogenous hazards and measures to control them.
5. To enable the students to understand the concept of emerging approaches in disaster management.

UNIT - I:

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical reserches.

UNIT - II:

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man indeced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endongenous Hazards - Exogenous Hazards

UNIT - III:

Endogenous Hazards - Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjusment, perception & mitigation of earthquake.

UNIT - IV:

Exogenous hazards / disasters - Infrequent events - Cumulative atmospheric hazards / disasters

Infrequent events: Cyclones - Lightning - Hailstorms

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Cyclones: Tropical cyclones & Local stroms - Destruction by tropical cyclones & local stroms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Heal waves Floods :- Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation) Droughts :- Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards / Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion

Soil Erosion: Mechanics & forms of Soil Erosion - Factors 7 causes of Soil Erosion - Conservation measures of Soil Erosion.

Chemical hazards / disasters: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes :- Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation

Biological hazards / disasters: Population Explosion.

UNIT - V:

Emerging approaches in Disaster Management - Three stages

1. Pre-disaster Stage (preparedness)
2. Emergency Stage
3. Post Disaster stage - Rehabilitation

TEXT BOOKS:

1. Disaster Mitigation: Experiences And Reflections by Pradeep Sahni
2. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

REFERENCES:

1. R. B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990
2. Savinder Singh Environmental Geography, PrayagPustakBhawann 1997
3. Kates, B. I & White, G. FThe Environment as Hazards, oxford, New York, 1978
4. R. B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
5. H. K. Gupta (Ed) Disaster Management, Universities Press, India, 2003
6. R. B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
7. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003
8. A. S. Arya Action Plan For Earthquake, Disaster, Mitigation in V. K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
9. R. K. BhandaniAn overview on Natural &Man made Disaster & their Reduction, CSIR, New Delhi
10. M. C. Gupta Manuals on Natural Disaster Management in india, National Centre for Disaster Management, IIPA, New Delhi, 2001

Course Outcomes: On successful completion of course students will be able to

CO 1: Understand the need of disaster management system in India.

CO 2: Have the thorough knowledge of environmental hazards and disasters.

CO 3: Get the complete concept of endogenous hazards and their mitigation measures.

CO 4: Know the principles and measures to control exogenous hazards.

CO 5: Have the in-depth knowledge of emerging approaches in disaster management.

CO-PO Mapping:

DM	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1		√	√	√	√	√		√	√	√	√	√
CO 2	√	√		√	√	√			√		√	
CO 3			√	√	√			√	√	√	√	√
CO 4		√	√	√	√	√		√	√	√	√	
CO 5	√	√		√	√	√		√	√		√	√

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(CS743PE) ARTIFICIAL INTELLIGENCE

(PROFESSIONAL ELECTIVE - IV)

Prerequisites: Probability and statistics, Automata and languages, Programming, Discrete Mathematics.

Course Objectives:

- To learn the distinction between optimal reasoning Vs. human like reasoning
- To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
- To learn different knowledge representation techniques.
- To understand the applications of AI, namely game playing, theorem proving, expert systems, machine learning and natural language processing

Unit - I:

Introduction:

AI problems, The Underlying Assumption, AI Techniques, The Level of the Model, Criteria for Success

Problems, Problem Spaces and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs

Heuristic Search Techniques:

Generate – and – Test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.

Unit - II:

Knowledge Representation:

Issues in Knowledge Representation, Representing Simple Facts in Predicate Logic, Representing Instance and ISA Relations, Computable Functions and Predicates, Resolution, Natural Deduction

Representing Knowledge Using Rules: Procedural Vs Declarative Knowledge, Logic Programming, Forward Vs Backward Reasoning, Matching, Control Knowledge

Weak Slot – and – Filler Structures: semantic nets, frames

Strong Slot – and – Filler Structures: conceptual dependency, scripts, CYC

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Unit - III:

Reasoning Techniques: Introduction to Non-monotonic reasoning, Logics for Non-monotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation of Depth First Search and Breadth First Search, Probability and Bayes Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks.

