



ANURAG ENGINEERING COLLEGE

An Autonomous Institution
(Affiliated to JNTUH-Hyderabad, Approved by AICTE-New Delhi)
ANANTHAGIRI (V) (M), SURYAPET (D), TELANGANA-508206



IT

II YEAR			
S.No	Course Code	Course Name	Description of the course Outcomes
	PS301BS	PROBABILITY AND STATISTICS	<ol style="list-style-type: none">1. Basic concepts of probability and 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.2. Concepts like mean variance, co-variance of random variables expectation, discrete distributions.3. The Normal random variable for the continuous case predominantly describes important probability distributions, the types of sampling and Sampling distribution.4. Estimations of statistical parameters and Testing of hypothesis of few unknown statistical parameters.5. Understand the stochastic process and Markov chains.
	EC302ES	DIGITAL ELECTRONICS	<ol style="list-style-type: none">1. Understand the working of logic families and logic gates.2. Define Postulates of Boolean algebra and to minimize combinational functions.3. Design and analyze Combinational circuits.4. Design and analyze sequential circuits for various cyclic functions.

			5. To learn about Memories and Programmable Logic Devices.
	CS303PC	DATA STRUCTURES	<ol style="list-style-type: none"> 1. Analyze the representation of various static, dynamic and, hierarchical data structures and Design and implement the mechanism of linear data structures. 2. Outline the concepts of hashing, collision and its resolution methods using hash function. 3. Design and Implementation of various advanced concepts of binary trees. 4. Implement various algorithms on graph data structures and implementation of various sorting techniques. 5. Design and implementation of Pattern Matching algorithms to find patterns within a bigger set of data or text.
	CM304PC	COMPUTER ORGANIZATION AND MICROPROCESSOR	<ol style="list-style-type: none"> 1. Able to understand the basic components and the design of CPU, ALU and Control Unit. 2. Ability to understand memory hierarchy and its impact on computer cost/performance. 3. Ability to understand the advantage of instruction level parallelism and pipelining for high performance Processor design.

			<ol style="list-style-type: none"> 4. Ability to understand the instruction set, instruction formats and addressing modes of 8086. 5. Ability to write assembly language programs to solve problems.
	IT305PC	INTRODUCTION TO IOT	<ol style="list-style-type: none"> 1. Apply the concepts of IOT. 2. Interpret the basic protocols in sensor networks. 3. Program and configure Arduino boards for various designs. 4. Understand Python programming and Interfacing for Raspberry Pi. 5. Demonstrate the applications of IoT for real time problems.
	CS306PC	DATA STRUCTURES LABORATORY	<ol style="list-style-type: none"> 1. Ability to develop C programs for computing and real-life applications using basic elements like control statements, functions, pointers and structures and various linked lists. 2. Ability to develop data structures like stacks and queues using arrays and pointers. 3. Ability to implements the sorting methods like Quick sort, Heap sort and Merge sort. 4. Ability to implement various trees and tree traversal techniques in recursive and non-recursive manner. 5. Gain knowledge on implementing the graph traversal techniques and

			Pattern matching algorithms like Boyer- Moore, Knuth-Morris-Pratt
	EC307ES	DIGITAL ELECTRONICS LABARATORY	<ol style="list-style-type: none"> 1. Understand the working of logic families and logic gates. 2. Design and implement Combinational logic circuits. 3. Design and implement Sequential logic circuits. 4. Design and implement synchronous and asynchronous logic circuits. 5. Design logic gates using different logics.
	IT308PC	INTERNET OF THINGS LABARATORY	<ol style="list-style-type: none"> 1. Ability to introduce the raspberry PI platform used in IoT applications 2. Ability to introduce the concept of M2M (machine to machine) with necessary protocols and get awareness in implementation of distance sensor 3. Get the skill to program using python scripting language which is used in many IoT devices. 4. Accessing of GPIO pins using Python. 5. Collection of sensor data.
	HS309MC	GENDER SENSITIZATION	<ol style="list-style-type: none"> 1. Students will have developed a better understanding of important issues related to gender in contemporary India 2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be

			<p>achieved through discussion of materials derived from research, facts, everyday life, literature and film.</p> <ol style="list-style-type: none"> Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. Students will acquire insight into the gendered division of labour and its relation to politics and economy. Men and women students and professionals will be better equipped to work and live together as equals
	CS308PC	DATA VISUALIZATION-R PROGRAMMING/POWER BI	<ol style="list-style-type: none"> Understand How to import data into Tableau. Understand Tableau concepts of Dimensions and Measures. Develop Programs and understand how to map Visual Layouts and Graphical Properties. Create a Dashboard that links multiple visualizations. Use graphical user interfaces to create Frames for providing solutions to real world problems.
	MB401HS	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS	<ol style="list-style-type: none"> The students will understand the various Forms of Business and the impact of economic variables on the Business. The students will understand the concept in Demand and supply.

