ANURAG ENGINEERING COLLEGE

(An Autonomous Institution)

Ananthagiri (V&M),Suryapet (Dt) 508 206

Definitions of Key Words:

Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.
Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).
Course: Usually referred to, as 'papers' is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/laboratory work/ field work/ outreach activities/ project work/vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.
Credit Based Semester System (CBSS): Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.
Credit Point: It is the product of grade point and number of credits for a course.
Credit: A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.
Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.
Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.
Letter Grade: It is an index of the performance of students in a said course.
Grades are denoted by letters O, A+, A, B+, B, C, P and F.
Programme: An educational programme leading to award of a Degree, Diploma or Certificate.
Semester Grade Point Average (SGPA): It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.
Semester: Each semester will consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled from July to December and even semester from January to June.

Transcript or Grade Card or Certificate: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and

CGPA earned till that semester.

Types of Courses: The Courses in a programme may be of three kinds: Core, Elective and Foundation.

Core Course:-

There may be a Core Course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

Elective Course:-

Elective course is a course which can be chosen from a pool of papers. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student's proficiency/skill.

An elective may be "Generic Elective" focusing on those courses which add generic proficiency to the students. An elective may be "Discipline centric" or may be chosen from an unrelated discipline. It may be called an "Open Elective."

Foundation Course:-

The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation. "Compulsory Foundation" courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines. Elective Foundation courses are value-based and are aimed at man-making education.

ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B.Tech. (Regular) from the Academic Year 2015-16 onwards

1. Title and Duration of the Progamme.

1.1 The programme shall be called the degree programme in Bachelor of Technology, abbreviated as B.Tech.

1.2 The programme shall be of four academic years duration divided into eight semesters, each semester having duration of minimum 16 weeks of instruction.

1.3 The calendar of events in respect of the programme shall be fixed by the College from time to time.

1.4 The external examination in all the courses (subjects) shall be conducted at the end of each semester for all the eight semesters.

1.5 Students joining the B.Tech. Programme shall have to complete the programme within a stipulated time frame of 8 years from the year of joining and Students joining the B.Tech. Programme in the third semester directly through Lateral Entry Scheme (LES) shall have to complete the programme within a stipulated time frame of 6 years from the year of joining. Otherwise, they shall forfeit their seat in B.Tech Programme and their admission shall stand cancelled.

2. Admission Procedure

2.1 Admissions will be done as per the norms prescribed by the Government of Telangana State.

2.2 The Government orders in vogue shall prevail.

2.3 The candidate should have passed the prescribed qualifying examination on the date of admission.

3. Award of B. Tech. Degree

A student will be declared eligible for the award of B. Tech. Degree if he fulfills the following academic requirements:

3.1 The candidate shall pursue a course of study for not less than four academic years and not more than eight academic years.

3.2 The candidate shall register for 192 credits and secure all the 192 credits by securing a minimum CGPA of 5.0.

3.3 The students, who fail to fulfill the academic requirements for the award of the degree within eight academic years from the year of admission, shall forfeit their seats in B.Tech.

Programme.

4. Courses of Study

The following B. Tech. Programmes are offered at present:

Branch	Branch Code
Civil Engineering	01
Electrical and Electronics Engineering	02
Mechanical Engineering	03
Electronics and Communication Engineering	04
Computer Science and Engineering	05

and any other course as approved by the Authorities from time to time.

5. Credits

	Semester	
	Contact Periods / week	**Credits**
Theory	04	04
	03	03
	02	02
Practical	03	02
Drawing	00+04	02
	02+02	03
	00+06	03
Mini project	--	02
Comprehensive Viva Voce	--	02
Seminar	6	02

Project	15	10

***Note on Tutorials:- No Credits for < 2 periods /week**

4. **Distribution and Weightage of Marks**

6.2 The performance of a student in a semester shall be evaluated course-wise for a maximum of 100 marks each for a theory and practical course. In addition, industry-oriented mini-project, seminar, Comprehensive Viva-Voce and Project work shall be evaluated for 100, 100, 100 and 200 marks respectively.

6.3 For theory courses the distribution shall be 25 marks for Continuous Internal Evaluation (CIE) and 75 marks for the Semester End- Examination (SEE).

6.4 For theory courses, during the semester there shall be 2 midterm examinations. Each mid term examination consists of Part-A (Short Answers) for 5 marks and Part-B (Long Answers) for 15 marks with duration of 90 Minutes and an assignment carrying 5 marks.

Part-B shall contain 3 questions with internal choice, each carries 5 marks. First mid term examination shall be conducted for 2.5 units of syllabus and second mid term examination shall be conducted for remaining 2.5 units. First Assignment should be submitted before the conduct of the first mid term exam, and the second assignment should be submitted before the conduct of the second mid term exam.

The total marks secured by the student in each mid term examination for 25 marks is considered and the average of the two mid term examinations shall be taken as the final marks secured by each student**.** If he/she is absent for any test / assignment, he/she is awarded zero marks for that test / assignment.

6.5 The Semester End Examination will be conducted for 75 marks which consist of two parts viz. i). Part-A for 25 marks, ii). Part –B for 50 marks.

6.6 Part-A is compulsory, which consists of ten questions (numbered from 1 to 10) two from each unit carrying 2 / 3 marks each.

6.7 Part-B consists of five questions (numbered from 11 to 15) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an “either” “or” choice (that means there will be two questions from each unit and the student should answer any one question).

6.8 For practical courses, there shall be a continuous internal evaluation during a semester for 25 sessional (internal) marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and midterm practical examination shall be evaluated for 10 marks conducted by the laboratory teacher concerned. Semester End Examinations carries 75 marks.

6.9 The practical Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed by the Principal from the panel of examiners recommended by Chairman, Board of Studies in respective branches.

6.10 For the courses having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 25 marks for internal evaluation (15 marks for day-to-day work and 10 marks for midterm examination) and 75 marks for end examination. There shall be two midterm examinations in a semester and the average of the two shall be considered for the award of marks for midterm examinations.

6.11 There shall be an industry-oriented mini-Project, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated in IV year I Semester. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 100 marks. The committee consists of an external examiner, Head of the Department, the Supervisor of Mini Project and a Senior Faculty member of the department. There shall be no internal marks for industry oriented mini project.

6.12 There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, Supervisor of Seminar and a Senior Faculty member of the department. The seminar report shall be evaluated for 100 marks. There shall be no external examination for the seminar.

6.13 There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a committee consisting of Head of the Department and two Senior Faculty members of the department. The Comprehensive Viva-Voce is intended to assess the students understanding of the courses he studied during the B. Tech. course of study. The Comprehensive Viva-Voce shall be evaluated for 100 marks. There are no external marks for the Comprehensive Viva-Voce.

6.14 Out of a total of 200 marks for the Project work, 50 marks shall be for Internal Evaluation and 150 marks for the Semester End Examination. The Semester End Examination (viva-voce) shall be conducted by the committee. The committee consists of an external examiner, Head of the Department, the Supervisor of Project and a Senior Faculty member of the department. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of Project work shall be conducted at the end of the IV year II Semester. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his project.

6.15 The Laboratory marks and the sessional marks awarded by the faculty are subject to scrutiny and scaling by the Institution whenever/wherever necessary. In such cases, the sessional and laboratory marks awarded by the teacher will be referred to a College Standing Committee/ Academic Committee. The Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved as per the University rules and produced before the Committees of the University as and when asked for.

6.16 Candidates shall be permitted to apply for recounting/revaluation of SEE scripts within the

stipulated period with payment of prescribed fee.

7. Attendance Requirements

7.1 A student is eligible to write the Semester End Examinations only if he / she acquires a minimum of 75% of attendance in aggregate of all the courses.

7.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds with a documentary evidence approved by the Academic Council.

7.3 A stipulated fee shall be payable towards condonation of shortage of attendance.

7.4 Shortage of attendance below 65% in aggregate shall not be condoned under any circumstances.

7.5 Students whose shortage of attendance is not condoned are not eligible to write Semester End Examinations of that semester. Such students are detained and their registration for examination stands cancelled.

7.6 A student detained due to shortage of attendance in a semester may seek re-admission into that semester, as and when offered, within four weeks from the date of the commencement of class work with the academic regulations of the batch into which he/she gets admitted.

7.7 A student will be promoted to the next semester if he/she satisfies the attendance requirement of the present semester and shall not be eligible for readmission into the same semester.

7.8 For all mandatory, non-credit courses offered in a semester, a "Satisfactory Participation Certificate" shall be issued to the student, only after securing minimum 75% of attendance in such a course. No marks or Letter Grade shall be allotted for these activities.

8. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7.

8.1 A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical/design/drawing course/project and secured not less 35% marks in Semester End Examination (SEE), and minimum 40% marks when the total of the internal evaluation and semester end examinations taken together.

8.2 The student has to pass the failed course by appearing the supplementary examination as per the requirement for the award of degree.

8.3 Students who fail to earn 192 credits as indicated in the course structure within eight academic years from the year of their admission, shall forfeit their seat in B. Tech. Programme and their admission stands cancelled.

8.4 A student shall be promoted from I Year to II Year only if he/she fulfills the academic requirements of securing 50% of average credits (24 credits out of 48 credits) upto I year II Semester, from all the examinations, whether or not the candidate takes the examinations.

8.5 A student shall be promoted from II Year to III Year only if he/she fulfills the academic

requirements of securing 50% of average credits (36 credits out of 72 credits) up to II year I semester, from all the examinations, whether or not the candidate takes the examinations.

8.6 A student shall be promoted from III year to IV year only if he/she fulfills the academic requirements of securing 50% of average credits (60 credits out of 120 credits) up to III year I semester, from all the examinations, whether or not the candidate takes the examinations.

8.7 A student shall register and put up minimum attendance in all 192 credits and earn all 192 credits for the award of degree.

8.8 When a Student is detained due to shortage of attendance in any semester, no Grade Allotments or SGPA/CGPA calculations will be done for that entire Semester in which he got detained.

8.9 When a Student is detained due to lack of Credits in any year, he may be readmitted after fulfillment of the Academic Requirements, with the Academic Regulations of the Batch into which he gets readmitted subject to 3.3.

8.10 For readmitted candidates, if there are any Professional Electives / Open Electives, the same may also be re-registered if offered. However, if those Electives are not offered in later Semesters, then alternate Electives may be chosen from the same set of Elective Courses offered under that category.

8.11 After securing the necessary 192 Credits as specified for the successful completion of the entire UGP, an exemption up to 8 secured Credits (in terms of two of their corresponding Courses (Subjects)) may be permitted for optional drop out from these 192 Credits earned; resulting in 184 Credits for UGP performance evaluation, i.e., the performance of the Student in these 184 Credits shall alone be taken into account for the calculation of 'the final CGPA (at the end of UGP, which takes the SGPA of the IV Year II Semester into account)' , and shall be indicated in the Grade Card of IV Year II Semester; however, the Student's Performances in the earlier individual Semesters, with the corresponding SGPA and CGPA for which already Grade Cards are given, will not be altered. Further, optional drop out for such 8 secured Credits shall not be allowed for Courses listed as … i) Laboratories/ Practicals, ii) Industrial Training/ Mini-Project, iii) Seminar, iv) Comprehensive Viva Voce v) Major Project.

8.12 If a Student registers for some more 'extra courses' (in the parent Department or other Departments/Branches of Engg.) other than those listed courses totalling to 192 Credits as specified in the Course Structure of his Department, the performances in those 'extra courses' (although evaluated and graded using the same procedure as that of the required 192 Credits) will not be taken into account while calculating the SGPA and CGPA. For such 'extra courses' registered, % marks and Letter Grade alone will be indicated in the Grade Card, as a performance measure, subject to completion of the Attendance and Academic Requirements as stated in Items 7 and 8.1 – 8.11 above.

9. Program Structure

S. No.	Classification		Course Work - Subject Area	Range of Total Credits (%)	
	AICTE	UGC		Min	Max
1	HS	Foundation Courses	Humanities and Social Sciences including Management; (HS),	5	10
2	BS		Basic Sciences(BS) including Mathematics, Physics, Chemistry, Biology;	15	20
3	ES		Engineering Sciences (ES), including Materials, Workshop, Drawing, Basics of Electrical/ Electronics/ Mechanical/Computer Engineering Instrumentation;	15	20
4	PC	Core Courses	Professional Subjects-Core (PC), relevant to the chosen specialization/branch; (May be split into Hard (no choice) and Soft (with choice), if	30	40
5	PW		Project Work, Seminar and/or Internship in Industry or elsewhere.	10	15
6	PE	Elective Courses	Professional Subjects – Electives (PE), relevant to the chosen specialization/ branch;	10	15
7	OE		Open Subjects- Electives (OE), from other technical and/or emerging subject areas;	5	10

10. Course pattern

10.1 The entire course of study is for four academic years in semester pattern.

10.2 A student eligible to appear for Semester End Examinations in a course, but absent from it or failed in that examination, may write the exam in that course during supplementary exams.

10.3 A student eligible to appear in the Semester End Examination in any Course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that Course at the supplementary examination as and when conducted. In such cases, his Continuous Internal Evaluation (CIE) marks assessed earlier for that Course will be carried over, and added to the marks to be obtained in the supplementary examinations, for evaluating his performance in that course.

11. Minimum Instruction Days

The minimum instruction days for each semester shall be 90 days.

12. Grade Points

12.1 Marks will be awarded to indicate the performance of each student in each theory course, or Lab/Practicals, or Seminar, or Project, or Mini-Project, Minor Course etc., based on the % of marks obtained in CIE+SEE(Continuous Internal Evaluation + Semester End Examination, both taken together) as specified in Item 6 above, and a corresponding Letter Grade shall be given.

12.2 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed.

Letter Grade	Grade Points	% of marks Secured (Class Intervals)
O (Out Standing)	10	80% and above (≥80%, ≤100%)
A+ (Excellent)	9	Below 80% but not less than 70% (≥70%, <80%)
A (Very Good)	8	Below 70% but not less than 60% (≥60%, < 70%)
B+ (Good)	7	Below 60% but not less than 55% (≥55%, < 60%)
B (Above Average)	6	Below 55% but not less than 50% (≥50%, < 55%)
C (Average)	5	Below 50% but not less than 45% (≥45%, < 50%)
P (Pass)	4	Below 45% but not less than 40% (≥40%, < 45%)
F (Fail)	0	Below 40% (< 40%)
Ab (Absent)	0	--

12.3 A student obtaining F Grade in any Course shall be considered 'failed' and will be required to reappear as 'Supplementary Candidate' in the Semester End Examination (SEE), as and when offered. In such cases; his Continuous Internal Evaluation (CIE) marks in those Course(s) will remain same as those he obtained earlier.

12.4 A Letter Grade does not imply any specific % of Marks.

12.5 In general, a student shall not be permitted to repeat any Course (s) only for the sake of 'Grade Improvement' or 'SGPA/CGPA Improvement'. However, he has to repeat all the Courses pertaining to that Semester, when he is detained (as listed in items 8.10 - 8.11).

12.6 A student earns Grade Point (GP) in each Course, on the basis of the Letter Grade obtained by him in that Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Course. **Credit Points (CP) = Grade Point (GP) x Credits of that Course.**

12.7 The Student passes the Course only when he gets GP ≥ 4 (P Grade or above).

13. Registration/Dropping

13.1 Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely necessary for the student to register for courses in time.

13.2 The student has to register for a minimum of 20 credits and may register up to a maximum of 28 credits based on the advice of the Faculty Advisor. On an average, a student is expected to register for 24 credits.

13.3 A student at the end of II year II semester either having the CGPA of ≥ 7.0 or having passed all previous courses in first attempt with a minimum CGPA ≥ 5.0 is allowed to register an additional course / credits from the offered open electives. However mandatory non credit courses can be register during the course of study with the consent of the faculty advisor.

13.4 Open Electives are offered to students in III year II semester ,IV year I and II semester, which can be registered by the students during III year I and II semester. Prior permission for registration of Open Electives as additional course is compulsory.

13.5 A student would be allowed to register in an additional course only if he/she satisfies the prerequisites.

13.6 Departments will notify at the time of registration about the minimum number of students to be enrolled for a particular open elective to be offered.

13.7 Any student may be barred from registering for any course for specific reasons like disciplinary reasons, non- payment of fees, etc.

13.8 Dropping of Courses: Within four weeks after the commencement of the semester, the student may, in consultation with his / her faculty advisor, can drop one or more courses without prejudice to the minimum number of credits as specified in 13.2. The dropped courses are not recorded in the Grade Card.