Unit - IV:

Game Playing: Overview, Minimax Search, Alpha – Beta Cutoffs

Planning System: Overview, The Blocks World, Components of a Planning System, Goal Stack Planning, Hierarchical Planning

Understanding: Understanding as constraint satisfaction, Waltz Algorithm

Natural Language Processing: Introduction, Syntactic Processing, Augmented Transition Networks, Semantic Analysis

Unit - V:

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

Text Books:

1. Artificial Intelligence" 3rd Edn. , E.Rich and K.Knight (TMH)

Reference Books:

1. Artificial Intelligence A Modern Approach, Second Edition, Stuart Russell, Peter Norvig, PHI/ Pearson Education.
2. Artificial Intelligence and Expert systems – Patterson PHI

Course Outcomes:

Upon the successful completion of this course, the student will be able to:

CO 1. Formulate an efficient problem space for a problem expressed in natural language.
CO 2. Select a search algorithm for a problem and estimate its time and space complexities.
CO 3. Possess the skill for representing knowledge using the appropriate technique for a given problem
CO 4. Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and natural language processing.

CO 5. Develop self-learning and research skills to tackle a topic of interest on his/her own or as part of a team.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	✓	✓				✓			✓			
CO 2	✓	✓		✓					✓			
CO 3	✓	✓	✓						✓			
CO 4	✓	✓			✓				✓		✓	
CO 5								✓				✓

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IV Year B.Tech. CSE II Semester	L	T/P/D	C
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(CS863PE) MACHINE LEARNING

(PROFESSIONAL ELECTIVE - VI)

Prerequisites: Data structures, knowledge in statistical methods.

Course Objectives:

- To understand the concepts of machine learning.
- To understand supervised and unsupervised learning and their applications.
- To understand the theoretical and practical aspects of probabilistic graphical models.
- To appreciate the concepts and algorithms of reinforcement learning.
- To learn aspects of computational learning theory.

Unit- I:

Introduction: Machine Learning - Machine Learning Foundations –Overview – applications - Types of machine learning - basic concepts in machine learning Examples of Machine Learning -Applications - Linear Models for Regression-Linear Basis Function Models - The Bias-Variance Decomposition - Bayesian Linear Regression - Bayesian Model Comparison

Unit - II:

Supervised Learning: Linear Models for Classification, Linear Models for Classification - Discriminant Functions -Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression. Decision Trees - Classification Trees- Regression Trees - Pruning. Neural Networks -Feed-forward Network Functions - Error Back propagation, Radial Basis Function Networks.

Unit - III:

Unsupervised Learning: Clustering- K-means - EM - Mixtures of Gaussians - The EM Algorithm in General -Model selection for latent variable models - high-dimensional spaces - - The Curse of Dimensionality -Dimensionality Reduction - Factor analysis - Principal Component Analysis - Probabilistic PCA- Independent components analysis

Unit - IV:

Probabilistic Graphical Models: Directed Graphical Models - Bayesian Networks - Exploiting Independence Properties - From Distributions to Graphs - Examples -Markov Random Fields - Inference in Graphical Models - Learning –Naive Bayes Classifiers-Markov Models – Hidden Markov Models.

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Unit - V:

Advanced Learning: Sampling – Basic sampling methods, Reinforcement Learning- K-Armed Bandit Elements - Model-Based Learning- Value Iteration- Policy Iteration. Temporal Difference Learning Exploration Strategies- Deterministic and Non- deterministic Rewards and Actions. Semi - Supervised Learning. Computational Learning Theory.

Text Books:

1. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2006
2. Tom Mitchell, Machine Learning, McGraw-Hill, 1997

Reference Books:

1. Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Ethem Alpaydin, Introduction to Machine Learning, Prentice Hall of India, 2005
   Hastie, Tibshirani ,Friedman, The Elements of Statistical Learning,2nd Edition, Springer,2008
3. Stephen Marsland, Machine Learning –An Algorithmic Perspective, CRC Press, 2009

Course Outcomes:

Upon the successful completion of this course, the student will be able to:

CO 1. Implement a neural network for an application of your choice using an available tool

CO 2. Implement probabilistic discriminative and generative algorithms for an application of your choice and analyze the results

CO 3. Use a tool to implement typical clustering algorithms for different types of applications

CO 4. Design and implement an HMM for a sequence model type of application

CO 5. Identify applications suitable for different types of machine learning with suitable Justification

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1		✓	✓									
CO 2		✓				✓						
CO 3			✓	✓	✓							✓
CO 4			✓	✓		✓						✓
CO 5				✓					✓	✓		✓

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IV Year B.Tech. CSE II Semester	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(CS852PE) INTERNET OF THINGS

(PROFESSIONAL ELECTIVE - V)

Prerequisites: Knowledge in Networking, Sensing, Database and Programming.