			<ol style="list-style-type: none"> 3. The student will learn the various concepts in Production, Cost and Pricing strategies. 4. The student will gain the knowledge on financial position by analyzing the financial statements of a company. 5. The students can able to evaluate financial position by analyzing the Financial rations of the company
	CS402PC	DISCRETE MATHEMATICS	<ol style="list-style-type: none"> 1. Understand and construct Inference Theory and Normal Forms 2. Apply set theory and Relations to formulate Discrete Structures 3. Analyze and solve Po sets and Algebraic Problems using Groups 4. Apply Permutations and Combinations to Solve the Discrete Problems 5. Apply graph theory in solving computing problems
	CS403PC	OPERATING SYSTEMS	<ol style="list-style-type: none"> 1. Will be able to control access to a computer and the files that may be shared 2. Demonstrate the knowledge of the components of computers and their respective roles in computing. 3. Ability to recognize and resolve user problems with standard operating environments.

			<p>4. Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.</p> <p>5. Identify storage management and protection</p>
	CS404PC	DATABASE MANAGEMENT SYSTEMS	<ol style="list-style-type: none"> 1. Gain knowledge of fundamentals of DBMS and ER Model. 2. Able to apply the knowledge of relational model and normalization. 3. Apply the basics of SQL for retrieval and management of data. 4. Be acquainted with the basics of transaction processing and concurrency control. 5. Gain knowledge on database storage structures and access techniques.
	IT405PC	JAVA PROGRAMMING	<ol style="list-style-type: none"> 1. Solve real world problems using OOP techniques 2. Develop programs using the concepts of exception handling. 3. Solve problems using packages and java collection framework. 4. Develop multithreaded applications with synchronization and applications using JDBC. 5. Design GUI based applications.

	CS406PC	OPERATING SYSTEMS LABORATORY	<ol style="list-style-type: none"> 1. Simulate and implement operating system concepts such as scheduling, 2. Able to implement C programs using Unix system calls 3. Implement the dead lock avoidance using banker's algorithm 4. Implement the producer and consumer problem and Page Replacement algorithms 5. Exercise inter-process communication.
	CS407PC	DATABASE MANAGEMENT SYSTEMS LABORATORY	<ol style="list-style-type: none"> 1. Develop ER data model and Relational data model for a database. 2. Design database schema for a given application and apply normalization. 3. Apply SQL commands for data definition and data manipulation. 4. Apply the basics of SQL for retrieval and management of data. 5. Develop solutions for data base applications using procedures, cursors and triggers.
	IT408PC	JAVA PROGRAMMING LABARATORY	<ol style="list-style-type: none"> 1. Able to write the programs for solving real world problems using Java OOP principles. 2. Able to write programs using Exceptional Handling approach. 3. Able to write programs using Java collection framework. 4. Able to write multithreaded applications.

			5. Able to write GUI programs using swing controls in Java.
	HS411MC	INTELLECTUAL PROPERTY RIGHTS	<ol style="list-style-type: none"> 1. Understand the fundamentals of intellectual properties and its agencies. 2. Know the trademark registration process and its rights. 3. Understand the fundamentals of copyrights and patent law. 4. Know the trade secret determination and protection. 5. Know the recent developments in protection of intellectual property rights
	CS409PC	SKILL DEVELOPMENT COURSE(NODE JS/ REACT JS/DJANGO)	<ol style="list-style-type: none"> 1. Build a custom website with HTML, CSS, and Bootstrap and little JavaScript. 2. Demonstrate Advanced features of JavaScript and learn about JDBC 3. Develop Server – side implementation using Java technologies. 4. Develop the server – side implementation using Node JS. 5. Design a Single Page Application using React.
III YEAR			
1	CS501PC	Design and Analysis of Algorithms	<ol style="list-style-type: none"> 1. Acquire the knowledge of algorithm analysis and its notations that are applied on the problems solved by divide and conquer