13.9 After Dropping, minimum credits registered shall be 20.

14 Earning of Credit

A student shall be considered to have completed a Course successfully and earned the credits if he/she secures an acceptable letter grade in the range 'O' to 'P'. Letter grade 'F' in any Course implies failure of the student in that Course and no credits earned.

15 Passing Standards:

15.1 A student shall be declared successful or 'passed' in a Semester, only when he/she gets a SGPA ≥ 5.00 (at the end of that particular Semester); and a student shall be declared successful or 'passed' in the entire UGP, only when he/she gets a CGPA ≥ 5.00; subject to the condition that he/she secures a GP ≥ 4 (P Grade or above) in every registered Course in each Semester (during the entire UGP) for the award of Degree, as required.

15.2 In spite of securing P Grade or above in some (or all) Courses in any Semester, if a Student receives a SGPA < 5.00 and/ or CGPA < 5.00 at the end of such a Semester, then he 'may be allowed' (on the 'specific recommendations' of the Head of the Department and subsequent approval from the Principal) -

(i) to go into the next subsequent Semester (subject to fulfilling all other attendance and academic requirements as listed under Items 7-8);

(ii) to 'improve his SGPA of such a Semester (and hence CGPA) to 5.00 or above', by reappearing for ONE or MORE (as per Student's choice) of the same Course(s) in which he has secured P Grade(s) in that Semester, at the Supplementary Examinations to be held in the next subsequent Semester(s). In such cases, his Continuous Internal Evaluation Marks (CIE Marks) in those Course(s) will remain same as those he obtained earlier.

In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

15.3 A Student shall be declared successful or 'passed' in any Non-Credit Course, if he secures a 'Satisfactory Participation Certificate' for that Mandatory Course.

15.4 After the completion of each Semester, a Grade Card or Grade Sheet (or Transcript) *(are all theses 3 are same?)* shall be issued to all the Registered Students of that Semester, indicating the Letter Grades and Credits earned. It will show the details of the Courses Registered (Course Code, Title, No. of Credits, Grade Earned etc.), Credits earned, SGPA, and CGPA.

16 Vertical Progression

It shall also be necessary to lay down uniform minimum standards for SGPA and CGPA together with the minimum number of *credits* to be earned in a semester for the *vertical progression* of students. This shall be used in facilitating the mobility of students from one College to another and also in avoiding any confusion among the students. The

a) Minimum Standard for SGPA =5.0;

b) Minimum Standard for CGPA =5.0; (at the end of each semester)

However, failure to secure a minimum CGPA = 5.0 at the end of any semester for the first time, shall **attract a warning** before approval of the student to continue in the following semester and will be required to register for courses having a GPA of 4.0 to improve the SGPA to 5.0 or above.

17 Eligibility for Award of B.Tech. Degree

A student shall be eligible for award of the B.Tech degree if he/she fulfils all the following conditions;

17.1 Registered and successfully completed all the components prescribed in the Programme of study (*Course of study* mentioned in all earlier occasions) to which he/she is admitted,

17.2 Obtained CGPA greater than or equal to 5.0 (Minimum requirements for Pass),

17.3 Has no dues to the College, hostels, Libraries, NCC / NSS etc., and

17.4 No disciplinary action is pending against him/her.

18 Award of Class

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:

CGPA	Class Awarded	
≥8.00	First Class with Distinction	**From the CGPA secured from 192 credits**
≥6.50 - <8.00	First Class	
≥5.50 - <6.50	Second Class	
≥5.00 - <5.50	Pass Class	

18.1 The marks obtained in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) will not be shown in the memorandum of marks.

18.2 For the purpose of awarding First Class with Distinction (CGPA ≥ 8.0), the student must obtain the minimum required CGPA within 4 academic years or within 3 academic years in

case of Lateral Entry candidates by clearing all the courses.

18.3 Candidates detained / prevented from writing the Semester End Examinations due to any reason in any semester are not eligible for the award of First Class with Distinction. Such candidates even if the CGPA ≥ 8.0, shall be placed in first class.

18.4 For the purpose of awarding First, Second and Pass Class, CGPA obtained in the examinations appeared within the maximum period allowed for the completion of Programme shall be considered as per the regulations.

18.5 A student with final CGPA < 5.00 (at the end of the UGP) will not be eligible for the Award of the Degree.

18.6 The CGPA can be converted to equivalent percentage of marks by using the following equation:

(CGPA - 0.5) X 10

19 Consolidated Grade Card

A consolidated grade card containing credits & grades obtained by the candidates will be issued after completion of the four years B. Tech Programme.

20 Withholding of Results

If the student has not paid the dues, if any, to the College or if any case of indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His degree will be withheld in such cases the matter will be referred to the Academic Council. The decision of the Academic Council is final.

21 Transitory Regulations

21.1 Discontinued, detained, or failed candidates are eligible for readmission as and when next offered as per the college admission procedure.

21.2 Students on transfer shall complete the prescribed courses of the concerned programme not covered earlier and however he/she should take the remaining programme along with others.

21.3 There shall be no branch transfers after the cut off date of admissions in the academic year.

22 Transcripts

After successful completion of the total Programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee.

23 Supplementary Examinations

In addition to the Regular Final Examinations held at the end of each semester, Supplementary Final Examinations will be conducted during the academic year. Candidates taking the Regular /

Supplementary examinations as Supplementary candidates may have to take more than one Semester End Examination per day. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstances.

24 Graduation Ceremony

24.1 The College shall have its own annual Graduation Ceremony for the award of degree to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

24.2 The College shall institute Prizes and Awards to meritorious students, for being given away annually at the Graduation Ceremony.

25 Termination from the Program

The admission of a student to the program may be terminated and the student asked to leave the College in the following circumstances:

25.1 The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

25.2 The student fails to satisfy the norms of discipline specified by the College from time to time.

26 Non-Credit Courses (Mandatory Courses)

26.1 All the courses designated as mandatory course is a compulsory requirement for all students for the award of degree.

26.2 These activities carry no credits and are evaluated as Satisfactory/ Unsatisfactory.

26.3 Minimum attendance requirement as per the regulations is compulsory for completing the mandatory courses.

27 Amendments

The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.

28 General

28.1 Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

28.2 The academic regulation should be read as a whole for the purpose of any interpretation.

28.3 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Academic Council is final.

ACADEMIC REGULATIONS FOR B. TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B. Tech. (Lateral Entry Scheme) from the Academic Year 2016-17 and onwards

1. **Eligibility for award of B. Tech. Degree (LES)**

1.1 The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.

1.2 The candidate shall register for 144 credits and secure 144 credits by securing a minimum CGPA of 5.0 from II to IV year B.Tech. Program (LES) for the award of B.Tech. degree.

1.3 The students, who fail to fulfill the requirement for the award of the degree in **six** academic years from the year of admission, shall forfeit their seats.

1.4 The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech.(LES).

2. **Promotion Rule**

A student shall be eligible for promotion in B.Tech programme, if he/she acquires the minimum number of credits as given below:

2.1 A student shall be promoted from II Year to III Year only if he/she fulfills the academic requirements of securing 50% of average credits (12 credits out of 24 credits) up to II year I semester, from all the examinations, whether or not the candidate takes the examinations.

2.2 A student shall be promoted from III year to IV year only if he/she fulfills the academic requirements of securing 50% of average credits (36 credits out of 72 credits) up to III year I semester, from all the examinations, whether or not the candidate takes the examinations.

2.3 A student shall register and put up minimum attendance in all 144 credits and earn all 144 credits to be eligible for award of degree.

2.4 Students who fail to earn 144 credits as indicated in the course structure within six academic years, shall forfeit their seat in B.Tech. Programme and their admission stands cancelled.

3. **Award of Class**

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he shall be placed in one of the following four classes:**CGPA**	**Class Awarded**	**From the CGPA secured from 144 credits**
≥8.00	First Class with	
≥6.50 - <8.00	First Class	
≥5.50 - <6.50	Second Class	
≥5.00 - <5.50	Pass Class	

4. All the other regulations as applicable to B. Tech. 4-year degree course (Regular) will hold good for B.Tech. (Lateral Entry Scheme).

ANNEXURE - I

1 Grade Point Average

1.1 SGPA and CGPA

The *credit index* can be used further for calculating the Semester Grade Point Average *(SGPA)* and the Cumulative Grade Point Average *(CGPA),* both of which being important performance indices of the student. While *SGPA* is equal to the *credit index* for a semester divided by the total number of *credits* registered by the student in that semester, *CGPA* gives the sum total of *credit indices* of all the previous semesters divided by the total number of *credits* registered in all these semesters. Thus,

The Grade Point Average (GPA) will be calculated according to the formula:

$$GPA = \frac{\sum CiGi}{\sum Ci}$$

Where Ci = number of credits for the course i,

Gi = grade points obtained by the student in the course.

1.2 Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation. SGPA is rounded off to TWO Decimal Places.

SGPA will be computed as follows;

∑ [(Course *credits*) X (*Grade points*)] (for all Courses passed in that semester)

∑ [(Course *credits*)] (for all courses registered in that semester)

1.3 To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time. CGPA is rounded off to TWO Decimal Places.

CGPA will be computed as follows:

∑ [(Course *credits*) X (*Grade points*)] (for all Courses passed upto that semester)

∑ [(Course *credits*)] (for all Courses registered until that semester)

CGPA is thus computed from the I Year First Semester onwards, at the end of each

Semester, as per the above formula. However, the SGPA of I year I Semester itself

may be taken as the CGPA, as there are no cumulative effects

1.4 **Illustrative Example**

An illustrative example given in below Table below indicates the use of the above two equations in calculating SGPA and CGPA, both of which facilitate the declaration of academic performance of a student, at the end of a semester and at the end of successive semesters respectively . Both of them shall be normally calculated up to the second decimal position, so that the *CGPA,* in particular, can be made use of in rank ordering the student's performance in a class. If two students get the same *CGPA*, the tie should be resolved by considering the number of times a student has obtained higher *SGPA;* But, if it is not resolved even at this stage, the number of times a student has obtained higher grades like O, A, B etc shall be taken into account in rank ordering of the students in a class.

Year and Semester	Course No.	Credits	Grade	Grade Points	Credit Points
I Year I sem	XX101	5	A	8	40
I Year I sem	XX102	4	F	0	00
I Year I sem	XX103	3	A+	9	27
I Year I sem	XX104	4	F	0	00
I Year I sem	XX105	5	C	5	25
I Year I sem	XX106	5	P	4	20
Total		**26 (18*)**			**112**
SGPA = 112/26 = 4.31			**CGPA = 4.31**		
I Year II Sem	XX107	5	B+	7	35
I Year II Sem	XX108	4	A	8	32
I Year II Sem	XX109	3	C	5	15
I Year II Sem	XX110	5	P	4	20
I Year II Sem	XX111	4	A+	9	36
I Year II Sem	XX112	2	F	0	00
I Year II Sem	Xx113	2	A	8	16
Total		**25 (23*)**			**154**
SGPA = 154/25 = 6.16			**CGPA = 266/51 = 5.22**		

* Total No. of credits excluding those with 'F'; this is particularly important to keep track of the number of credits earned by a student up to any semester;

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	**Punishment**
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the course (subject) of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that course (subject) only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester. The Hall Ticket of the candidate is to be cancelled.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the

		seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all END examinations. The continuation of the course by the candidate is course to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all END examinations. The continuation of the Programme by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6.	Refuses to obey the orders of the Chief Controllerof Exams/Chief Superintendent / Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the

	others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	remaining examinations of the courses of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred for two consecutive semesters from class work and all END examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat.

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the PRINCIPAL for further action to award suitable punishment.	

ANURAG ENGINEERING COLLEGE

(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE (R15)

I B.Tech (ECE) I Semester

S.No.	Course Code	Course	Course Category	Lectures	T / P / D	Credits	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	A51213	English Language Communication Skills Lab-I	HS	-	3	2	25	75	100
8	A51214	Computer Programming – I Lab	BS	-	3	2	25	75	100
9	A51215	Engineering Physic Lab	ES	-	3	2	25	75	100
10	A51216	Engineering Workshop	ES	-	3	2	25	75	100
Total				16	15	24	250	750	1000

T– Tutorial P – Practical D – Drawing

I B.Tech (ECE) II Semester

S.No.	Course Code	Course	Course Category	Lectures	T / P / D	Credits	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	A52213	English Language Communication Skills Lab-II	HS	-	3	2	25	75	100
8	A52215	Engineering Chemistry Lab	BS	-	3	2	25	75	100
9	A52216	IT Work shop	ES	-	3	2	25	75	100
10	A52214	Electronic Devices and Circuits Lab	PC	-	3	2	25	75	100
Total				16	16	24	250	750	1000

T – Tutorial P – Practical D – Drawing

II B.Tech (ECE) I Semester

S.No.	Course Code	Course	Course Category	Lectures	T / P / D	Credits	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

T – Tutorial P – Practical D – Drawing

II B.Tech (ECE) II Semester

S. No.	Course Code	Course	Course Category	Lectures	T / P / D	Credits	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

T – Tutorial P – Practical D – Drawing

III B.Tech (ECE) I Semester

S. No.	Course Code	Course	Course Category	Lectures	T / P / D	Credits	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		PE-I							
	A55029	1. Electronic Measurements & Instrumentation	PE	3	0	3	25	75	100
	A55030	2. Artificial Neural Networks							
	A55031	3. 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

T – Tutorial P – Practical D – Drawing

III B.Tech (ECE) II Semester

S.No.	Course Code	Course	Course Category	Lectures	T / P / D	Credits	Internal Marks	External Marks	Total Marks
1	A56022	Management Science	HS	3	0	3	25	75	100
2	A56023	Microprocessors & 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		PE-II							
	A56026	1. Telecommunication switching Systems	PE	3	1	3	25	75	100
	A56027	2. Satellite Communications							
	A56020	3. Nanotechnology							
6		OE-I	OE	3	0	3	25	75	100
7	A56207	Digital Signal Processing Lab	PC	-	3	2	25	75	100
8	A56208	Microprocessors & Microcontrollers Lab	PC	-	3	2	25	75	100
Total				20	10	24	200	600	800

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IV B.Tech (ECE) I Semester

S. No.	Course Code	Course	Course Category	Lectures	T / P / D	Credits	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		PE-III							
	A57031	1. Embedded Systems Design	PE	3	0	3	25	75	100
	A57032	2. Biometric System							
	A57028	3.Optical Communications							
5		PE-IV							
	A57034	1. Digital Signal Processors & Architectures	PE	3	0	3	25	75	100
	A57035	2. Digital Image Processing							
	A57036	3.Television Engineering							
6		OE-II	OE	3	1	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

IV B.Tech (ECE) II Semester

S. No.	Course Code	Course	Course Category	Lectures	T / P / D	Credits	Internal Marks	External Marks	Total Marks
1		PE-V							
	A58019	1. Cellular & Mobile Communications	PE	3	1	3	25	75	100
	A58020	2. Radar Systems							
	A58021	3.Net work Security							
2		PE-VI							
	A58022	1.Wireless Communications & Networks	PE	3	1	3	25	75	100
	A58023	2. Internet of Things							
	A58024	3.Scripting Languages							
3		OE-III	OE	3	1	3	25	75	100
4	A58210	Seminar	PW	-	3	2	100		100
5	A58211	Major Project	PW	-	15	10	50	150	200
6	A58212	Comprehensive Viva	PW	-	-	2		100	100
Total				9	21	23	225	475	700

T – Tutorial P – Practical D – Drawing

ANURAG ENGINEERING COLLEGE
(An Autonomous Institution)

OPEN ELECTIVE- I			
S.No	**Course**	**Subject**	**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**	**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**	**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	

ANURAG ENGINEERING COLLEGE, KODAD

(An Autonomous Institution)

I Year B.Tech. ECE – I Sem	L	T/P/D	C
	3	1/-/-	3

(A51002)MATHEMATICS-I

(Calculus and Matrices)

Course Objectives:

1. Able to know the Mean value theorems and determine the maxima and minima for function of several variables.
2. Concepts of matrix algebra, methods of solving system of linear equations.
3. Determine eigen values and eigen vectors of a matrix, cayeley hamilton theorem and inverse by cayley Hamilton theorem
4. Develop a strategy for finding a solution of given arbitrary differential equation, using different methods.
5. Understand the sol of higher order differential equations, application of ODE in Bending of beams, electrical circuits and simple harmonic motion.

UNIT-I: Functions of Single Variable and Functions of several variables

Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem – Generalized Mean Value theorem (all theorems without proof) – Geometrical interpretation of Mean value theorems. Functions of several variables – Partial Differentiation and total differentiation - Functional dependence-Jacobian Determinent- Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT-II: Matrices and Linear System of Equations

Matrices and Linear systems of equations: Real matrices – Symmetric, skew - symmetric, orthogonal, Linear Transformation – Orthogonal Transformation. Complex matrices: Hermitian, Skew – Hermitian and Unitary. Elementary row transformations-Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods (Gauss Elimination, Gauss Jordan).