Course Objectives:

- To understand the concepts of Internet of Things.
- To understand the concept of sensor networks with necessary protocols.
- To understand data analytics and cloud in the context of IoT.
- Understand the challenges of IoT in industry perspective.
- To build simple IoT Systems using Arduino and Raspberry Pi.

Unit - I:

What is the IoT and why is it important? Evolution of Internet of Things, IoT Architectures, Elements of an IoT ecosystem, Technology driver Business drivers, Typical IoT applications, Trends and implications.

Unit - II:

Sensors, sensor nodes and connectivity: Sensing devices, Sensor modules, nodes and systems. Arduino-Based Sensor Nodes, Raspberry Pi-based Sensor Nodes- Wireless technologies for the IoT, Edge connectivity and protocols. Wireless sensor networks.

Unit - III:

Analytics: Signal processing, real-time and local analytics, Databases, cloud analytics -. Cloud-to-Device Connectivity- Messaging and the IoT- Device Ingress/Egress- Data Normalization and Protocol Translation- Data Consistency-Infrastructure.

IOT applications: The Semantic Model- Software UX Design Considerations -Machine Learning and Predictive Analytics.

Unit - IV:

Industry perspective: Business considerations, Challenges-Legal challenges, Design challenges, Development challenges, Security challenges and other challenges.

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Unit - V:
IOT lab exercises and mini-project

IoT platforms – Arduino – Raspberry Pi –Raspberry Pi Interfaces - Real time applications of IoT – Home automation – Automatic lighting – Home intrusion detection – Cities – Smart parking – Environment – Weather monitoring system – Agriculture – Smart irrigation.

Mini-project: Designing an IoT system (group exercise).

Text Books:

1. J. Biron and J. Follett, "Foundational Elements of an IoT Solution", O'Reilly Media, 2016.
2. Keysight Technologies, "The Internet of Things: Enabling Technologies and Solutions for Design and Test", Application Note, 2016.
3. Charles Bell, "Beginning Sensor Networks with Arduino and Raspberry Pi", Apress, 2013.
4. D. Evans, "The Internet of Things: How the Next Evolution of the Internet Is Changing Everything", Cisco Internet Business Solutions Group, 2011
5. McKinsey & Company, "The Internet of Things: Mapping the value beyond the hype", McKinsey Global Institute, 2015
6. European Alliance for Innovation (EAI), "Internet of Things: Exploring the potential", Innovation Academy Magazine, Issue No. 03, 2015
7. Digital Greenwich, "Greenwich Smart City Strategy", 2015
8. ITU and Cisco, "Harnessing the Internet of Things for Global Development", A contribution to the UN broadband commission for sustainable development

Reference Books:

1. Vijay Madisetti and Arshdeep Bahga, **"Internet of Things (A Hands-on-Approach)"**, 1st Edition, VPT, 2014.
2. Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything"**, 1st Edition, Apress Publications, 2013

Course Outcomes:

Upon the successful completion of this course, the student will be able to:

CO 1. Understand the concepts of Internet of Things.
CO 2. Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
CO 3. Apply data analytics and use cloud offerings related to Internet of Things.
CO 4. Interpret the impact and challenges posed by Internet of Things leading to Industry perspective.
CO 5. Analyze applications of Internet of Things in real time scenario.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1		✓					✓					
CO 2												
CO 3		✓	✓		✓	✓						
CO 4						✓		✓	✓		✓	
CO 5			✓	✓					✓	✓		✓

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IV Year B.Tech. CSE I Semester	L	T/P/D	C
	3	-/-/-	3

(CS732PE) BIG DATA ANALYTICS

(PROFESSIONAL ELECTIVE - III)

Prerequisites: Database Management System, Data Warehousing and Mining.