			<p>paradigm</p> <ol style="list-style-type: none"> 2. Apply the major graph algorithms for model engineering problems and knowledge of the greedy paradigm 3. Apply the dynamic programming paradigm and recite algorithms that employ dynamic programming paradigm 4. Apply the concept of back tracking, branch and bound paradigm for real time problems 5. Analyse the complexity of problems and differentiate that in term of P and NP Problems.
2	IT502PC	Automata Theory and Compiler Design	<ol style="list-style-type: none"> 1. Able to employ finite state machines for modeling and solving computing problems. 2. Able to design context free grammars for formal languages. 3. Able to distinguish between decidability and un decidability. 4. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis. 5. Acquire skills in using lex tool and design LR parsers
3	EC522PE	Embedded Systems	<ol style="list-style-type: none"> 1. Expected to understand the selection procedure of processors in the embedded domain. 2. Design procedure of embedded firm ware. 3. Expected to visualize the role of Real time operating systems in embedded systems.

			<ol style="list-style-type: none"> 4. Expected to evaluate the correlation between task synchronization and latency issues. 5. Expected to Understanding the OS based Embedded System
		Professional Elective –I	
4	IT511PE	Full Stack Development	<ol style="list-style-type: none"> 1. Understand Full stack components for developing web application. 2. Apply packages of NodeJS to work with Data, Files, Http Requests and Responses. 3. Use MongoDB data base for storing and processing huge data and connects with NodeJS application. 4. Design faster and effective single page applications using Express and Angular. 5. Create interactive user interfaces with react components.
5	IT512PE	Data Mining	<ol style="list-style-type: none"> 1. Understand the need of data mining and pre-processing techniques. 2. Perform market basket analysis using association rule mining. 3. Utilize classification techniques for analysis and interpretation of data. 4. Identify appropriate clustering and outlier detection techniques to handle complex data. 5. Understand the mining of data from web, text and time series data.
6	CS513PE	Scripting Languages	<ol style="list-style-type: none"> 1. Understand how to Comprehend the differences between

			<p>Ruby, Ruby on Rails and RubyTk and Designing CGI scripts using Ruby and Web.</p> <ol style="list-style-type: none"> 2. Able to Understand and Extend the Ruby and Embedding a Ruby Interpreter. 3. Ability to create and run scripts using PERL and able to translate from Perl/Tk to Ruby. 4. Ability to create Internet ware applications by Advanced Perl. 5. Acquire programming skills in TCL, Tk and Perl-Tk.
7	IT514PE	Mobile Application Development	<ol style="list-style-type: none"> 1. Understand the working of Android OS Practically. 2. Develop Android user interfaces 3. Develop, deploy and maintain the Android Applications. 4. Deploy software to mobile devices 5. Debug programs running on mobile devices
8	IT515PE	Software Testing Methodologies	<ol style="list-style-type: none"> 1. Understand purpose of testing and path testing 2. Understand strategies in data flow testing and domain testing 3. Develop logic-based test strategies 4. Understand graph matrices and its applications

			5. Implement test cases using any testing automation tool
		Professional Elective –II	
9	AM515PE	Computer Graphics	<ol style="list-style-type: none"> 1. Understand the applications and primitives of Computer Graphics system. 2. Perform 2D transformations on graphical objects. 3. Understand 3D object representations. 4. Perform 3D transformations on graphical objects. 5. Design computer based animation systems.
10	IT522PE	Quantum Computing	<ol style="list-style-type: none"> 1. Understand basics of quantum computing 2. Understanding background mathematics of quantum computing. 3. Understand physical implementation of Qubit 4. Understand Quantum algorithms and their implementation 5. Understand The Impact of Quantum Computing on Cryptography
11	IT523PE	Advanced Operating Systems	<ol style="list-style-type: none"> 1. Understand the design approaches of advanced operating systems 2. Analyze the design issues of distributed operating systems. 3. Evaluate design issues of multi-processor operating systems. 4. Identify the requirements Distributed File System and Distributed Shared Memory. 5. Formulate the solutions to schedule the real time applications.