UNIT-III: Eigen Values and Eigen Vectors

Eigen values, Eigen vectors – properties, Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonolization of matrix.

UNIT-IV: Differential Equations of first order and their Applications

Differential equations of first order and first degree: exact, linear and Bernoulli, Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-V: Higher Order Linear Differential Equations and their Applications Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X) = $e^{ax}, \sin ax, \cos ax \text{ and } x^k, e^{ax}V(x), x^kV(x)$. Method of variation of parameters. Applications - Bending of beams, Electrical circuits, simple harmonic motion.

Course Outcomes:

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

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Engineering Mathematics Vol - I, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
2. Shahanaz Bathul (2007), Engineering Mathematics-I, 3rd Edition, Hyderabad, Right Publishers.
3. Ramana B.V (2010), Engineering Mathematics, New Delhi, Tata McGraw Hill Publishing Co. Limited
4. Mathematical Methods: S.R.K. Iyengar and R.K. Jain, Narosa Publishing House.
   Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

ANURAG ENGINEERING COLLEGE, KODAD

(An Autonomous Institution)

I Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
	2	**1/-/-**	**2**

(A51001)ENGLISH-I

1. INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc. The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. *However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills*

2. OBJECTIVES:

a. To improve the language proficiency of the students in English with emphasis on LSRW skills.

b. To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.

c. To develop the study skills and communication skills in formal and informal situations.

LEARNING OUTCOMES:

1. Usage of English Language, written and spoken.

2. Enrichment of comprehension and fluency

3. Gaining confidence in using language in verbal situations.

SYLLABUS:

Listening Skills:

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation

2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.

• Listening for general content

• Listening to fill up information

• Intensive listening

• Listening for specific information

Speaking Skills:

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.

2. To enable students to express themselves fluently and appropriately in social and professional contexts.

• Oral practice

• Describing objects/situations/people

• Role play – Individual/Group activities (Using exercises from the five units of the prescribed text: ***Skills Annexe - Functional English for Success)***

• Just A Minute(JAM) Sessions.

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

• Skimming the text

• Understanding the gist of an argument

• Identifying the topic sentence

• Inferring lexical and contextual meaning

• Understanding discourse features

• Scanning

• Recognizing coherence/sequencing of sentences

NOTE: *The students will be trained in reading skills using the prescribed text for detailed study.*

They will be examined in reading and answering questions using 'unseen' passages which may be taken from

authentic texts, such as magazines/newspaper articles.

Writing Skills :

Objectives

1. To develop an awareness in the students about writing as an exact and formal skill

2. To equip them with the components of different forms of writing, beginning with the lower order ones.

• Writing sentences

• Use of appropriate vocabulary

• Paragraph writing

• Coherence and cohesiveness

• Narration / description

• Note Making

• Formal and informal letter writing

• Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

For Detailed study:

First Textbook: ***"Skills Annexe -Functional English for Success***", Published by Orient Black Swan, Hyderabad

For Non-detailed study:

Second text book ***"Epitome of Wisdom",*** Published by Maruthi Publications, Guntur

UNIT –I

Chapter 1: **'Wit and Humour'** from 'Skills Annexe' -Functional English for Success, Published by Orient Black Swan, Hyderabad 2 hrs

L-Listening For Sounds, Stress and Intonation 1

S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations) 1

R- Reading for Subject/ Theme 1

W- Writing Paragraphs 1

UNIT –II

Chapter 2:**'Mokshagundam Visvesvaraya'** from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad. 3 hrs

G-Types of Nouns and Pronouns 1

V- Homonyms, homophones synonyms, antonyms 2

UNIT-III

Chapter 3: **"Cyber Age"** from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad. 2 hrs

L – Listening for themes and facts 1

S – Apologizing, interrupting, requesting and making polite conversation 1

R- For theme and gist 1

W- Describing People, Places, Objects, Events 1

UNIT-IV

Chapter 4:**'Three Days To See'** from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad 2 hrs

G- Verb forms 2

V- noun, verb, adjective and adverb 2

UNIT-V

Chapter 5'**Risk Management'** from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad 2 hrs

L – for main points and sub-points for note taking 1

S – giving instructions and directions; Speaking of hypothetical situations 1

R – reading for details 1

W – note-making, information transfer, punctuation 1

REFERENCES :

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi.2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao**,** P Sreehari, Published by Pearson
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw – Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.

16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publishers

ANURAG ENGINEERING COLLEGE, KODAD

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I Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(A51003)ENGINEERING PHYSICS – I

Course objectives:

1. To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics.
2. To enable students to apply the knowledge acquired in improving the properties of engineering materials.
3. To provide the students with the necessary knowledge to solve the problems and make decisions with regards to the application of materials in a variety of engineering disciplines.
4. To equip the students with the required fundamentals of engineering chemistry to carry out in the interdisciplinary research such that the findings benefit the common man.
5. After the completion of the course, the student would understand about the important chemistry of water, electrochemistry, batteries and surface chemistry.

UNIT- I

Interference And Diffraction:

Superposition principle, resultant amplitude, coherence, methods to obtain coherent sources, interference, Young's double slit experiment (Qualitative), interference in thin films by reflection, Newton's rings Experiment, Distinction between Fraunhofer and Fresnel diffraction, Diffraction at single slit, Diffraction grating (Qualitative), Introduction to polarization, Brewster's law and Double refraction.

UNIT - II

Crystal Structures:

Space lattice – Unit cell – Lattice parameter – Crystal systems – Bravais lattices, Atomic radius – Co-ordination number - Structures d Packaning fractions of Simple Cubic – Body Centered Cubic – Face Centered Cubic crystals.

Directions, Planes and X-Ray Diffraction:

Miller Indices for Crystal planes and directions – Inter planar spacing of orthogonal crystal systems – Diffraction of X-rays by crystal planes and Bragg's law–Powder method – Applications of X-ray diffraction.

UNIT - III

Elements of Statistical Mechanics:

Introduction, Phase space, Definition of Ensembles, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics – Photon gas –Planck's law of black body radiation – Deduction of Wien's law and Rayleigh-Jeans law from Plank's law.

UNIT – IV

Magnetic Properties :

Introduction – Basic definitions - Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – properties of Anti ferro and Ferri magnetic materials .

Superconductivity: Introduction, Meissner effect – Critical fields, Type I and Type II superconductors-Applications of super conductors.

UNIT - V

Dielectric Properties:

Electric dipole, Dipole moment, Dielectric constant – Parallel plate Capacitor, Electronic, Ionic and Orientation Polarization – Calculation of Polarizibilities – Internal fields – Claussius – Mossotti equation – Basic concepts of Piezo, Pyro and Ferro electricity.

TEXT BOOKS:

(1) Modern Engineering Physics by, Dr.K. Vijay Kumar & Dr.S.Chandralingam:S .Chand.Co

(2) Eengineering Physics by P K Palanisamy :Scietech publication
(3) Solid State Physics by M Armugam; Anuradha Publications

REFERENCE BOOKS:

(1) Introduction to Solid State Physics by Charles Kittel : John Wiley & Sons
(2) Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
(3) Engineering Physics by V Rajendran; McGraw hill education private ltd.
(4) A Text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar; S Chand
(5) Engineering Physics by K Malik, A K Singh; Tata Mc Graw hill book publishers
(6) Engineering Physics by M.R.Srinivasan, New Age Publishers

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I Year B.Tech. ECE – I Sem	L	T/P/D	C
	3	1/-/-	3

(A51008)ELECTRICAL CIRCUITS

Course Objective:

This course introduces the basic concept of circuit analysis which is the fundamental for all subjects of the Electrical engineering discipline. The emphasis of this course if laid on the basic analysis of circuit which includes single phase circuits, magnetic circuits and theorems

UNIT-I: Introduction to Electrical Circuits:

Circuit concept, R-L-C parameters, voltage and current sources, dependent and independent sources, source transformations, relationship for passive elements for different input signals (square, ramp, saw- tooth, triangular).

KCL, KVL, network reduction technique, series, parallel, series-parallel, Star-Delta, Delta-Star transformations. Nodal analysis, Mesh analysis - super node and super mesh for DC excitations.

UNIT-II: Magnetic circuits:

Magnetic circuits, Faraday's laws of electro magnetic induction - concept of self and mutual inductance. Dot convention, coefficient of coupling, composite magnetic circuits, analysis of series and parallel magnetic circuits.

UNIT-III: Single Phase AC Circuits:

R.M.S, average values and form factor for different periodic wave forms – steady state analysis of R,L,C (in different combination) with sinusoidal excitation - concept of reactance, impedance, susceptance and admittance. Phase and phase difference, concept of power factor, real and reactive power, J – notation , complex and polar forms of representation, complex power.

UNIT-IV: Locus diagram and Resonance:

Locus diagram: Series R-L, R-C, R-L-C and parallel combination with variation of various parameters. **Resonance**: Series, parallel circuits, concept of bandwidth and Q-factor.

UNIT –V: Network Theorems(with A.C and D.C Excitations): Super position, Norton's, Reciprocity, Thevenin's, Maximum power transfer, Milliman's, and compensation theorems. Problems on all above theorems.

Course Outcomes:

1. To develop a basic concepts of electrical components, energy sources, their various types of connections and solutions of D.C circuits.
2. To develop a basic concepts of magnetic circuits, Faraday's Laws and analysis of series and parallel magnetic circuits.
3. To develop a basic concept of different periodic wave forms, complex power, J-notation.
4. To develop a 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.
5. To develop a solutions of various complex circuit connections by using different theorems of D.C & A.C excitations.

TEXT BOOKS:

1. Engineering circuits analysis by William Hayt and Jack E. Kemmerly, McGraw Hill company, 6th edition.
2. Network Analysis by A. sudhakar and Shyammohan S Palli, Tata McGraw-Hill.
3. Electrical circuits by A. Chakrabarthy, Dhanpat Rai & Sons.

REFERENCE BOOKS:

1. Network Analysis by M.E Van Valkenberg.
2. Linear circuits analysis(time domain, phasor and laplace transform approaches) Second edition by Raymond A. Decarlo and Penmin-Lin, Oxford University Press. Second edition, 2004.
3. Electrical circuits theory by K. Rajeswaran, Pearson Education, 2004.
4. Basic circuits analysis by D.R.Cunningham & J.A. Stuller, Jaico publications.

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I Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(A51005)COMPUTER PROGRAMMING - I

Course Objectives:

1. To explain representation of numbers, alphabets and other characters in computer system
2. To understand the basic concepts in C Programming Language
3. To explain software development tools like algorithm, pseudo codes and programming structure.
4. To explain selection and repetition statements in 'C' Language
5. To explain arrays to solve problems
6. To explain strings and string operations
7. To learn how to write modular programming in 'C' Language.

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, operating system functions, language processor concepts.

Overview of C Language : Program structure and simple programs using scanf and printf functions.

Data representations- Binary, octal, hexa number systems, ASCII and EBCDIC, data types, Identifiers, Variables, Constants, declarations.

UNIT - II

Operators, Expressions, Precedence and Associativity, evaluation of expressions, sample programs using expressions, Type conversions, unformatted I/O.

Algorithms- control structure – grouping, selectors, repetitions.

Step wise refinement, flowchart.

UNIT - III

Statements- Selection Statements – if and switch statements, algorithm and program example using selectors.Repetition statements (loops)-while, for, do-while statements, algorithm development using repetition and programs using repetition, break, continue, goto, exit, Simple C Program examples.

UNIT - IV

Arrays – Introduction, declaration, reading and printing arrays , programs using arrays, two – dimensional arrays,

Mmultidimensional arrays, C program examples.

Strings – Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, C program examples.

UNIT – V

Functions- procedural abstraction, function declarations, function calls and parameter passing, Standard functions, Storage classes- recursion- recursive functions, example C programs.

Course Outcomes: Upon completion of this course the students will have an:

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

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

2. Programming in C. P. Dey and M Ghosh , Oxford University Press.

REFERENCE BOOKS:

1. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.

2. C for All, S. Thamarai Selvi, R.Murugesan, Anuradha Publications.

3. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.

4. Programming in C, Ajay Mittal, Pearson.

5. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.

6. Problem solving with C, M.T.Somasekhara, PHI

7. Programming with C, R.S.Bickar, Universities Press.

8. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.

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I Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
	2	**-/0/-**	**2**

(A51009)ENGINEERING GRAPHICS

Course Objectives:

1. To visualize and communicate geometrical elements like Polygons,Curves,Conic Sections, Cycloids and Involutes
2. To understand the fundamentals of geometry like Orthographic Projections and its applications in design and manufacturing of various engineering components.
3. To understand the fundamentals of geometry like Principles involved in Planes and Solids and its applications in design and manufacturing of various engineering components.
4. To understand the fundamentals of geometry like Isometric Projections and its applications in design and manufacturing of various engineering components.
5. To understand the fundamentals of geometry like Conversion of Orthographic Views to Isometric Views and its applications in design and manufacturing of various engineering components.

UNIT – I

Introduction to Engineering Drawing: Drawing Instruments and their uses, types of lines, use of pencils, Lettering, Rules of dimensioning.
Construction of polygons: Inscription and superscription of polygons given the diameter of circle.
Curves used in Engineering Practice and their Constructions:
Conic Sections: Ellipse, Parabola, Hyperbola including the Rectangular Hyperbola - General method only.
Cycloidal curves - Cycloid, Epicycloid and Hypocycloid
Involutes

UNIT – II

Drawing of Projections or Views (Orthographic Projection in First Angle Projection Only): Principles of Orthographic Projections – Conventions – First and Third Angle Projections, Projection of Points, Projection of Lines - inclined to both planes, True lengths. (Mid points & Traces are eliminated).

UNIT – III

Projections of Planes: Projections of regular Planes – Inclined to both planes.

Projections of Solids: Projections of Regular Solids – Regular Polyhedra, solids of revolution, Axis inclined to both planes – Change of position.

UNIT –IV

Isometric Projections/views: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.

UNIT –V

Conversion of Orthographic Views to Isometric Views of simple objects.
Transformation of Projections: Conversion of isometric views to orthographic views of simple objects.

Course Outcomes:

1. To Know the importance of Engineering Graphics and to represent the various Polygons,Curves,Conic Sections, Cycloids and Involutes used in Engineering Graphics.
2. To Draw and understand the Principles involved in Orthographic Projections and to represent the Principles involved in Points, Lines and Traces.
3. To Draw and understand the construction Principles involved in Planes and Solids.
4. To Draw and understand the construction Principles involved in Isometric Projections.
5. To Draw and understand about Conversion of Orthographic Views to Isometric Views and also represent it's Transformation of Projections.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhatt / Charotar publishers
2. Engineering Drawing, K.L.Narayana and Kannaiah / Scietech publishers.

REFERENCES:

1. Engineering Drawing, K.Venugopal/G.Sreekanjana, New Age International Publishers.

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I Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**2**

(A51213)ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-I

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussion and public speaking

Learning Outcomes:

1. Better Understanding of nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking with clarity and confidence thereby enhancing employability skills of the students

Syllabus: English Language Communication Skills Lab shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English Language Communication Skills Lab:

Exercise-I

CALL Lab: Introduction to Phonetics
Speech Sounds
Vowels and Consonants

Exercise-II

ICS Lab: Ice-Breaking activity and JAM session
Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Exercise-III

CALL Lab: Structure of Syllables
Past Tense Marker and Plural Marker
Weak Forms and Strong Forms
Consonant Clusters.

Exercise-IV

ICS Lab: Situational Dialogues -Role-Play- Self-introduction and introducing others-Greetings-Apologies- Requests.

Exercise-V

ICS Lab: Social and Professional Etiquette and Telephone Etiquette-Tenses-Non-Verbal Communications.

Minimum Requirement of infra structural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

ii) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab :

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation
2. **Strengthen Your Steps -** Dr. M. Hari Prasad and others, Maruthi Publications
3. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.
4. Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
5. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP
6. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.
7. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP
8. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP
9. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi : Foundation
10. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan
11. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.
12. **English Pronouncing Dictionary** Daniel Jones Current Edition with CD.
13. **A textbook of English Phonetics for Indian Students** by T. Balasubramanian (Macmillan)
14. **Lab Manual:** A Manual entitled "**English Language Communication Skills (ELCS) Lab Manual- cum- Work Book**", published by Cengage Learning India Pvt. Ltd, New Delhi. 2013

ANURAG ENGINEERING COLLEGE, KODAD

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I Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**2**

(A51214)COMPUTER PROGRAMMING – I LAB

Course Objectives:

1. To make the student learn Linux commands
2. To make the student learn a programming language
3. To teach the student to write programs in C to solve the problems
4. To make the student to write the programs using control statements
5. To make the student to use arrays for solving the problems
6. To make the student to write modular programming

Week 1:

1. Familiarity with Linux Commands – Login, Wild Chars, ls, cp, mv, mkdir, wc, chdir.
2. Creation of text files using vi editor.