Course Objectives:

The main objective of this course is to help students in -

- Understanding the Big Data Platform and its applications.
- Learning big data analytics tools.
- Comprehending the concepts of Apache Hadoop, HDFS and Map Reduce.
- Studying modern computing big data technologies like HBase, Hive, Spark and MongoDB.

Unit – I:

Introduction: **Data Classification and Characteristics, Big Data Evolution, Definition, Challenges, Applications, Seven V's of Big Data, Business Intelligence vs. Big Data, Data Warehouse vs. Hadoop.**

Data Analytics: Data Science, Big Data Terminologies, Big Data Analytics, Classification, Challenges and Importance, Analytics Tools.

Unit – II:

Hadoop: History, Features, Advantages, Key Considerations, Versions, Distributions, Hadoop vs. RDMS, Hadoop vs. SQL, Hadoop System Overview, Hadoop Ecosystems, Interacting with Ecosystem.

HDFS: Installation, Architecture, Anatomy, HDFS Shell Commands, MapReduce Framework, MapReduce Programming-Mapper and Reducer, Word Count Example, YARN.

Unit – III:

Zookeeper: Characteristics, Zookeeper Service-Data Model, Operations, Consistency, Sessions, States.

HBase: Basics, History, Characteristics, Concepts, Implementation, Schema Design.

Hive: Introduction, Architecture, Data Types, Files Formats, Hive Query Language,

SQL vs. HQL.

Unit – IV:

Spark: Introduction, History, Spark Stack, Versions, Uses, Sparks' Python and Scala shells,

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RDD Basics, Creating RDDs, RDD Operations.

MLlib: Overview, Machine Learning Basics, Data types, Algorithms-Feature Extraction, Statistics, Classification and Regression, Clustering.

Unit – V:

NoSQL: Definition, Uses, Need for NoSQL, Advantages, Types of NoSQL Databases, Industrial Use, SQL vs. NoSQL, NewSQL

MongoDB: Introduction, MongoDB Key Features, Core Server and Tools, MongoDB Shell, MongoDB Query Language.

Text Books:

1. Big Data and Analytics by Seema Acharya & Subhashini Chellappan, Wiley publications 2015.
2. Hadoop: The definitive Guide, Tom White, O Reilly Publications 2012.
3. Learning Spark Paperback by Holden Karau, Andy Konwinski, Patrick Wendell & Matei Zaharia, O'Reilly publications 2015.
4. MongoDB in Action, Kyle Banker,Piter Bakkum , Shaun Verch, Douglas Garrett & Tim Hawkins, Manning Publications 2016.

Reference Books:

1. Big Data Big Analytics by Michael Minnelli, Wiley Publications 2013.
2. Understanding Big Data by Chris Eaton, McGraw-Hill Publishing 2012.

Course Outcomes:

Upon the successful completion of this course, the student will be able to:

CO 1. Identify Big Data characteristics and its Business Implications.
CO 2. List the components of Hadoop and Hadoop Eco-System and Manage Job Execution in Hadoop Environment.
CO 3. Understand Zookeeper services and accessing HBase and Hive.
CO 4. Interpret with Spark shell and configure machine learning algorithms.
CO 5. Infer the concepts of NoSQL database MongoDB and its language features.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	✓	✓	✓	✓	✓							
CO 2	✓	✓	✓	✓	✓							
CO 3	✓	✓	✓	✓	✓							
CO 4	✓	✓	✓	✓	✓							
CO 5	✓	✓	✓	✓	✓							

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IV Year B.Tech. ME I Semester	L	T/P/D	C
	3	-/-/-	3

(ME722OE) INDUSTRIAL ROBOTICS

(OPEN ELECTIVE-II)

Pre-requisites: Basic principles of Kinematics and mechanics.

Course Objectives:

- To learn the concepts of Robotics. Understand the basic components of robots.
- Model forward and inverse kinematics of robot manipulators.
- Analyze forces in links and joints of a robot.
- Programme a robot to perform tasks in industrial applications
- Design intelligent robots using sensors.

Unit – I:

INRODUCTION: Automation and Robotics – An over view of Robotics – classification by coordinate system and control systems.

COMPONENTS OF THE INDUSTRIAL ROBOTICS: Degrees of freedom – End effectors; Mechanical gripper – Magnetic – Vacuum cup and other types of grippers – General consideration on gripper selection and design.