12	CS524PE	Distributed Databases	<ol style="list-style-type: none"> 1. Understand the concepts of distributed databases and their architecture & design. 2. Cognize query processing and optimization algorithms. 3. Realize transaction management and concurrency control mechanisms. 4. Analyse failures in DDBS systems and parallel architectures 5. Infer the notions of object database systems
13	IT525PE	Pattern Recognition	<ol style="list-style-type: none"> 1. Understand the importance of pattern recognition and its representation 2. Analyza the variants of NN algorithm 3. Understand the necessity of Hidden markov models, decision tree and SVM for classification 4. Understand different types of clustering algorithms 5. Differentiate among types of classifiers for algorithm independent machine learning.

14	IT504PC	Compiler Design Lab	<ol style="list-style-type: none"> 1. Design, develop, and implement a compiler for any language. 2. Use lex tools for developing a scanner . 3. Understand the type checking storage allocation strategies 4. Design and implement LL and LR parsers. 5. Use yacc tools for developing a parser
15	IT505PC	Embedded Systems Lab	<ol style="list-style-type: none"> 1. Expected to understand the selection procedure of processors in the embedded domain. 2. Design procedure of embedded firm ware. 3. Expected to visualize the role of real-time operating systems in embedded systems. 4. Expected to evaluate the correlation between task synchronization and latency issues 5. Expected to Understanding the OS based Embedded System
16	IT534PE	Professional Elective-I Lab	
	IT531PE	FULL STACK DEVELOPMENT LAB	<ol style="list-style-type: none"> 1. Design flexible and responsive Web applications using Node JS, React, Express and Angular. 2. Perform CRUD operations with MongoDB on huge amount of data. 3. Develop real time applications using react components.

			4. Use various full stack modules to handle http requests and responses.
	IT532PE	DATA MINING LAB	<ol style="list-style-type: none"> 1. Apply preprocessing statistical methods for any given raw data. 2. Gain practical experience of constructing a data warehouse. 3. Implement various algorithms for data mining in order to discover interesting patterns from large amounts of data. 4. Apply OLAP operations on data cube construction 5. To analyze the process of preprocessing the data
	IT533PE	SCRIPTING LANGUAGES LAB	<ol style="list-style-type: none"> 1. Understand the basic concepts of Ruby. 2. Understand the concepts of Ruby for developing web based projects. 3. Understand the basic concepts of TCL. 4. Understand the concepts of TCL for working with files. 5. Understand the applications Perl scripting language.
	IT534PE	MOBILE APPLICATION DEVELOPMENT LAB	<ol style="list-style-type: none"> 1. Develop Applications in an android environment. 2. Develop user interface applications. 3. Develop URL related applications. 4. Develop text related applications 5. Develop database related applications.
	IT535PE	SOFTWARE TESTING METHODOLOGIES LAB	<ol style="list-style-type: none"> 1. Design and develop the best test strategies in accordance with the development model.

			<ol style="list-style-type: none"> 2. Design and develop GUI, Bitmap and database checkpoints 3. Develop database checkpoints for different checks 4. Perform batch testing with and without parameter passing 5. Perform Silent mode test execution without any interruption
17	CS507PC	UI design- Flutter	<ol style="list-style-type: none"> 1. Knowledge on installation of various softwares. 2. Understanding of various Widgets 3. Application of Animation to Apps 4. Implements Flutter Widgets and Layouts 5. Responsive UI Design and with Navigation in Flutter
III YEAR II SEMESTER			
10	IT602PC	Software Engineering	<ol style="list-style-type: none"> 1. Able to understand the software engineering principles, practices and process models 2. Able to elicit, analyze and specify software requirements from the project stakeholders 3. Able to analyze and translate the specifications into software designs and model the designs 4. Able to apply different test strategies to perform testing and

			<p>metrics to assess the software</p> <p>5. Able to identify and manage software risks and maintain the quality of the software</p>
11	IT603PC	Data Communications and Computer Networks	<ol style="list-style-type: none"> 1. Understand and explore the basics TCP/IP and OSI models. 2. Understand data link layer concepts of a computer network. 3. Understand network layer concepts of a computer network 4. Understand transport layer concepts of a computer network 5. Understand the working of application layer protocols.
12	CS601PC	Machine Learning	<ol style="list-style-type: none"> 1. Distinguish between, supervised, unsupervised and semi-supervised learning 2. Understand algorithms for building classifiers applied on datasets of non-linearly separable classes 3. Understand the principles of evolutionary computing algorithms 4. Design an ensembler to increase the classification accuracy 5. Understand the Reinforcement Learning methods.
13		Professional Elective - III	
	IT611PE	Biometrics	1. Identify the various Biometric technologies.