Week 2:

Using vi editor – perform operations of pattern search, insertion, deletion and substitution operations

Week 3:

Write simple programs using scanf and printf functions and familiarity with format strings.

Week 4 & 5:

Write programs to illustrate the Assignment Operators

Week 6:

Write programs to illustrate the Logical Operators

Week 7:

Write programs to illustrate the Relational Operators

Week 8:

Write programs using If Statement

Week 9:

Write programs using while, do-while loops

Week 10:

Write programs using for loop

Week 11:

Write programs to illustrate one dimensional arrays

Week 12:

Write programs to illustrate two dimensional arrays

Week 13:

Write programs to illustrate String concepts.

Week 14:

Write programs using functions

Week 15:

Review

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I Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**2**

(A51215)ENGINEERING PHYSICS LAB

1. Diffraction Grating with sodium vapor lamp
2. Single Slit with laser source
3. Newton's Rings
4. Energy gap of a semiconductor material
5. Torsional Pendulum Expt. to determine the rigidity modulus of material of a wire
6. Seebeck Effect
7. Decay of charge - R C circuit and time constant
8. L C R Series circuits
9. Dispersive Power of the material of a Prism using Spectrometer
10. Stewart & Gee's experiment
11. LED Characteristics
12. Numerical Aperture of an Optical Fibre & Bending losses of an Optical Fibre
13. Diffraction Grating with laser source

References:

1. Fundamentals of physics – D Halliday, R Resnick& John wiley.
2. Optics – A Ghatak Tata Mcgrawhill.
3. Practical Physics – G.L Squires.

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I Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**2**

(A51216)ENGINEERING WORKSHOP

Course Objectives:

1. To impart the knowledge regarding the various techniques, skills and tools necessary for engineering workshop practice.
2. To provide the students with hands on experience on different trades of engineering workshop like carpentry, tin-smithy, fitting, welding and house wiring.
3. To learn about the machines in view of constructions details, different operations to be performed on the machines and different tools.
4. To enhance the practical approach towards machine tools.
5. To introduce the concepts of power tools in constructions , wood working, electrical engineering and mechanical engineering in manufacturing applications

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Fitting
3. Tin-smithy and development of jobs carried out and soldering.
4. House-wiring
5. Welding

2. TRADES FOR DEMONSTRATION&EXPOSURE:

1. Plumbing
2. Machine shop
3. Power tools in construction, wood working, electrical engineering and mechanical engineering.

Course Outcomes:

1. To make a lap joint.
2. To make a dovetail- joint.
3. To make a T-briddle joint.
4. To prepare a flat filing.

5. To prepare a step cutting.
6. To prepare a angular cutting.
7. To prepare a open scoop.
8. To prepare a rectangular tray.
9. To prepare a square tin.
10. To understand and to give the connections for one light point control by one single pole switch.
11. To understand and to give the connections for one light point control by two-two way switchs (parallel connections).
12. To understand and to give the connections for to-connect a electrical bell by using bell- push.
13. To understand and to give the connections for two light point controlled by one single pole switch.
14. To prepair a pipe joint,tap and pressing- connections by using pluming.
15. To apply different operations to be performed on the lathe machines.
16. To prepare a switch boards, wood drilling and threading different various sizes.

TEXT BOOKS:

1. Work shop manual - P.Kannaiah/K.L Narayana/scitech publishers.
2. Workshop manual by Venkat Reddy

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I Year B.Tech. ECE – II Sem	L	T/P/D	C
	3	1/-/-	3

(A52002)MATHEMATICS – II
(Mathematical Techniques)

Course Objectives:

1. To introduce some special functions like Gamma, Beta and learn how to evaluate definite integrals with the help of special functions.
2. Able to know the Laplace , Inverse Laplace transform and sol of ODE by using Laplace transforms
3. Evaluate the multiple integrals and analyze the DEL properties.
4. Apply the theorems by using line, surface and volume integrals
5. Determine the Fourier coefficients of a given function. Analyze the characteristics and properties of Fourier transforms

UNIT-I: Laplace transform and its applications to Ordinary differential equations

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

UNIT-II: Gamma and Beta Functions:

Gamma and Beta Functions-Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.

UNIT – III: Multiple Integrals

Multiple integrals - double and triple integrals – change of order of integration- change of variables. Gradient- Divergence- Curl and their related properties - Potential function - Laplacian and second order operators.

UNIT-IV: Vector Calculus

Line integral – work done —- Surface integrals - Flux of a vector valued function. Vector integrals theorems: Green's – Stoke's and Gauss's Divergence Theorems (Only Statements & their Verifications).

UNIT-V: Fourier Series

Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval – even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

Course Outcomes:

1. Apply Beta and Gamma functions to evaluate many integrals which cannot be expressed in terms of elementary functions.
2. Apply Laplace transform to solve differential equations which will be converted to algebraic
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
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
5. Develop Fourier series of periodic functions.

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Engineering Mathematics Vol - I, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Shahanaz Bathul (2007), Mathematical Methods, 3rd Edition, Hyderabad, Right Publishers.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Dass H.K. and Rajnish Verma Er (2007), Higher Engineering Mathematics, First Edition, New Delhi, S. Chand & Company Limited.
4. Integral Transforms by A.R.Vasista
5. Schaum's outline series on Vector Analysis; Linear Algebra.
6. Larry C. Andrews and Bhimsen K. Shivamoggi, Integral Transforms for Engineers, Prentice – Hall of India Private Limited, New DelMathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

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I Year B.Tech. ECE – II Sem	L	T/P/D	C
	3	-/-/-	3

(A52008)MATHEMATICS-III

(Numerical Techniques and Partial Differential Equations)

Course Objectives:

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

UNIT-I: Solution of Non- linear Equations and Linear System of Equations.

Solution of Algebraic and Transcendental Equations – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

Solving system of non-homogeneous equations by L-U Decomposition method(Crout's Method)Jacobi's and Gauss-Seidel Iteration method,

UNIT-II: Interpolation:

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols- Difference Equations - Differences of a polynomial-Newton's formulae for interpolation – Central difference interpolation Formulae – Gauss Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange's Interpolation formula.

UNIT-III: Numerical Differentiation, Numerical Integration & Curve fitting

Numerical Diferentiation, Generalized Quadrature (Newton's Cote's formula), Trapezoidal, Simson's and Weddle's rules and problems. Curve fitting: Fitting a straight line – Second degree curve – exponentional curve-power curve by method of least squares.

UNIT – IV: Numerical solution of IVP's in ODE

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods –Predictor-Corrector Methods-Adams-Bashforth Method-Milne Thamson Method.

UNIT-V: Partial differential equations

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (Standard type) equations, Charpits Method, Method of separation of Variables for second order equations. Classification of general second order partial differential equations. Applications of Partial Differential Equations-One dimensional wave equation, Heat equation.

Course Outcomes:

1. Determination of roots of an equations 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.
2. Solutions of linear system of equations can be found by numerical methods known as direct and indirect methods such as Gauss elimination and its modifications ,Jacobi's and Gauss -seidal iterative methods, made the difference between of those methods.
3. Interpolate the values using the techniques of Newton's forward and backward, Gauss forward and backward, Lagrange's interpolation, and spline'sinterpolation..
4. Analyze and calculate numerical differentiation and numerical integrations methods.
5. Calculate solutions of ODE using Taylor's, Euler's, picard's, Runge-Kutta, Predictor and corrector methods.
6. Calculate boundary value problems
7. Calculate Solutions of partial differential equation

TEXT BOOKS:

1. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
2. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
3. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley.

REFERENCE BOOKS:

1. Shahanaz Bathul (2007), Mathematical Methods, 3rd Edition, Hyderabad, Right Publishers.
2. Jain R. K., and Iyengar S. R. K (2008), Advanced Engineering Mathematics, 3rd Edition, New Delhi, Narosa Publication House.
3. Introductory Methods of Numerical Analysis. S.S. Sastry, Prentice Hall.
4. Numerical Analysis (Paper IV), First Edition 2010, Telugu Akademi, Hyderabad.
5. Schaum's outline series on Matrices.
6. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

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I Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
	2	**1/-/-**	**2**

(A52001)ENGLISH-II

1. INTRODUCTION:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competencies of Engineering students. The prescribed books and the exercises are meant to serve broadly as students' handbooks.

In the English classes, the focus should be on the skills of reading, writing, listening and speaking and for this the teachers should use the text prescribed for detailed study. For example, the students should be encouraged to read the texts/selected paragraphs silently. The teachers can ask comprehension questions to stimulate discussion and based on the discussions students can be made to write short paragraphs/essays etc. The text for non-detailed study is for extensive reading/reading for pleasure. Hence, it is suggested that they read it on their own the topics selected for discussion in the class. The time should be utilized for working out the exercises given after each section, as also for supplementing the exercises with authentic materials of a similar kind for example, from newspaper articles, advertisements, promotional material etc.. *However, the stress in this syllabus is on skill development, fostering ideas and practice of language skills.*

2. OBJECTIVES:

a. To improve the language proficiency of the students in English with emphasis on LSRW skills.

b. To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.

c. To develop the study skills and communication skills in formal and informal situations.

LEARNING OUTCOMES:

1. Usage of English Language, written and spoken.

2. Enrichment of comprehension and fluency

3. Gaining confidence in using language in verbal situations.

SYLLABUS:

Listening Skills:

Objectives

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW Skills approach to language and improve their pronunciation

2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language to be able to recognise them, to distinguish between them to mark stress and recognise and use the right intonation in sentences.

• Listening for general content

• Listening to fill up information

• Intensive listening

• Listening for specific information

Speaking Skills:

Objectives

1. To make students aware of the role of speaking in English and its contribution to their success.

2. To enable students to express themselves fluently and appropriately in social and professional contexts.

• Oral practice

• Describing objects/situations/people

• Role play – Individual/Group activities (Using exercises from the five units of the prescribed text: ***Skills Annexe - Functional English for Success)***

• Just A Minute(JAM) Sessions.

Reading Skills:

Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.

2. To develop the ability of students to guess the meanings of words from context and grasp the overall message of the text, draw inferences etc.

- Skimming the text
- Understanding the gist of an argument
- Identifying the topic sentence
- Inferring lexical and contextual meaning
- Understanding discourse features
- Scanning
- Recognizing coherence/sequencing of sentences

NOTE : *The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.*

Writing Skills :

Objectives

1. To develop an awareness in the students about writing as an exact and formal skill

2. To equip them with the components of different forms of writing, beginning with the lower order ones.

- Writing sentences
- Use of appropriate vocabulary
- Paragraph writing
- Coherence and cohesiveness
- Narration / description
- Note Making

• Formal and informal letter writing

• Describing graphs using expressions of comparison

TEXTBOOKS PRESCRIBED:

For Detailed study:

First Textbook: ***"Skills Annexe -Functional English for Success***", Published by Orient Black Swan, Hyderabad

For Non-detailed study:

Second text book ***"Epitome of Wisdom",*** Published by Maruthi Publications, Guntur

UNIT-I

Chapter 1:**'Leela's Friend'** by R.K. Narayan from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad 2 hrs

G – Present Tense 2

V – Synonyms and Antonyms 2

UNIT-II

Chapter 2: **'Human Values and Professional Ethics'** from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad 2 hrs

L -Listening for specific details and information 1

S- Narrating, expressing opinions and telephone interactions 1

R -Reading for specific details and information 1

W- Writing formal letters and CVs 1

UNIT-III

Chapter 3: **'The Convocation Speech'** by N.R. Narayanmurthy' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad 2 hrs

G- Past and future tenses 2

V- Vocabulary - idioms and Phrasal verbs 2

UNIT-IV

Chapter 4: **'Sports and Health'** from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad 2 hrs

L- Critical Listening and Listening for speaker's tone/ attitude 1

S- Group discussion and Making presentations 1

R- Critical reading, reading for reference 1

W-Project proposals; Technical reports, Project Reports and Research Papers 1

UNIT-V

Chapter5: '**The Secret of Work'** from "Epitome of Wisdom", Published by Maruthi Publications Hyderabad. 2 hrs

G- Adjectives, Prepositions and Concord 2

V- Collocations and Technical Vocabulary 2

REFERENCES:

1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi.2010.
2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
3. English Grammar Practice, Raj N Bakshi, Orient Longman.
4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao**,** P Sreehari, Published by Pearson
6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw – Hill.
7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
8. Technical Communication, Meenakshi Raman, Oxford University Press
9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
12. Everyday Dialogues in English, Robert J. Dixson, Prentice Hall India Pvt Ltd.,
13. ABC of Common Errors Nigel D Turton, Mac Millan Publishers.
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. Effective Technical Communication, M Ashraf Rizvi, Tata Mc Graw –Hill.
16. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO
17. A Communicative Grammar of English, Geoffrey Leech, Jan Svartvik, Pearson Education
18. Enrich your English, Thakur K B P Sinha, Vijay Nicole Imprints Pvt Ltd.,
19. A Grammar Book for You And I, C. Edward Good, MacMillan Publishers

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I Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
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(A52003)ENGINEERING PHYSICS – II

Course Objectives:

1. To impart the knowledge of mathematics and science to determine the working of semiconductor devices .
2. Emphasize the study of Quantum mechanics to apply it to solve problems of micro & macro particles.
3. To have the knowledge of laser technology to know about the working & applications of laser.
4. To inculcate the importance of nanotechnology which has the world wide importance.

UNIT- I Principles Of Quantum Mechanics: 08

Waves and particles – De Broglie hypothesis - Matter waves - Davisson and Germer experiment – Schrodinger Wave Equation – Wave function and its Physical Significance - Particle in one dimensional potential box(wave functions, probability densities and energy states).

UNIT- II Free Electron Theory Of Metals: 06

Classical Theory, Electrical Conductivity and Ohm's Law – Drawbacks, Sommerfield theory (Qualitative), Density of States, Effect of temperature on the Fermi-Dirac distribution.

Band Theory Of Solids: 06 Electron in a periodic potential – Bloch Theorem - Kronig-Penney model (Qualitative) – Origin of energy band formation in solids – Classification of materials into conductors, semiconductors & Insulators - Concept of effective mass of an electron.

UNIT- III Semiconductor Physics: 08

Fermi level in Intrinsic and Extrinsic semiconductors - Intrinsic semiconductor and carrier concentration – Extrinsic semiconductor and carrier concentration – Characteristics of p-n junction diode - Hall effect, LED, Photodiode.

Fibre Optics 04

Basic principle of optical fibre, Acceptance angle, Acceptance cone, numerical aperture (Quantitative), Types of optical fibre, applications of optical fibre.

UNIT IV Lasers: 06

Characteristics of Lasers – Spontaneous and Stimulated Emission of radiation, meta stable state, population inversion, lasing action, Einstein's coefficients and relation between them — Ruby Laser – Helium-Neon Laser –Semiconductor Laser – Applications of lasers.

UNIT V Basic Principles Of Nano Science: 07

Introduction, surface to volume ratio, quantum confinement – Fabrication of nano materials- Top down fabrication, Bottom up fabrication: sol-gel Technique, CVD method– Characterization (XRD & TEM) - Applications of nano materials.

Course Outcomes:

1. Having the knowledge of semiconductors & fiber optics, there will be a chance to know their applications.
2. There will be a chance for them to use the subject as a mathematical tool to solve their real life problems.
3. The students will be able to know the working of different lasers & their real life applications.

TEXT BOOKS:

1. Engineering Physics by P K palanisamy :Scietech publication
2. Solid State Physics by M Armugam; Anuradha Publications

REFERENCE BOOKS:

1. Introduction to Solid State Physics by Charles Kittel : John Wiley & Sons
2. Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
3. Engineering Physics by V Rajendran; McGraw hill education private ltd.
4. A Text book of Engineering Physics by M N Avadhanulu, P G Kshirsagar; S Chand
5. Engineering Physics by K Malik, A K Singh; Tata Mc Graw hill book publishers
6. Engineering Physics by M.R.Srinivasan, New Age Publishers

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I Year B.Tech. ECE – II Sem	L	T/P/D	C
	3	1/-/-	3

(A52009)ENGINEERING CHEMISTRY

Course objectives:

1. To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics.
2. To enable students to apply the knowledge acquired in improving the properties of engineering materials.
3. To provide the students with the necessary knowledge to solve the problems and make decisions with regards to the application of materials in a variety of engineering disciplines.
4. To equip the students with the required fundamentals of engineering chemistry carry out in the interdisciplinary research such that the findings benefit the common man.
5. After the completion of the course, the student would understand about the important chemistry of water, corrosion and its control, polymer chemistry, electrochemistry (including batteries) and advanced engineering materials.