Unit – II:

MOTION ANALYSIS: Basic rotation matrices – Composite rotation matrices – Euler Angles – Equivalent Angle and Axis – Homogeneous transformation – Problems.

MANIPULATOR KINEMATICS: D-H notations – joint coordinates and world coordinates – Forward and inverse kinematics – problems.

Unit – III:

DIFFERENTIAL KINEMATICS: Differential kinematics of planar and spherical manipulators – Jacobians – Problems.

ROBOT DYNAMICS: Lagrange – Euler formulations – Newton - Euler formulations – Problems on planar two link manipulators.

Unit – IV:

TRAJECTORY PLANNING: Joint space scheme – cubic polynomial fit – Avoidance of obstacles. **TYPES OF MOTION:** Slew motion – joint interpolated motion – straight line motion – problems.

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ROBOT ACTUATORS: Actuators- Pneumatic and Hydraulic actuators, Electric Actuators: DC servo motors – stepper motors.

Unit – V:

FEED BACK COMPONENTS: position sensors – potentiometers, resolvers and encoders – velocity sensors – Tactile sensors.

ROBOT APPLICATION IN MANUFACTURING: Material Transfer and loading/unloading Material handling – Assembly and inspection.

Text Books:

1. Industrial Robotics- Groover M.P-Pearson Edu.
2. Introduction to Robotic Mechanics and control by JJ Craig, Pearson, 3rd edition.

Reference Books:

1. Robotics-Fu K.S- McGraw Hill.
2. Robotic Engineering -Richard D. Klafter, Prentice Hall
3. Robot Analysis and intelligence -Asada and Slotine -Wiley inter Science.
4. Robot Dynamics & Control – Mark W. Spong and M.Vidyasagar -John Wiley & sons (ASIA) Pt. Ltd..
5. Robotics and control- Mittal R.K & Nagrath I.J -TMH.

Course Outcomes:

Upon the successful completion of this course, the student will be able to:

CO 1. understand the basic components of Robots and differentiate types of robots and robot grippers.
CO 2. Model forward and inverse kinematics of robot manipulators.
CO 3. Analyze forces in links and joints of a robot.
CO 4. Programme a robot to perform tasks in industrial applications.
CO 5. Design intelligent robots using sensors.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	✓				✓	✓	✓	✓	✓			
CO 2	✓		✓			✓	✓	✓	✓			
CO 3	✓				✓	✓	✓		✓			
CO 4	✓		✓			✓	✓	✓	✓			
CO 5	✓		✓		✓	✓	✓	✓	✓			

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	3	-/-/-	3

(CE721OE) DISASTER MANAGEMENT

(OPEN ELECTIVE -II)

Course Objectives:

- To study about concept of Environmental Hazard, stress, and disasters
- To know various types of environmental hazards and disasters
- To understand causes and effects and control measure of disasters
- To study about types of exogenous hazards like cyclones, floods etc.
- To study about emerging approaches

Unit - I:

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

Unit - II:

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards - Planetary Hazards / Disasters - Extra Planetary Hazards / disasters - Planetary Hazards - Endogenous Hazards - Exogenous Hazards

Unit - III:

Endogenous Hazards - Volcanic eruption - Earthquakes - landslides - Volcanic Hazards / Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards / disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake.

Unit - IV:

Exogenous hazards / disasters - Infrequent events - Cumulative atmospheric hazards / disasters Infrequent events: Cyclones - Lightning - Hailstorms

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Cyclones: Tropical cyclones & Local stroms - Destruction by tropical cyclones & local stroms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters :- Floods - Droughts - Cold waves - Heal waves Floods :- Causes of floods - Flood hazards India - Flood control measures (Human adjustment, perception & mitigation) Droughts :- Impacts of droughts - Drought hazards in India - Drought control measures - Extra Planetary Hazards / Disasters - man induced Hazards / Disasters - Physical hazards / Disasters - Soil erosion

Soil Erosion: Mechanics & forms of Soil Erosion - Factors 7 causes of Soil Erosion - Conservation measures of Soil Erosion.