			<ol style="list-style-type: none"> 2. Design of biometric recognition for the organization. 3. Develop simple applications for privacy. 4. Understand the watermarking techniques of biometrics. 5. Understand the research on biometric techniques
	EC512PE	Advanced Computer Architecture	<ol style="list-style-type: none"> 1. Computational models and Computer Architectures. 2. Concepts of parallel computer models. 3. Concepts of Shared-Memory Organizations, Pipeline Processors and pipeline design. 4. Scalable Architectures, Pipelining, Superscalar processors, Three Generations of Multicomputer, Message-passing Mechanisms 5. Techniques of Vector Processing's and SIMD computer Organizations
	CS633PE	Data Analytics	<ol style="list-style-type: none"> 1. Understand the impact of data analytics for business decisions and strategy 2. Carry out data analysis/statistical analysis 3. To carry out standard data visualization and formal inference procedures 4. Design Data Architecture 5. Understand various Data Sources
	EC632PE	Image Processing	<ol style="list-style-type: none"> 1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization. 2. Demonstrate the knowledge of filtering techniques. 3. Demonstrate the knowledge of 2D transformation techniques. 4. Demonstrate the knowledge of image enhancement, segmentation, restoration . 5. Demonstrate the compression techniques.

	CS515PE	Principles of Programming Languages	<ol style="list-style-type: none"> 1. Acquire the skills for expressing syntax and semantics in formal notation 2. Identify and apply a suitable programming paradigm for a given computing application 3. Able to Implementing Subprogram and abstract data types 4. Able to implement Exception Handling and Event Handling 5. Gain knowledge of the features of various programming languages and their comparison
		Open Elective – I	
14	IT611OE	Java Programming	<ol style="list-style-type: none"> 1. Solve real world problems using OOP techniques 2. Develop programs using the concepts of exception handling. 3. Solve problems using packages and java collection framework. 4. Develop multithreaded applications with synchronization and applications using JDBC. 5. Design GUI based applications.
15	IT612OE	Software Engineering	<ol style="list-style-type: none"> 1. Able to understand the software engineering principles, practices and process models 2. Able to elicit, analyze and specify software requirements from the project stakeholders 3. Able to analyze and translate the specifications into software

			<p>designs and model the designs</p> <ol style="list-style-type: none"> 4. Able to apply different test strategies to perform testing and metrics to assess the software 5. Able to identify and manage software risks and maintain the quality of the software
16	IT605PC	Software Engineering & Computer Networks Lab	<ol style="list-style-type: none"> 1. Ability to translate end-user requirements into system and software requirements 2. Ability to generate a high-level design of the system from the software requirements 3. Implement data link layer farming methods 4. Analyze error detection and error correction codes. 5. Implement and analyze routing and congestion issues in network design.
17	CS604PC	Machine Learning Lab	<ol style="list-style-type: none"> 1. Understand modern notions in predictive data analysis. 2. Select data, model selection, model complexity and identify the trends. 3. Understand a range of machine learning algorithms along with their strengths and weaknesses. 4. Build predictive models from data and analyse their performance. 5. Understand the Performance Analysis of Classification Algorithms.

18	AE606HS	Advanced English Communication Skills Lab	<ol style="list-style-type: none"> 1. Apply reading and listening strategies to enhance comprehension skills 2. Develop different kinds of Writing: Formal Letters, Précis Writing, Essay Writing and Technical Report Writing 3. Enhance presentation skills to apply in professional life 4. Use strategies and techniques to clear group discussions 5. Practice mock interviews to improve employability skills
19	CS606PW	Industrial Oriented Mini Project/ Internship/ Skill Development Course (Big data-Spark)	<ol style="list-style-type: none"> 1. Develop Map Reduce Programs to analyze large dataset Using Hadoop and Spark 2. Write Hive queries to analyze large dataset Outline the Spark Ecosystem and its components 3. Perform the filter, count, distinct, map, flatMap RDD Operations in Spark. 4. Build Queries using Spark SQL 5. Apply Spark joins on Sample Data Sets Make use of sqoop to import and export data from hadoop to database and vice-versa