UNIT I: Water:

Hardness of water, expression of hardness ($CaCO_3$ equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler troubles: priming and foaming, boiler corrosion, scales, sludges and caustic embrittlement. Boiler feed water and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (zeolite process and ion –exchange process) , Numerical problems on softening of water.

UNIT II: Electrochemistry : Conductance and its types . Electrode, electrode potential, galvanic cell , cell reactions and cell notation, cell EMF , types of electrodes (Normal Hydrogen Electrode , calomel electrode, glass electrode and quinhydrone electrode) , Nernst equation Numerical problems. Potentiometric titrations. Concentration cells, classification with examples.

Batteries: Introduction to cell and battery, characteristics of a cell. Primary (dry cell and lithium cell) and secondary cells, (lead-Acid cell, Ni-Cd cell and Lithium ion cells,). Solar battery, engineering applications of batteries. Fuel cells – Hydrogen – Oxygen fuel cell, advantages and engineering applications of fuel cells.

UNIT III: Corrosion and Its Control Introduction, types of corrosion : chemical and electrochemical corrosion, mechanism of chemical and electrochemical corrosion , galvanic , water line and pitting corrosion, factors affecting the rate of corrosion : nature of the metal , galvanic

series, purity of metal, nature of corrosion product , nature of environment : effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protective coatings : metallic coatings (anodic and cathodic), methods of application on metals , hot dipping (galvanizing), cladding, cementation, electroplating(of copper) electroless plating (of nickel) . Organic coatings – paints, its constituents and their functions.

UNIT IV: Polymer Chemistry : Introduction, classification of polymers, types of polymerization (addition and condensation, *mechanisms not included*). Plastics- types of plastics -thermoplastics and thermosetting plastics. Compounding and moulding of plastics. Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and Terelene (Dacron). Elastomers: natural rubber, structure, vulcanization. Synthetic rubbers: Buna-S, butyl rubber, Thikol rubber. Conducting polymers: classification, mechanism of conduction, Poly acetylene - preparation and effects of doping on conduction. Applications of conducting polymers.

UNIT V: Advanced Engineering Materials: Biodegradable polymers, types, examples: Polyhydroxy butyrate (PHB) ,Poly-Hydroxybutyrate-co-b-Hydroxy valerate (PHBV) ,Polyglycolic acid (PGA) , Polylactic acid (PLA) ,Poly (Î-caprolactone) (PCL). Applications of biodegradable polymers.
Composite materials: Constituents of composite materials. Types of composite materials. Advantages and engineering applications of composite materials.
Nano materials: Introduction, basic methods of preparation and applications of nano meterials.

Insulators- Classification, characteristics of thermal & electrical insulators and applications.

Biofuels – biodiesel, general methods of preparation and advantages

Course Outcomes:

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

Text Books:

1. Engineering Chemistry by NYS.Murthy, Pearson, India.

2. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpat Rai Publishing Company

Reference Books:

1. 1.Text Book of Engineering Chemistry by Shasi Chawla, Dhantpat Rai publishing Company,
2. Engineering Chemistry by C.Daniel Yesudian , Anuradha publications

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I Year B.Tech. ECE – II Sem	L	T/P/D	C
	3	-/-/-	3

(A52010)ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

1. To provide clear explanation about the operation of basic semiconductor devices available today.
2. To show how each device and its characteristics is used in appropriate circuits
3. Demonstration of Amplifier Design with different gain & Oscillator circuits with different frequency operation.

UNIT I – P-N Junction Diode and Rectifiers:

Quantative theory of P-N Junction, P-N Junction as Diode, Diode Equation, Volt-Ampere Characteristics, Temperature Dependence of VI Characteristic, Transition and Diffusion Capacitances, Diode Equivalent Circuits, Breakdown Mechanisms in Semi Conductor Diodes, Zener Diode Characteristics, Principle of Operation and Characteristics of Tunnel Diode, Schottky Barrier Diode.

The P-N Junction as a Rectifier, Half wave Rectifier, Full wave Rectifier, Bridge Rectifier, Harmonic Components in a Rectifier Circuit, Inductor Filters, Capacitor Filters, L-Section Filters, Π-Section Filters, Comparison of Filters, Voltage Regulation Using Zener Diode, SCR.

UNIT II - Bipolar Junction Transistor and Field Effect Transistor:

The Junction Transistor, Transistor Current Components, Transistor Construction, BJT Operation, BJT Symbol, Transistor as an Amplifier, Common Base, Common Emitter and Common Collector Configurations, Limits of Operation, BJT Specifications.

The Junction Field Effect Transistor (Construction, Principle of Operation, Symbol), Pinch –Off Voltage –Volt –Ampere Characteristics, The JFET Small Signal Model, MOSFET (Construction, Principle of Operation, Symbol) MOSFET Characteristics In Enhancement and Depletion Modes.

UNIT III - Transistor Biasing and Stabilization:

Operating Point, The DC and AC Load Lines, Need For Biasing, Fixed Bias, Collector Feedback Bias, Emitter Feedback Bias, Collector Emitter Feedback Bias, Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization Against Variation In V_{BE} and β, Bias Compensation Using Diodes and Transistors. Thermal Runway, Thermal Stability, Biasing FET.

UNIT IV - BJT AND FET Amplifiers:

BJT Hybrid Model, Determination of h-Parameters From Transistor Characteristics, Analysis of A Transistor Amplifier Circuit Using h-Parameters, Comparison of CB, CE And CC Amplifier Configurations.FET Common Source Amplifier, Common Drain Amplifier, Generalized FET Amplifier, FET, As Voltage Variable Resistor, Comparison of BJT And FET, The Uni Junction Transistor

UNIT – V: Feed Back Amplifiers And Oscillators:

Concepts of feedback. Claffication of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, Simple problems.

OSCILLATORS: Condition for oscillations. RC and LC type oscillators, Crystal oscillators, Frequency and amplitude stability of oscillators, Generalized analysis of LC oscillators, Quartz (Hartley, Colpitts), RC-phase shift and Wien-bridge oscillators.

Course Outcomes:

1. Concepts of physical electronics particularly solid state devices and its conductivity.
2. Operation of PN-junction diode, zener diode and other diodes and interpret its characteristics.
3. Construction of different rectifier circuits with and without filters.
4. Ability to draw characteristics of a transistor in various configurations and interpret its usages in different regions.
5. The concepts of the load line or bias-curve which are used to establish the quiescent operating conditions in a different amplifier circuits.
6. Design specifications and circuit construction for Amplifiers & Oscillators.

TEXT BOOKS:

1. Millman's Electronic Devices and Circuits – J. Millman, C.C.Halkias, and Satyabrata Jit Tata McGraw Hill, 2nd Ed., 2007.
2. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall,9th Edition,2006.
3. Introduction to Electronic Devices and Circuits- Rober T. Paynter PE.
4. Electronics Devices and Circuits – A. P. Godse Technical Publications.

REFERENCE BOOKS:

1. Electronic Devices and Circuits – T.F. Bogart Jr., J.S.Beasley and G.Rico, Pearson Education, 6th edition, 2004.
2. Principles of Electronic Circuits – S.G.Burns and P.R.Bond, Galgotia Publications, 2nd Edn.., 1998.
3. Microelectronics – Millman and Grabel, Tata McGraw Hill, 1988.
4. Electronic Devices and Circuits – Dr. K. Lal Kishore, B.S.

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(A52213)ENGLISH LANGUAGE COMMUNICATION SKILLS LAB-II

The **Language Lab** focuses on the production and practice of sounds of language and familiarises the students with the use of English in everyday situations and contexts.

Objectives

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitise the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussion and public speaking

Learning Outcomes:

1. Better Understanding of nuances of language through audio- visual experience and group activities
2. Neutralization of accent for intelligibility
3. Speaking with clarity and confidence thereby enhancing employability skills of the students

Syllabus: English Language Communication Skills Lab shall have two parts:

1. **Computer Assisted Language Learning (CALL) Lab**
2. **Interactive Communication Skills (ICS) Lab**

The following course content is prescribed for the English Language Communication Skills Lab

Exercise-I

CALL Lab: Minimal Pairs
Word accent and Stress Shifts
Listening Comprehension

Exercise-II

ICS Lab: Descriptions- Narrations- Giving Directions and Guidelines

Question Tags and One-Word Substitutes

Concord (Subject in agreement with verb) and Words often misspelt- confused/misused

Exercise-III

CALL Lab: Intonation and Common Errors in Pronunciation.-Neutralization of Mother Tongue Influence and Conversation Practice.

Exercise-IV

ICS Lab: Extempore - Oral Presentation Skills

Active and Passive Voice,

Common Errors in English,

Idioms and Phrases

Exercise-V

ICS Lab: Information Transfer

Public Speaking

Reading Comprehension

Job Application with Resume preparation.

Minimum Requirement of infra structural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

System Requirement (Hardware component):

(computers with suitable configuration as per the purchased software demands)

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

ii) Headphones of High quality

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

1. Suresh Kumar, E. & Sreehari, P. 2009. A Handbook for English Language Laboratories. New Delhi: Foundation

2. Strengthen Your Steps - Dr. M. Hari Prasad and others, Maruthi Publications

3. Speaking English Effectively 2nd Edition by Krishna Mohan and N. P. Singh, 2011. Macmillan Publishers India Ltd. Delhi.

4. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill

5. Hancock, M. 2009. English Pronunciation in Use. Intermediate. Cambridge: CUP

6. Spoken English: A Manual of Speech and Phonetics by R. K. Bansal & J. B. Harrison. 2013. Orient Blackswan. Hyderabad.

7. Hewings, M. 2009. English Pronunciation in Use. Advanced. Cambridge: CUP

8. Marks, J. 2009. English Pronunciation in Use. Elementary. Cambridge: CUP

9. Nambiar, K.C. 2011. Speaking Accurately. A Course in International Communication. New Delhi: Foundation

10. Soundararaj, Francis. 2012. Basics of Communication in English. New Delhi: Macmillan

11. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.

12. A textbook of English Phonetics for Indian Students by T. Balasubramanian (Macmillan)

13. Lab Manual: A Manual entitled “English Language Communication Skills (ELCS) Lab Manual-cum- Work Book”, published by Cengage Learning India Pvt. Ltd, New Delhi. 2013.

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(A52214)ELECTRONIC DEVICES AND CIRCUITS LAB

PART A: (Only for Viva-voce Examination)

ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):

1. Identification, Specifications, Testing of R, L, C, Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's

2. Identification, Specification and Testing of Active Devices, Diodes, BJT's LOW power JFET's, MOSFET's, Power Transistors, LED's, SCR, UJT.

3. Study and operation of

- Multi-meters (Analog and Digital**)**
- Regulated Power Supplies
- Function Generator
- CRO

PART B (For Laboratory Examination – Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Diode.

2. Zener diode characteristics and Zener as voltage Regulator.

3. Half Wave Rectifier with & without filters.

4. Full Wave Rectifier with & without filters

5. Input &output characteristics of Transistor in CB Configuration.

6. Input &output Characteristics of Transistor in CE Configuration.

7. FET characteristics.

8. Measurement of h- parameters of transistor in CB, CE, CC configurations

9. Frequency Response of CC Amplifier.

10. Frequency Response of CE Amplifier.

11. Frequency Response of FET Amplifier (Common source).

12. SCR Characteristics

13. UJT Characteristics.

PART C: Equipment required for laboratories:

1. Regulated power supplies (RPS)
2. CRO's : 0-20MHZ
3. Function Generator : 0-1 MHZ
4. Multimeters
5. Decade Resistance Boxes / Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) : 0-20μA, 0-50μA, 0-100μA, 0-200μA,0-10 mA
8. Voltmeters (Analog or Digital) : 0-50V,0-100V, 0-250V
9. Electronic Components : Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, diodes Ge & Si type, Transistors NPN, PNP type

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I Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
	0	**-/3/-**	**2**

(A52215)ENGINEERING CHEMISTRY LAB

Course objectives:

1 To impart fundamental knowledge in handling the equipment /glassware and chemicals in the chemistry laboratory.

2. To offer hands on experience on the basic equipment related to engineering chemistry.

3. For practical understanding of theoretical concepts of chemistry

(Any ten experiments out of the following fourteen experiments should be performed)

Titrimetry:

1. Fundamentals of volumetric analysis : (a) Determination of strength of an acid (HCl)
2. Estimation of ferrous iron by dichrometry
3. Estimation of hardness of water by EDTA method.
4. Determination of alkalinity of water.
5. Determination of free chlorine or chlorides in water.
6. Determination of iron by permanganometry.
7. Estimation of copper by colorimetric method.
8. Estimation of HCl by conductometry using standard NaOH solution.
9. Estimation of HCl by potentiometry using standard NaOH solution.
10. Determination of viscosity of sample oil by Redwood/Oswald's viscometer
11. Determination surface tension of lubricants.
12. Determination of the rate constant of acid catalyzed hydrolysis of methyl acetate .
13. Preparation of thiokol rubber and nylon 6,6.
14. Preparation of Biodiesel from Waste Vegetable Oil (WVO).

TEXT BOOKS:

1. Vogel's Textbook of Quantitative Chemical Analysis

2. Essentials of experimental engineering chemistry, Shashi Chawla, Dhanpat Rai & Co

3. Laboratory manual of engineering chemistry, S.K.Bhasin and Sudha Rani , Dhanpat Rai & Co.

4. A text book on experiments and calculations. S.S. Dara, S. Chand & Co

REFERENCE BOOKS:

1. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.

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(A52216)IT WORKSHOP

Objectives:

The IT Workshop for engineers is a training lab course spread over 40 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, and Power Point.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible.**

Internet & World Wide Web module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email.

Productivity tools module would enable the students in crafting professional word documents, excel spread sheets and power point presentations. (**Recommended to use Microsoft office 2007 in place of MS Office 2003)**

PC Hardware

Exercise 1 – Task 1: Identify the peripherals of a computer, components in a System Cabinet and its functions. Draw the block diagram of the compute mother board along with the configuration of each peripheral and submit to your instructor.

Exercise 2 – Task 2 : Every student should disassemble and **assemble the PC back to working condition.** Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Exercise 3 – Task 3 : Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Exercise 4 – Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Exercise 5 - Task 1 : **Orientation & Connectivity Boot Camp :** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Exercise 6 - Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

MS Word

Exercise 7&8: The mentor needs to give an overview of Microsoft (MS) word 2007: Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. Give a task covering to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Inserting table, using Drawing toolbar in word.

MS Excel

Exercise 9&10: The mentor needs to tell the importance of MS office 2007 Excel as a Spreadsheet tool covering Accessing, overview of toolbars, saving excel files, Using help and resources., Also give a task that is covering the features like Gridlines, Format Cells, Summation, auto fill, Formatting Text.

MS Power Point

Exercise 11&12: Students will be working on MS power point which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power point. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

REFERENCES:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech

2. The Complete Computer upgrade and repair book,3rd edition Cheryl A Schmidt, WILEY Dreamtech

3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

4. PC Hardware and A+Handbook – Kate J. Chase PHI (Microsoft)

5. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

6. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

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(A53016)ENVIRONMENTAL STUDIES

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance.

(a) Ecosystems: Concept of an ecosystem – Classification, structure and function of Forest, Pond, Grass Land ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Food chains, food webs and ecological pyramids- Ecological succession.

(b) Biodiversity and its conservation: Introduction - Definition: genetic, species and ecosystem diversity. - Bio-geographical classification of India - Value 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. ICUN 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 – Natural resources and associated problems
Forest resources – Use and over – exploitation, deforestation, – Timber extraction, mining, dams and other effects on forest and tribal people
Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems
Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
Role of an individual in conservation of natural resources: Equitable use of resources for sustainable lifestyles.

UNIT – III

(a) Environmental Pollution: Definition, Cause, effects and control measures of different kinds of pollution (Air, Water , Soil , Nuclear, e –Waste)

(b) Social Issues and the Environment: From Unsustainable to Sustainable development - Urban problems related to energy -Water conservation, rain water harvesting, and watershed management. -Climate change, global warming, ozone layer depletion, nuclear accidents and holocaust.