Chemical hazards / disasters: Release of toxic chemicals, nuclear explosion - Sedimentation processes Sedimentation processes. Global Sedimentation problems - Regional Sedimentation problems - Sedimentation & Environmental problems - Corrective measures of Erosion & Sedimentation

Biological hazards / disasters: Population Explosion.

Unit - V:

Emerging approaches in Disaster Management - Three stages

4. Pre-disaster Stage (preparedness)
5. Emergency Stage
6. Post Disaster stage - Rehabilitation

Text Books:

3. Disaster Mitigation: Experiences And Reflections by Pradeep Sahni
4. Natural Hazards & Disasters by Donald Hyndman & David Hyndman - Cengage Learning

Reference Books:

11. R. B. Singh (Ed) Environmental Geography, Heritage Publishers New Delhi, 1990
12. Savinder Singh Environmental Geography, Prayag Pustak Bhawann 1997
13. Kates, B. I & White, G. F The Environment as Hazards, oxford, New York, 1978
14. R. B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
15. H. K. Gupta (Ed) Disaster Management, Universities Press, India, 2003
16. R. B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
17. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003
18. A. S. Arya Action Plan For Earthquake, Disaster, Mitigation in V. K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
19. R. K. Bhandani An overview on Natural & Man made Disaster & their Reduction, CSIR, New Delhi

20. M. C. Gupta Manuals on Natural Disaster Management in india, National Centre for Disaster Management, IIPA, New Delhi, 2001.

Course Outcomes:

Upon the successful completion of this course, the student will be able to:

1. Application of different approaches, human ecology in geographical research
2. Have the knowledge on planetary hazards/disasters
3. Know the principles and measures to control various disasters/exogenous hazards
4. Plan for face types of exogenous hazards, impacts and mitigation techniques & management system
5. Apply emerging approaches in different types of disasters

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CO 2	✓	✓			✓	✓					✓	
CO 3			✓					✓	✓	✓	✓	✓
CO 4		✓	✓	✓		✓		✓		✓		
CO 5	✓	✓		✓	✓	✓		✓	✓			✓

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(An Autonomous Institution)

III Year B.Tech. CSE II Semester	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(CS623PE) NETWORK SECURITY

(PROFESSIONAL ELECTIVE - II)

Prerequisites:

A course on "Computer Networks".

A course on "C Programming".

Course Objectives:

- Analyze the importance of Network Security in real world.
- Compare and analyze different encryption Algorithms.
- Summarize authentication functions using MAC and Hash.
- Analyze security importance of various web applications.
- Categorize various types of intruders and viruses

Unit – I:

Attacks on Computers and Computer Security: Introduction, The need for security, Security Principles, Types of Security Attacks, Security Services, Security Mechanisms, A Model for Network Security. Plain, Substitution Techniques, Transposition Techniques

Unit – II:

Cryptography: Concepts and Techniques, symmetric and asymmetric key cryptography, steganography, Symmetric key Ciphers: DES structure, DES Analysis, Security of DES, variants of DES, Block cipher modes of operation , AES structure, Analysis of AES , Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Analysis of RSA, Diffie-Hellman Key exchange.

Unit – III:

Message Authentication and Hash Functions: Authentication requirements and functions, MAC and Hash Functions, MAC Algorithms: Secure Hash Algorithm, Whirlpool, HMAC, Digital signatures, X.509, Kerberos.

Unit – IV:

Security at layers (Network, Transport, Application): IPSec, Secure Socket Layer(SSL), Transport Layer Security(TLS), Secure Electronic Transaction(SET), Pretty Good Privacy(PGP), S/MIME.

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Unit – V:

Intruders, Virus and Firewalls: **Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls.**

Text Books:

1. Michael E. Whitman, Herbert J. Mattord, Principles of Information Security, CENGAGE Learning, 4th Edition.
2. William Stallings, Cryptography and Network Security, Pearson Education,4th Edition.