UNIT – IV

(a) Waste management technology: Solid waste Management: Causes, effects and control measures of Solid and Biomedical wastes. Disaster management: floods, earthquake, cyclone and landslides.

Waste water treatment technology: Sewage Water and Effluent Water- primary, secondary and tertiary treatments. Brief account on Bioremediation and Phyto- remediation, R.O technology. Application of GIS and GPS system in environment.

(b) Environmental policy, Rules and regulations. EIA (Environmental Impact Assessment) – Definition, Baseline Data acquisition, Impacts Assessment, EIS(Environment Impact Statement) & EMP (Environment Management Plan) – Environment Protection Act-1986, - Air (Prevention and Control of Pollution) Act- 1981, -Water (Prevention and control of Pollution) Act-1974, -Wildlife Protection Act-1974, –Forest Conservation Act.

UNIT – V

(a) **Towards sustainable future**: concept of sustainable development, threats of sustainability, population and its explosion, over exploitation of resources, strategies for achieving sustainable development. Environmental education, Conservation of resources. Urban sprawl, sustainable cities and sustainable communities, human health. Environmental ethics, concept of green building, Basic principles of Green engineering, clean development mechanism (CDM), Low carbon life cycle, Polluters-pay principle.

(b) **Field work:** Visit to a local area to document environmental assets River/forest grassland/hill/ mountain Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds, Visit to effluent treatment plant/sewage treatment plant Study of simple eco systems pond, river, hill slopes, etc.

Mini projects by students which is mandatory.

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,2005

REFERENCES:

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.

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(A53007)MATHEMATICS-IV

Course Objective:

This course aims the increasing importance of Mathematics IV in applied sciences have led to greater demand for courses which deal with the techniques of Complex analysis. The reason is that Mathematics IV can give solutions to applied problems when ordinary analytical methods fail.

UNIT-I: Fourier Transformations

Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms Fourier sine and cosine transforms – properties –inverse transforms – Convolution theorem – Finite Fourier transforms.

UNIT-II: Functions of a complex variable

Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method. Elementary functions: Exponential, trigonometric, hyperbolic functions and their properties – General power Z (c is complex), principal value.

UNIT-III: Complex Integration and Complex Power series

Line integral – evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula. Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point –Isolated singular point – pole of order m – essential singularity.

UNIT-IV: Contour Integration

Residue – Evaluation of residue by formula and by Laurent series - Residue theorem.
Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{C}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$

(c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$ (d) Integrals by indentation.

UNIT-V: Conformal mapping

Transformation by $e^Z, \ln Z, Z^2, Z^n$ (n positive integer), Sin z, Cos z, z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points .

Course Outcomes:

- To develop a working knowledge of complex variables
- To develop a working knowledge of Complex integration.
- To develop a working knowledge of Complex power series
- To develop a working knowledge of Contour Integration
- To develop a working knowledge of Conformal Mapping and
- To develop a working knowledge of Z Transforms

TEXT BOOKS:

1. A text Book of Engineering Mathematics, Vol-III T. K. V. Iyengar, B. Krishna Gandhi and Others, S. Chand & Company.
2. Grewal B.S (2007), Higher Engineering Mathematics, 40th Edition, New Delhi, Khanna Publishers.
3. Iyengar T.K.V., Krishna Gandhi B. & Others (2011), Mathematical Methods, 10th Revised Edition, New Delhi, S. Chand & Company Limited.
4. A text Book of Engineering Mathematics, C. Sankaraiah, V. G. S. Book Links.
5. A text Book of Engineering Mathematics, P. Nageshwara Rao, Y. Narasimhulu & N. Prabhakar Rao, Deepthi Publications.

REFERENCE BOOKS:

1. A text Book of Engineering Mathematics, B. V. Raman, Tata Mc Graw Hill.
2. Advanced Engineering Mathematics, Irvin Kreyszig, Wiley India Pvt. Ltd.
3. A text Book of Engineering Mathematics, Thamson Book Collection.
4. Shahanaz Bathul (2010), Engineering Mathematics - III, 2nd Edition, Hyderabad, PHI Learning Private Limited.
5. Schaum's outline series on Complex Anlysis.
6. Mathematical Methods of Science and Engineering (Aided with Matlab) Kanti B.Datta (2012), Seventh Edition, CENGAGE Learning.

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(A53008)SWITCHING THEORY AND LOGIC DESIGN

Course objectives:

- To learn basic technique for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.

UNIT-1: NUMBER SYSTEMS AND CODES

Review of number systems binary arithmetic, binary weighted and non-weighted codes. Error detecting and error correcting codes.

BOOLEAN ALGEBRA:

Postulates and theorems: representation of switching functions, SOP and POS forms Karnaugh Map representations, minimization using K Maps.

UNIT- II: DESIGN OF COMBINATIONAL CIRCUITS

Tabular minimization – design of single output and multi output functions design using conventional AND, OR, NOT, NAND, NOR & EX-OR gates. Design using MSI & LSI devices, digital multiplexer/selector, decoder, de-multiplexer, design of 4 bit adder, carry look-ahead adder, magnitude comparator, BCD converter. Logic implementations using ROM, PAL & PLA**.**

Unit-III: INTRODUCTION TO SEQUENTIAL CIRCUITS

Combinational versus sequential circuits, asynchronous versus synchronous circuits, state table and state diagram, state assignment, memory elements and their excitation functions, T flip flop, RS flip flop, JK flip flop and their excitation requirements. Design of synchronous sequential circuits like sequence detectors and binary counters.

UNIT-IV: CAPABILITIES AND MINIZATION OF SEQUENTIAL MACHINES

Melay and Moore machines, capabilities and limitations of finite state machine, state equivalence and machine minimization.

UNIT-V: ALGORITHIMIC STATE MACHINES

ASM chart, timing considerations, control implementation, design with multiplexers and PLA control. Introduction to unate functions and threshold logic.

Course Out comes:

- Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various course such as ASCII, gray and BCD.

- Be able to manipulate simple Boolean expressions using the theorem and postulate of Boolean algebra and to minimize combinational functions.

TEXT BOOKS:

1. Switching And Finite Automata Theory – By Zvi Kohavi, TMH Edition.
2. Digital Logic Computer Design – By M. Morris Mano, PHI.
3. Digital Logic Design Principles – By Norman Balbamian and Bradley, John Wiley

REFERENCES:

1. Introduction to Switching Theory and Logic Design- By F. J. Hill and Peterson, John Wiley Publications.
2. Digital Logic – Applications & Design – By- John M. Yarbrough, Vikas Publications, 1997.
3. Digital System Design – By R. P. Jain TMH.
4. Digital Systems Principles, Applications– By Ronald J. Tocci, Pearson Education/Phil

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II Year B.Tech. ECE– I Sem	**L**	**T/P/D**	**C**
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(A53019)ELECTRONIC CIRCUIT ANALYSIS

Course objective:

- To familiarize the student with the analysis and design of basis transistor amplifier circuits
- To analysis the frequency response characteristics transistor amplifier circuits, feedback amplifiers, oscillators, large signal amplifier and turned amplifiers.

Unit-I: **Single Stage Amplifiers:**

Classification Of Amplifiers, Distortion In Amplifiers, Analysis Of CB, CE And CC Configurations Using Simplified (Approximate) Hybrid Model, Millers Theorem And Its Dual, Analysis Of CE Amplifier With Emitter Resistor, Design Of Single Stage RC Coupled Amplifier Using BJT.

Unit-II: **BJT Amplifiers - Frequency Response:**

Logarithms, Decibels, General Frequency Considerations- Frequency Response Of BJT Amplifiers, Analysis At Low And High Frequencies, Effect Of Coupling and Bypass Capacitors, Hybrid Pi Model For CE Transistor, CE Short Circuit Current Gain, Current Gain With Resistive Load, Single Stage CE Transistor Amplifier Response, Alpha, Beta Cut-Off Frequencies, Gain Bandwidth Product , Emitter Follower At High Frequencies

Unit-III: **Multi Stage Amplifiers:**

Analysis Of Cascaded RC Coupled BJT Amplifiers, Cascade Amplifiers, Darlington Pair, Different Coupling Schemes Used In Amplifiers- RC Coupled Amplifiers, Transformer Coupled Amplifiers And Direct Coupled Amplifiers.

Unit – IV: Large Signal Amplifiers:

Classification, Class A Large Signal Amplifiers, Transformer Coupled Class A Audio Power Amplifiers, Efficiency of Class A Amplifier, Class B Amplifier, Efficiency of Class B Amplifier, Class B Push-Pull Amplifier, Complementary Symmetry Class B Push-Pull Amplifier, Distortion In Power Amplifiers, Thermal Stability And Heat Sinks.

Unit –V: Tuned Amplifiers:

Introduction- Factor, Small Signal Tuned Amplifiers, Effect Of Cascading Single Tuned & Double Tuned Amplifier on Bandwidth, Stagger Tuned Amplifiers, Stability Of Tuned Amplifiers

Out comes:

- Design and analysis the Dc bias circuitry of BJT and FET.
- Analyze the different types of amplifiers, operation and its characteristics.
- Design circuits like amplifiers, oscillators using the transistors diodes and oscillators.

TEXT BOOKS:

1. Integrated Electronic- Jacob Milliman &Christor C Halkias, 1991 Ed.,2008, Tmh
2. Electronic Devices And Circuits - -S.Salivahana, N. Suresh Kumar, A Vallavaraj, 2ed.,
3. Design of Analog CMOS Integrated Circuits – Behzad Razavi, 2008, Tmh.

REFERENCES:

1. Introductory Electronic Devices and Circuits- Robert T. Paynter, 7ed. 2009, Pel.
2. Electronic Circuit Analysis- K.Lal Kishore, 2004, Bsp.
3. Electronic Devices & Circuit –David A Bell-5ed, Oxford University Press.

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II Year B.Tech, ECE-I SEM	**L**	**T/P/D**	**C**
	3	**1/ - /-**	**3**

(A5320)PROBABILITY THEORY AND STOCHASTIC PROCESS

Course objective:

- To provide mathematical background and sufficient experience that the student can read, write, and understand sentences in language of probability theory, as well as solve probabilistic problems in signal processing and communication engg.
- To introduce students to the basic methodology of probability thinking and to apply it to problems
- To understand difference between time averages and static averages
- Analysis of random process and application to the signal process in the communication system

UNIT- I: Probability

Probability Introduced through Sets and Relative Frequency, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bays' Theorem, Independent Events

UNIT II: Random Variable And Operations On One Random Variable Random Variable

Definition of a Random Variable, Types of Random Variables, Conditions for a Function to be a Random Variable, Distribution and Density functions, and their Properties- Binomial, Poisson, Uniform ,Gaussian, Conditional Distribution, Conditional Density, Properties.

Operation On One Random Variable : Introduction, Expected Value of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non monotonic Transformations of Continuous Random Variable, Transformation of a Discrete Random Variable.

UNIT III: Multiple Random Variables And Operations On Multiple Random variables

Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions and its Properties, Conditional Distribution and Density , Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

Operations On Multiple Random Variables:

Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV: Stochastic Processes- Temporal Characteristics

The Stochastic Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationary and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide-Sense Stationary, Nth Order and Strict-Sense Stationary, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance and Its Properties, Gaussian Random Processes, Poisson Random Process.

UNIT V: Random Processes – Spectral Characteristics

Power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Course Outcomes:

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 legendary polynomials

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles - Peyton Z. Peebles, TMH, 4th Edition, 2001.TMH.
2. Probability, Random Variables and Stochastic Processes – Athanasius Papoulis and S. Unnikrishna Pilli, PHI, 4th Edition, 2002.

REFERENCES:

1. Probability and random processes with stochastic processes- Mallikarjuna Reddy Cengae Learning
2. Probability and Random Processes with Application to Signal Processing – Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Probability Methods of Signal and System Analysis. George R. Cooper, Clave D. MC Gilliam, Oxford, 3rd Edition, 1999.
4. Statistical Theory of Communication - S.P. Eugene Xavier, New Age Publications, 2003.

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II Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
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(A53018)COMPUTER PROGRAMMING - II

Course Objectives:

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

UNIT - I

Searching and Sorting – Sorting- selection sort, bubble sort, Insertion sort, Quick Sort, Merge sort, Searching-linear and binary search methods.

UNIT - II

Structures - Declaration, initialization, accessing structures, operations on structures, nested structures, arrays of structures, Unions, Enumerated types, Type Definition (typedef), C programming examples.

UNIT - III

Pointers – Concepts, declarations, usage, pointers to pointers, pointer expressions, Arrays and Pointers, array of pointers, parameter passing of pointers, pointers to void, pointers to functions, structures through pointers, self referential structures, C programming examples

UNIT - IV

Lists- Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Push and Pop Operations, Queues- Enqueue and Dequeue operations.

UNIT - V

Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), file status functions (error handling),Positioning functions, command –line arguments, C program examples.

Course Out Comes:

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

TEXT BOOKS:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Programming in C. P. Dey and M Ghosh , Oxford University Press.

REFERENCE BOOKS:

1. C& Data structures – P. Padmanabham, Third Edition, B.S. Publications.
2. C for All, S. Thamarai Selvi, R.Murugesan, Anuradha Publications.
3. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, 7th Edition, Pearson education.
4. Programming in C, Ajay Mittal, Pearson.
5. Programming with C, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
6. Problem solving with C, M.T.Somasekhara, PHI
7. Programming with C, R.S.Bickar, Universities Press.
8. Computer Programming & Data Structures, E.Balagurusamy, 4th edition, TMH.

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II Year B.Tech, ECE-I SEM	**L**	**T/P/D**	**C**
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(A53211)ELECTRONIC CIRCUIT ANALYSIS LAB

List of Experiments (12 Experiments to be done):

I. Design and Simulation Laboratory using any Simulation Software. (Any 6 Experiments):

1. Common Emitter Amplifier.
2. Common Source Amplifier.
3. Two Stage RC Coupled Amplifiers.
4. Current shunt and Voltage Series Feedback Amplifier.
5. Cascade Amplifier.
6. Wien Bridge Oscillator using Transistors.
7. RC Phase Shift Oscillator using Transistors.
8. Class A Power Amplifier (transformer less).
9. Common Base (BJT) / Common Gate (JFET) Amplifier.

II. Testing in the Hardware Laboratory (6 Experiments)

A) Any Three circuits simulated in simulation laboratory

B) Any Three of the following

1. Class A Power Amplifier (with transformer load)
2. Class C Power Amplifier.
3. Single Tuned Voltage Amplifier.
4. Hartley & Colpitt's Oscillators.
5. Darlington Pair.
6. RC Phase Shift Oscillator using Transistors.
7. Class B Complementary Symmetry Amplifier.

Equipments required for Laboratories:

1. For software simulation of Electronic circuits.
   - i) Computer System with latest specifications.
   - ii) Connected in LAN (Optional)
   - iii) Operating system (Windows XP)
   - iv) Suitable Simulations of Electronic Circuits.

2. For Hardware simulations of Electronic Circuits
   - i) Regulated Power Supply (0-30V)
   - ii) CRO's
   - iii) Function Generators
   - iv) Multimeters
   - v) Components.

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II Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
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(A53210)COMPUTER PROGRAMMING II LAB

Course Objectives:

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

Week 1:

Review of Arrays and functions.

Week 2:

Write programs to illustrate the implementation of Bubble Sort and Selection Sort

Week 3:

Write programs to illustrate the implementation of Insertion Sort and Quick Sort

Week 4:

Write programs to illustrate the implementation of Merge Sort.

Week 5:

Write programs to illustrate the implementation of Binary Search and Linear Search.

Week 6 & 7:

Write programs to illustrate the various concepts of structures

Week 8:

Write programs to illustrate the concepts of accessing variables using pointers

Week 9:

Write programs to illustrate the implementation of call by reference

Week 10:

Write programs to illustrate the implementation of arrays using pointers

Week 11:

Write programs to implement structures using pointers

Week 12:

Write program to illustrate the implementation of Single Linked List

Week 13:

Write programs to illustrate Stack operations using arrays and pointers

Week 14:

Write programs to illustrate Queue operations using arrays and pointers

Week 15:

Write programs to illustrate the various concepts of files.

Week 16: Review

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II Year B.Tech. ECE – I Sem	**L**	**T/P/D**	**C**
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(A53212)GENDER SENSITIZATION

(An Activity-based Course)

Objectives of the Course:

- To develop students sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debate on the politics and economics of work.
- To help students reflects critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Unit-I:

UNDERSTANDING GENDER:

Gender: Why Should We Study It? ***(Towards a World of Equals: Unit-*****1*****)***

Socialization: Making Women, Making Men ***(Towards a World of Equals: Unit-*****12*****)***

Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Just Relationships: Being Together as Equals ***(Towards a World of Equals: Unit-*****12*****)***

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Further Reading: Rosa Parks-The Brave Heart.

Unit-II:

GENDER AND BIOLOGY:

Missing Women: Sex Selection and Its Consequences ***(Towards a World of Equals: Unit-4)***

Declining 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 Economy ***(Towards a World of Equals: Unit-7)***

Facts and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

Unit-IV:

ISSUES OF VIOLENCE:

Sexual Harassments: Say No! ***(Towards a World of Equals: Unit-6)***

Sexual Harassments, not Eve-teasing-Coping with Everyday Harassment-Further Reading:"Chupulu".

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.

Learning Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- 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.
- 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.
- Students will develop a sense of appreciation of women in all walks of life.
- 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.

Essential Reading: All the Units in the Textbook." ***Towards a World of Equals: A Bilingual Textbook on Gender"*** **written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.**

Note: Since it is Interdisciplinary Course, Resource Persons can be drawn from 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 Review of Books 37.20 (20 December 1990). Print. 'We Were Making History...' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.
2. Tripti Lahiri."By the Numbers: Where Indian Women Work," Women's Studies Journal (14 December 2012) Available online at: http:// blogs.wsj.com/ India real time/2012/11/14/by-the-numbers-where-Indan-women-work/>
3. K. Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada http://http://harpercollins.co.in/BookDetail.asp?Book Code=3732
4. Vimala. "Vantillu (The Kitchen)." Women Writting in India: 600 BC to the Present. Volume II: The 20th Centuary. Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press,1995. 599-601.
5. Shatrughna, Veena et al. Women's Work and its Impact on Child Health and Nutrition,Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
6. Stree Shakti Sanghatana. "*We Were Making History* ....'Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women,1989.
7. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
8. Jayaprabha, A. 'Chupulu (Stares)". *Women Writing in India:* 600BC to the Present. Volume II: The 20th Centuary Ed. Susie Tharu and K. Lalita. Delhi: Oxford University Press, 1995. 596-597.
9. Javeed, Shayan and Anupam Manuhaar. "Women and Wage Discrimination in India: A Critical Analysis." International Journal of Humanities and Social Science Invention 2.4(2013).
10. Gautam, Liela and Gita Ramaswamy."A 'conversation' between a Daughter and a Mother." Broadsheet on Contemporary Politics. Special Issue on Sexuality and Harassement: Gender Politics on Campus Today. Ed.Madhumeeta Sinha and Asma Rasheed. Hyderabad: Anveshi Research Center for Women's Studies, 2014.
11. Abdulali Sohaila. "I Fought For My Life... and Won."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
12. Jeganathan Pradeep, Partha Chatterjee (Ed). "Community, Gender and Violence Subaltern Studies XI". Permanant Black and Ravi Dayal Publishers, New Delhi,2000
13. K.Kapdia. The Violence of Development: The Politics of Identity, Gender and Social Ineualities in India. London: Zed Books, 2002
14. S. Benhabib. Situating the Self: Gender, Community, and Postmodernism in Contemporary Ethics, London: Routledge, 1992
15. Virginia 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

ANURAG ENGINEERING COLLEGE, KODAD

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II Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
	3	**-/-/-**	**3**

(A4008)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Objective: To explain the basic principles of managerial economics, accounting and current business environment underlying business decision making.

UNIT – I

Introduction to Managerial Economics: Definition, Nature and scope of Managerial Economics – Demand Analysis: Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, methods of demand forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT – II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of inputs, Laws of Returns, internal and External Economics of scale.

Cost Analysis: Cost concepts, Opportunity cost, Out of pocket costs vs. Imputed costs. Break

– Even Analysis (BEA) – Determination of Break – Even Point (simple problems) – Managerial Significance and limitations of BEA.

UNIT – III

Introduction to Markets & Pricing Policies:

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, Price – Output determination in case of Perfect Competition

Objectives and Policies of Pricing – Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two – Part Pricing, Block Pricing, Peak Load Pricing, Cross Subsidization.

UNIT – IV

Capital and Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Nature and scope of capital budgeting, features of capital budgeting proposals, Methods of capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method, Profitability Index, Internal rate of return (simple problems)

UNIT – V

Introduction to Financial Accounting: Double – Entry Book Keeping, Journal, Ledger, and Trial Balance – Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis through ratios: Computation, Analysis and interpretation of Liquidity Ratios (Current Ratio and quick ratio), Activity Ratios (inventory turnover ratio and Debtor Turnover ratio), Capital structure Ratios (Debt – Equity, interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Profit Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri, Managerial Economics and Financial Analysis, TMH, 2009.
2. Varshney & Maheshwari; Managerial Economics, Sultan Chand, 2009.

REFERENCES:

1. Raghunatha Reddy & Narasimhachary; Managerial Economics & Financial Analysis, Scitech, 2009.
2. V. Rajasekarn & R.Lalitha, Financial Accounting, Pearson Education, New Delhi, 2010.
3. Suma Damodaran, Managerial Economics, Oxford University Press, 2009.
4. Domnick Salvatore; Managerial Economics in a Global Economy, 4th Edition, Cengage, 2009.
5. Subhash Sharma & M.P.Vittal, Financial Accounting for Management, Text & Cases, Machmillan, 2008.
6. S.N. Maheshwari & S.K .Maheshwari, Financial Accounting, Vikas 2008.
7. Truet and Truet; Managerial Economics; Analysis, Problems and Cases, Wiley, 2009.
8. Dwivedi; Managerial Economics, Vikas 2009.
9. M. Kasi Reddy, S.Saraswathi; Managerial Economics and Financial Accounting, PHI, 2007.
10. Erich A. Helfert; Techniques of Financial Analysis, Jalco, 2007.

Codes / **Tables**: Present Value Tables need to be permitted into the examinations Hall.

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II Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
	3	**1/ -/-**	**3**

(A50017)PRINCIPLES OF ELECTRICAL ENGINEERING

Course Objective:

This course facilitates to study Basic Electrical Engineering and Electronics Engineering concepts. About DC and AC machines.

UNIT-I D. C Transient Analysis

Transient response of R-L, R-C, R-L-C circuits (series and parallel) for D.C excitation-Initial conditions- Solution method using differential equation approach and Laplace transform method.

UNIT-II Two Port Networks

Z, Y, ABCD and Hybrid parameters, conversion of one parameter to another, conditions for reciprocity and symmetry, interconnection of two port networks in series, parallel and Cascaded, illustrative problems.

UNIT-III Filters and Attenuators

Classification of filters, filter networks, classification of pass Band and stop Band, characteristic impedance in the pass and stop bands, constant K low pass filter, high pass filter, band pass filter, band Elimination filter, illustrative problems. Symmetrical attenuators-T-type attenuators, π type attenuators, bridged T-type attenuators. Lattice attenuators.

UNIT-IV D.C. Generators & D.C. Motors

Principle of operation of DC machines, E.M.F Equation, types of generator, magnetization and load characteristics of DC generators**.** Illustrative problems.

D.C Motors – types of DC motors, characteristics of DC motors, losses and efficiency ,Swinburne's test, speed control of D.C. Motor, armature voltage and flux voltage control methods. Illustrative problems.

UNIT –V Transformers and their Performance

Principle of operation of Single phase transformer, types, constructional features, phasor diagram on no-load and load equivalent circuit, losses and efficiency of transformer and regulation, EMF equation- O.C & S.C tests, simple problems, introduction to single phase induction motor-split phase induction motor, capacitor motors, AC servomotors.

Course Outcomes:

After going through this course the student can able to understand

- Transient response of different circuits with DC excitation, different two-port network parameters (Z, Y, ABCD, H), and their inter-relations, .

- Design filters and attenuators.
- Identify type of electrical machine for a given application

TEXT BOOKS:

1. Circuits & Networks - *A.Sudhakar* and *Shyammohan S.Palli*, Tata McGraw Hill.
2. Principle of Electrical Engineering - *V.K. Mehtha,*,S.Chand Publications.

REFERENCES:

1. Networks, lines and fields - *John.D.Ryder*, 2nd edition, PHI, 2008.
2. Engineering circuit analysis -*W.H.Hayt and J.E.Kemmerly and S.M.Durbin*, TMH, 6th edition, 2008,.
3. Network analysis and synthesis - C.L.Wadhwa, 3rd edition, New Age International Publishers,2007.
4. Network analysis - *N.C.Jagan and C.Lakshmi Narayana*, BSP, 2006
5. Introduction To Electrical Engineering - *M.S Naidu* and *S. Kamakshiah*,TMH
6. Basic Electrical Engineering – *B.L. Theraja and A.K. Theraja,* S.Chand Publications.

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II Year B.Tech, ECE-II Sem	**L**	**T/P/D**	**C**
	3	**1/ - /-**	**3**

(A54018)PULSE AND DIGITAL CIRCUITS

Course Objectives:

- To explain the complete response of RC and RLC transient circuits
- To explain clippers clampers switching characteristics of transistor and sampling gates.
- To construct various multi vibrators using transistors, design of sweep circuits and sampling gates.

To discuss and realize logic gates using diodes and transistors

UNIT I: Linear Wave Shaping:

High pass, Low pass RC circuits and their responses for sinusoidal, step voltage, pulse, square wave and ramp inputs. High pass RC networks as Differentiator; Low pass RC as an Integrator. Attenuators and their applications in CRO probe. RL and RLC circuit their response for step input, ringing circuit.

UNIT II: Non-Linear Wave Shaping:

Diode clippers, Transistor clippers, Clipping at two independent levels, Emitter coupled clipper, Diode comparators, Diode differentiator.

Applications of Voltage comparators, Clamping operation, Clamping circuits using Diodes with different inputs, Clamping circuit theorem, Practical clamping circuits, Effect of Diode characteristics on clamping voltage.

Switching Characteristics Of Devices:

Diode as a switch, Piecewise Linear Diode Characteristics, Transistor as a switch, Breakdown voltage consideration of transistors, Saturation parameters of transistors and their variation with temperature. Design of a transistor switch, Transistor- switching times.

UNIT III: Multivibrators:

Analysis and Design of Bitable, Monostable and A stable Multivibrator using Transistors, Schmitt trigger using transistors

UNIT IV: Time Base Generators:

General features of Time Base Signal, Methods of Generating a Time Base Waveform, Voltage sweeps, Bootstrap and Miller circuits, linear current sweep, and Application in T.V. synchronization.

Synchronisation And Frequency Division:

Principles of Synchronization, Synchronization of A stable Multivibrator, Phase Delay and phase Jitters, Synchronization of sweep circuits with symmetrical signals.

UNIT V: Sampling Gates:

Basic Operating Principles of Sampling Gates, Unidirectional and Bi-directional sampling gates, Application of Sampling Gates.

Blocking Oscillators:

Mono Stable Blocking Oscillator (Base timing & Emitter timing). A stable blocking Oscillator (Diode Controlled), Applications of Blocking Oscillators.

Outcomes:

- Understand the applications of diode as integrator. differentiator , clipper ,clamper circuits
- Learn various switching devices such as diode , transistor, SCR
- Difference between logic gates ,sampling gates
- Realizing using diode and transistor

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, and Mothiki S.Prakash Rao, 2ed. 2008, TMH..
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn, 2002

REFERENCES:

1. Pulse and Digital Circuits-A. Anand Kumar, PHI, 2005.
2. Wave Generation and Shaping - L. Strauss.
3. Fundamentals of Pulse and Digital Circuits – Ronald J. Tocci, 3ed. 2008.
4. Pulse and Digital Circuits – Mothiki S.Prakash Rao, 2006, TMH.

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II Year B.Tech, ECE-II Sem	**L**	**T/P/D**	**C**
	4	**-/ - /-**	**4**

(A54019)ELECTROMAGNETIC THEORY AND TRANSMISSION LINES

Course Objectives:

- To introduce the student to the fundamental theory and concept electromagnetic waves and transmission lines, and their practice applications.
- To study the propagation, reflection and transmission of plane bounded and unbounded

UNIT – I: Electrostatics:

Coulomb's Law , Electric Field Intensity- Fields Due to Continuous Charge Distributions, Electric Flux Density, Gauss Law and Applications , Electric Potential, Relations Between E and V , Maxwell's Two Equations for Electrostatic Fields, Energy Density , Illustrative Problems.

Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics , Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT – II: Magnetostatics:

Biot-Savart's Law , Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces Due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

UNIT –III: Maxwell's Equations (Time Varying Fields):

Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

UNIT-IV: Em Wave Characteristics:

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves-Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors and Dielectrics- Characterization, Wave Propagation in Good Dielectrics and Good Conductors , Polarization, Reflection and Refraction of Plane Waves –Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem-Applications, Power Loss in a Plane Conductor, Illustrative Problems.

UNIT-V: Transmission Lines:

Transmission Lines – I: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading, Illustrative Problems.

Transmission Lines – II : Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR, UHF Lines as Circuit Elements: λ /4 ,λ /2, λ /8 Lines – Impedance Transformations, Significance of Z_{min} and Z_{max} Smith Chart – Configuration and Applications, Single and Double Stub Matching, Illustrative Problems.

Out comes:

- Study time varying Maxwell equations and their applications in electromagnetic problems.
- Determine the relationship between time varying electric and magnetic field and electro motive force.
- Analysis basic transmission line parameters in phasor domain.

TEXT BOOKS:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 4th ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech.India Publications), New Delhi, 2001.

REFERENCES:

1. Engineering Electromagnetic – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.
2. Networks, Lines and Fields – John D. Ryder, PHI, 2nd ed., 1999.
3. Engineering Electromagnetic – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
4. Electromagnetic Field Theory and Transmission Lines – G.S.N. Raju, Pearson Edn.Pte. Ltd., 2005.

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II Year B.Tech, ECE-II SEM	**L**	**T/P/D**	**C**
	4	**-/ - /-**	**4**

(A54020)SIGNALS AND SYSTEMS

Course objectives:

- This course focuses on to get in-depth knowledge about signals, systems and analysis of the same using various transforms

UNIT-I: Signal Analysis:

Analogy between vectors and signals, Orthogonal vector and signal spaces, Approximation of a function by a set of mutually orthogonal functions, Evaluation of mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Trigonometric and Exponential **Fourier series**, Representation of periodic function by Fourier series Dirchelets Conditions, Complex Fourier spectrum,

UNIT-II: **Fourier Transforms And Sampling**

Fourier Transforms: Deriving Fourier Transform (F.T.) from Fourier Series, F.T. of arbitrary and standard signals, Concept of impulse function, Fourier Transforms involving Impulse function, Properties of Fourier transforms,

Sampling: Sampling theorem and its proof, Effect of under sampling-Aliasing, Reconstruction of signal from its samples.

UNIT-III: Signal Transmission Through Systems:

Linear system, Impulse response, Response of a Linear System, Linear Time-Invariant (LTI) system, Linear Time-Variant (LTV) System, Transfer function of LTI system, Filter characteristics of Linear Systems. Distortion-less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and Rise time.

UNIT-IV: Convolution And Correlation Of Siganls:

Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Convolution property of Fourier Transforms, Cross Correlation and Auto correlation of functions, Properties of Correlation function, Energy density spectrum, Parse-Val's Theorem, Power density spectrum, Relation between Autocorrelation function and Energy/Power spectral density function.

UNIT-V: Laplace Transforms And Z-Transforms:

Laplace Transforms: Review of Laplace transforms Partial fraction expansion, Inverse Laplace transform, Concept of Region of convergence (ROC) for Laplace transforms, Constraints on ROC for various classes of signals, Properties of Laplace transforms, Relation between Laplace transform and Fourier transform of a signal. Laplace transform of certain signals using waveform synthesis.

Z-Transforms: Fundamental difference between Continuous and Discrete time signals, Discrete time signal representation using Complex exponential and Sinusoidal signals, Periodicity of Discrete time complex exponential signal, Concept of Z-transform of a discrete sequence. Distinction

between Laplace, Fourier and Z-Transforms. Region of convergence in Z-Transforms, Constraints on ROC for various classes of signals, Inverse Z-Transforms, properties of Z-Transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.

Outcomes:

- Represent any arbitrary signals in terms of complete sets orthogonal functions and understands the principles of impulse function, step function and signum function.
- 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.
- Can design a system for sampling a signal.
- For a given system, response can be obtained using Laplace transform, properties and ROC of L.T.

REFERENCES:

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Fundamentals of Signals and Systems Michel J. Robert, MGH International Edition, 2008.
3. Signals, Systems and Transforms - C. L. Philips, J.M.Parr and Eve A.Riskin, Pearson education.3rd Edition, 2004.Publications, 2nd Edition, 2005.