Reference Books:

1. C K Shyamala, N Harini, Dr T R Padmanabhan, Cryptography and Network Security : Wiley India, 1st Edition.
2. Bernard Menezes, Network Security and Cryptography: CENGAGE Learning
3. AtulKahate, Cryptography and Network Security: McGraw Hill, 2nd Edition

Course Outcomes:

Upon the successful completion of this course, the student will be able to:

1. Analyze the importance of Network Security in real world.
2. Designing and analysis of different encryption Algorithms.
3. Designing and analysis of different Authentication Algorithms.
4. Implementation of MAC and Hash functions, security at different layers of a network.
5. Explore different types of intruders and viruses

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1			✓	✓			✓					
CO 2			✓	✓			✓			✓	✓	
CO 3			✓	✓			✓			✓	✓	
CO 4			✓	✓			✓			✓	✓	
CO 5			✓	✓			✓				✓	

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II Year MBA - II Semester	**L**	**T/P**	**C**
	4	**0**	**4**

A94001: ENTREPRENEURSHIP CONCEPTS AND CASES

Course Objective: The aim of this subject is to inspire students to become entrepreneurs so that they emerge as job-providers rather than job-seekers.

Unit-I:

Introduction: Understanding Entrepreneurial Mindset, the Evolution of Entrepreneurship-Approaches to Entrepreneurship, Process Approach, Twenty First Century trends in Entrepreneurship.

Case: Ready, Aim, Fire Fire

Case: Henry Ford,

Case: From Candle Seller to CEO

Unit-II:

Individual and Corporate Entrepreneurship: The Individual Entrepreneurial Mind-set and Personality, The Entrepreneurial Journey, Stress and the Entrepreneur, The Entrepreneurial Ego, Entrepreneurial Motivations. Corporate Entrepreneurial Mind set, the Nature of Corporate Entrepreneur- Conceptualization of Corporate Entrepreneurship Strategy, Sustaining Corporate Entrepreneurship.

Case: Globalizing Local Talent,

Unit-III:

Launching Entrepreneurial Ventures: Opportunities Identification- Entrepreneurial Imagination and Creativity, the Nature of the Creativity Process, Innovation and Entrepreneurship. Methods to Initiate Ventures, creating new ventures, Acquiring an Established Entrepreneurial Venture, Franchising, Hybrid Disadvantage of Franchising.

Case: Water, Water Everywhere: But Not a Drop to Drink,

Case: Pets.com

Case: Creativity in Start-Ups

Case: Opportunity–Earthmoving Industry

Unit-IV:

Legal Challenges of Entrepreneurship: Intellectual Property Protection-Patents, Copyrights, Trademarks and Trade Secrets, Avoiding Trademark Pitfalls. Formulation of the Entrepreneurial Plan, The Challenges of New Venture Start-ups, Poor Financial Understanding, Critical factors for New Venture Development, The Evaluation Process, and Feasibility Criteria Approach.

Case: Victoria, Tomlinson; Network.

Case: Tim Lockett, Knowing your Customers & Suppliers

Case: Google

Case: Tata Motors–Nano

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Unit-V:

Strategic Perspectives in Entrepreneurship: Strategic Planning-Strategic Actions- Strategic Positioning- Business Stabilization- Building the Adaptive Firms- Understanding the Growth Stage-Unique Managerial Concern of Growing Ventures.

Case: To Lease or Not: A Cash Flow Question

Case: Public Sector - Address Seed Capital

Reference Books:

1. D F Kuratko and T V Rao -Entrepreneurship- A South-Asian Perspective-CengageLearning,
2. Arya Kumar —Entrepreneurship- Creating and Leading anEntrepreneurial Organizationll Pearson 2012.
3. Richard Blundelll Exploring Entrepreneurship Practices and Perspectives, Oxford,2011.
4. David H Holtll Entrepreneurship: New Venture CreationllPHI,2013.
5. The Journal of Entrepreneurship, Entrepreneurship Development Institute ofIndia, Ahmadabad,
6. Journal of Human Values: IIM Calcutta.
7. Vasant Desai, Small Scale Industries and Entrepreneurship, HPH,2012.
8. Rajeev Roy, Entrepreneurship, 2e, Oxford,

Course Outcome: Student will able to understand

1. About how to establish a new business.
2. To overcome stress by the business man in the business.
3. Modern trends in venture capital for entrepreneurs.
4. Legal issues for new business and methods to overcome them.
5. Strategic planning process for an entrepreneur.

CO-PO Mapping:

CO's /PO's	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	✓			✓								
CO 2						✓		✓				
CO 3		✓	✓				✓					
CO 4					✓				✓		✓	
CO 5										✓		✓

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