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II Year B.Tech, ECE-II SEM	**L**	**T/P/D**	**C**
	3	**-/ - /-**	**3**

(A54021)DIGITAL DESIGN USING VERILOG HDL

Course objective:
This course teaches**:**

- Designing digital circuits, behavioral and RTL modeling of digital circuits using Verilog HDL, verifying these models, and synthesizing RTL models to standard cell libraries and FPGAs
- Students gain practical experience by designing, modeling, implementing and verifying several digital circuits

UNIT I

Introduction To Verilog: Verilog as HDL, Levels of Design Description, Concurrency, Simulation and Synthesis, Functional Verification, System Tasks, Programming Language Interface (PLI), Module, Simulation and Synthesis Tools.

Language Constructs And Conventions: Introduction, Keywords, Identifiers, White Space Characters, Comments, Numbers, Strings, Logic Values, Strengths, Data Types, Scalars and Vectors, Parameters, Operators.

UNIT II

Gate Level Modeling : Introduction, AND Gate Primitive, Module Structure, Other Gate Primitives, Illustrative Examples, Tri-State Gates, Array of Instances of Primitives, Design of Flip-Flops with Gate Primitives, Delays, Strengths and Contention Resolution, Net Types, Design of Basic Circuits.

Modeling At Data Flow Level: Introduction, Continuous Assignment Structures, Delays and Continuous Assignments, Assignment to Vectors, Operators.

UNIT III

Behavioral Modeling: Introduction, Operations and Assignments, Functional Bifurcation, *Initial* Construct, *Always* Construct. Assignments with Delays, *Wait* construct, Multiple Always Blocks, Designs at Behavioral Level, Blocking and Non blocking Assignments, The *case* statement, Simulation Flow, *if* and *if-else* constructs, *Assign-de-Assign* construct, *repeat* construct, *for* loop, the *disable* construct, *while* loop, *forever* loop, parallel blocks, *force-release* construct, Event.

UNIT IV

Switch Level Modeling:

Introduction, Basic Transistor Switches, CMOS Switch, Bi-directional Gates, Time Delays with Switch Primitives, Instantiations with Strengths and Delays, Strength Contention with Trireg Nets.

System Tasks, Functions, And Compiler Directives: Parameters, Path Delays, Module Parameters, System Tasks and Functions, File-Based Tasks and Functions, Compiler Directives, Hierarchical Access, User- Defined Primitives.

UNIT V

Sequential Circuit Description: Sequential Models-Feedback Model, Capacitive Model, Implicit Model, Basic Memory Component, Function Register, Static Machine Coding, Sequential Synthesis.
Component Test And Verification: Test Bench-Combinational Circuit Testing, Sequential Circuit Testing, Test Bench Techniques, Design Verification, Assertion Verification

Outcomes:

By the end of this course, students should be able to:

- Describe Verilog hardware description languages (HDL).
- Design digital circuits
- Write behavioral models of digital circuits
- Write register transfer level(RTL)models of digital circuits
- Verify behavioral and RTL models
- Describe standard cell libraries and FPGAS
- Synthesize RTL models to standard cell libraries and FPGAS
- Implement RTL Models On FPGA and testing & verification

TEXT BOOKS:

1. Design through Verilog HDL – T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, 2009.
2. Verilog Digital Design-Zainalabdien Navabi,TMH,2nd Edition.

REFERENCES:

1. Fundamentals of Digital Logic with Verilog Design – Stephen Brown and Zvonko Vranesic, TMH, 2nd Edition 2010.
2.Verilog HDL – Samir Palnitkar, 2nd Editon Pearson Education.
3. Advanced Digital Design with Verilog HDL – Michael D. Ciletti, PHI, 2009.

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II Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
	-	**-/3/-**	**2**

(A54210)PRINCIPLES OF ELECTRICAL ENGINEERING LAB

PART-A:

All eight experiments are to be conducted compulsorily

1) Verification of Kirchhoff's voltage law and Kirchhoff's current law.
2) Verification of Series and Parallel Resonance circuit.
3) Time response of first order RL/RC network for periodic non-sinusoidal inputs. Time constant and steady state error determination.
4) Two port networks parameters- Z and Y Parameters.
5) Two port networks parameters- A, B, C, D and H- Parameters.
6) Verification of Superposition and Reciprocity theorem.
7) Verification of Maximum Power Transfer Theorem.
8) Experimental determination of Thevenin's and Norton's equivalent circuits.

PART-B:

Any two of the following experiments are to be conducted

1) Magnetization characteristics of DC shunt generator. Determination of critical field resistance.
2) Swinburne's test on DC shunt machine. Predetermination of efficiency at various loads as motor and generator.
3) OC &SC tests on single phase transformer. Predetermination of efficiency at various loads.
4) Speed control of DC Shunt Motor by
   a) Armature voltage control b) field flux control method.

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II Year B.Tech, ECE-II SEM	**L**	**T/P/D**	**C**
	-	**-/ 3 /-**	**2**

(A54211)BASIC SIMULATION LAB

Part-B: Minimum 10 Experiments to be conducted
Simulate the following circuits using MATLAB, SCILAB or equivalent software tools

1. Basic operation on matrices.
2. Generation on various signals and Sequences (periodic), such as unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, Sinc.
3. Operation on signal and sequence such as addition, multiplication scaling, folding, computation of energy and average power.
4. Finding the event and odd parts of signals/sequence and real and imaginary part of signals.
5. Convolution between signals and sequences.
6. Auto correlation and cross correlation between signals and sequences.
7. Verification of linearity and time invariance properties of a given continues /discrete system.
8. Computation of unit sample, unit step and sinusoidal response of the given LTI system and verifying its physical Realization and stability properties.
9. Gibbs phenomenon.
10. Finding the Fourier transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform synthesis using Laplace transforms.
12. Locating the zeros and poles and plotting the pole zero maps in s-plane and z-plane for the given transfer function.
13. Generation of Gaussian Noise (real and complex), computation of its mean, M.S. Value and its skew, kurtosis, and PSD, probability distribution function.
14. Sampling theorem verification.
15. Removal of noise by auto correlation/ cross correlation.
16. Extraction of periodic signal masked by noise using correlation.
17. Verification of Weiner-Khinchine relations.
18. Checking a random process for stationarity in wide sense.

Part-B: Minimum 6 Experiments to be conducted
Simulate the following circuits using Verilog HDL and verify by realization on FPGA

1. Design of 8- to -3 Encoder.
2. Design of 4 bit comparator.
3. Design of 8-to-1 multiplexer.
4. Design of full Adder.
5. Design of 1-to-8 De-multiplexer.
6. Design a 10 bit shift register.
7. Design of 4-Bit Binary counter.
8. Design of a Sequence detector.

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II Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
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(A54212)HUMAN VALUES AND PROFESSIONAL ETHICS

Objectives:

- To help the students appreciate the essential complementarities between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

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 (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family

UNIT - IV:

Understanding Harmony in the nature and Existence - Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness 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 IIlich, 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.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.

10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna 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. IIT Delhi, Modern Technology - the Untold Story

ANURAG ENGINEERING COLLEGE, KODAD

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III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
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(A55025) COMPUTER ORGANIZATION AND OPERATING SYSTEM

Course Objectives:

The course objectives are:

- To have a thorough understanding of the basic structure and operation of a digital computer.
- To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.
- To study the hierarchical memory system including cache memories and virtual memory.
- To demonstrate the knowledge of functions of operating system memory management scheduling, file system and interface, distributed systems, security and dead locks.
- To implement a significant portion of an Operating System.

UNIT-I:

Basic Structure of Computers: Computer Types, Functional UNIT, Basic OPERATIONAL Concepts, Bus Structures, Software, Performance, Multiprocessors and Multi Computers, Data Representation, Fixed Point Representation, Floating – Point Representation.

Register Transfer Language and Micro Operations: Register Transfer Language, Register Transfer Bus and Memory Transfers, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit, Instruction Codes, Computer Registers Computer Instructions– Instruction Cycle.

Memory – Reference Instructions, Input – Output and Interrupt, STACK

Organization, Instruction Formats, Addressing Modes, DATA Transfer and Manipulation, Program Control, Reduced Instruction Set Computer.

UNIT -II:

Micro Programmed Control: Control Memory, Address Sequencing, Microprogram Examples, Design of Control Unit, Hard Wired Control, Microprogrammed Control.

The Memory System: Basic Concepts of Semiconductor RAM Memories, Read-Only Memories, Cache Memories Performance Considerations, Virtual99 Memories Secondary Storage, Introduction to RAID.

UNIT -III:

Input-Output Organization: Peripheral Devices, Input-Output Interface,Asynchronous Data Transfer Modes, Priority Interrupt, Direct Memory Access, Input –Output Processor (IOP), Serial Communication; Introduction to Peripheral Components, Interconnect (PCI) Bus, Introduction to Standard Serial Communication Protocols like RS232, USB, IEEE1394.

UNIT -IV:

Operating Systems Overview: Overview of Computer Operating Systems Functions, Protection and Security, Distributed Systems, Special Purpose Systems, Operating Systems Structures-Operating System Services and Systems Calls, System Programs, Operating Systems Generation.

Memory Management: Swapping, Contiguous Memory Allocation, Paging, Structure of The Page Table, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Allocation of Frames, Thrashing

Principles of Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

UNIT -V:

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.

File System Implementation: File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free-Space Management.

Course Outcomes:

Upon completion of the course, students will have thorough knowledge about:

- Basic structure of a digital computer
- Arithmetic operations of binary number system
- The organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
- Operating system functions, types, system calls.
- Memory management techniques and dead lock avoidance operating systems' file system implementation and its interface.

TEXT BOOKS:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition,

McGraw Hill.

2. Computer Systems Architecture – M.Moris Mano, 3rd Edition, Pearson

3. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin,Greg Gagne, 8th Edition, John Wiley.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings 6th Edition, Pearson

2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI

3. Fundamentals of Computer Organization and Design – Sivaraama Dandamudi Springer Int. Edition.

4. Operating Systems – Internals and Design Principles, Stallings, 6th Edition–2009, Pearson Education.

5. Modern Operating Systems, Andrew S Tanenbaum 2nd Edition, PHI.

6. Principles of Operating Systems, B.L.Stuart, Cengage Learning, India Edition.

ANURAG ENGINEERING COLLEGE, KODAD

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III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
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(A55026) CONTROL SYSTEMS ENGINEERING

Course Objectives:

- To understand the different ways of system representations such as Transfer function representation and state space representations and Should able to assess the system dynamic response
- To assess the system performance using time domain analysis and should know how to improve it
- To assess the system performance using frequency domain analysis and should know how to improve it
- To design various controllers and compensators to improve system performance

UNIT I:

Introduction: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feedback Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer functions.

Transfer Function Representation: Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula.

UNIT II:

Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT III:

Stability Analysis in S-Domain: The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

UNIT IV:

Frequency Response Analysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots, Nyquist Plots Stability Analysis. Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT V:

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Course Outcomes:

- To Summarize the mathematical models of translational and rotational mechanical systems from their idealized elements
- To Calculate the transfer function using block diagram reduction techniques and signal flow graph method
- To Apply their mathematical knowledge to calculate the response of a linear system to various types of inputs
- Be able to Develop familiarity and confidence to explain transient and steady state responses of a linear system
- Be able to Construct Routh array and Root-Locus to describe the stability of linear time invariant system
- To predict the stability of a linear time invariant systems using frequency response plots
- Be able to design and construct the compensators for linear systems to achieve the desired specifications.
- Be able to explain the stability of modern control systems using state space approach

TEXT BOOKS:

1. Control Systems Theory and Applications - S. K. Bhattacharya, Pearson.
2. Control Systems - N. C. Jagan, BS Publications.

REFERENCE BOOKS:

1. Control Systems - A. Ananad Kumar, PHI.
2. Control Systems Engineering - S. Palani, TMH.
3. Control Systems - Dhanesh N. Manik, Cengage Learning.
4. Control Systems Engineering - I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers.
5. Control Systems - N. K. Sinha, New Age International (P) Limited Publishers.

ANURAG ENGINEERING COLLEGE, KODAD

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III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
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(A55027) ANTENNAS AND WAVE PROPAGATION

Course Objectives:

- To know about the fundamentals and design of various Antennas.
- To discuss the major applications of antennas emphasis is on how antennas are employed to meet electronic system requirements.
- To understand the concepts of radio wave propagation in the atmosphere.

UNIT I:

Antenna Basics: Introduction, Basic Antenna Parameters - Patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective Height. Related Problems.

Thin Linear Wire Antennas: Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated Power, Radiation Resistance, Beam widths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Centre-fed Antennas of Different Lengths, Illustrative Problems. Loop Antennas - Introduction, Small Loop, Comparison of Far Fields of Small Loop and Short Dipole, Radiation Resistances and Directivities of Small and Large Loops (Qualitative Treatment).

UNIT II: Antenna Arrays: Point Sources - Definition, Pattern, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication, Uniform Linear Arrays - Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their Characteristics and Comparison, BSAs with Non-unit form Amplitude Distributions - General Considerations and Binomial Arrays, Illustrative Problems.

VHF, UHF AND Microwave Antennas - I: Arrays with Parasitic Elements, Yagi - Uda Arrays, Folded Dipoles & their characteristics, Illustrative Problems.

UNIT III: VHF, UHF AND Microwave Antennas - II:

Helical Antennas - Helical geometry, Helix Modes, Practical Design Considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas - Types, Fermat's Principle, Optimum Horns, Design Considerations of Pyramidal Horns, Microstrip Antennas - Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas - Geometry and Parameters, Characteristics of Microstrip Antennas

UNIT IV: Impact of Different Parameters on Characteristics, Reflector Antennas - Introduction, Flar Sheet and Corner Reflectors, Paraboloidal Reflectors - Geometry, Pattern Characteristics, Feed Methods, Reflector Types - Related Features, Illustrative Problems.

Lens Antennas - Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement, Gain Measurements (by Comparison, Absolute and 3-Antenna Methods)

UNIT V: Wave Propagation - I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts, Ground Wave Propagation (Quantitative Treatment) - Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections, Space Wave Propagation - Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super retraction, M-Curves and Duct Propagation, Scattering Phenomena, Troposphere Propagation.

Wave Propagation - II: Sky Wave Propagation - Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Multi-hop Propagation.

Course Outcomes:

- To list the basics of antennas and various parameters of antenna along with Maxwell's equations
- To interpret the fields radiated power, directivity, effective length of small electric dipole & half wave-dipole, loop Antennas
- To explain the concepts of different types of arrays
- To summarize antennas operated in VHF & UHF ranges
- To analyze the reflectors used along with antennas
- To study the experimental arrangements for measuring the radiation properties of antenna
- 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
- To interpret the concepts of sky wave Propagation

TEXT BOOKS:

1. Antennas for All Applications – John D. Kraus and R. J. Marhefka, and Ahmad S. Khan TMH, New Delhi, 4th ed., (Special Indian Edition) 2010.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd ed., 2000.

REFERENCE BOOKS:

1. Antenna Theory - C.A. Balanis, John Wiley & Sons, 3rd ed., 2005.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.

3. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill (International Edition), 2nd Ed. 1988.

ANURAG ENGINEERING COLLEGE, KODAD

(**An Autonomous Institution**)

III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
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(A55028)ANALOG COMMUNICATIONS

Course Objectives:

- To know the need for modulation in radio communication system.
- To learn about various Analog and Pulse modulation techniques like Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Amplitude Modulation, Pulse Position Modulation and Pulse Width Modulation.
- To know about the transmitters, receivers of Analog Modulation.
- To analyze the noise performance of Analog Modulation systems.

UNIT I:

Amplitude Modulation: Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelop detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSB-SC Modulated waves, COSTAS Loop.

UNIT II:

SSB Modulation: Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelop detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT III:

Angle Modulation: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

UNIT IV: Noise in Analog Communication System: Types of Noise: Resistive (Thermal) Noise Source, Shot noise, Extraterrestrial Noise, Arbitrary Noise Sources, White Noise, Narrowband Noise- In phase and quadrature phase components and its Properties, Modelling of Noise Sources,

Average Noise Bandwidth, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks. Noise in DSB and SSB System Noise in AM System, Noise in Angle Modulation System, Noise Triangle in Angle Modulation System, Pre-emphasis and de-emphasis.

UNIT V:

Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

Pulse Modulation: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation and demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing.

Course outcomes:

- To describe various modulation techniques like AM, DSBSC and Variations among them in terms of power, modulation index, Band width
- To classify and experiment the functionality of modulators, demodulators of each modulation technique like AM, DSBSC and selection of appropriate filters
- Summarize various modulation techniques like SSB,VSB and apply applications in terms of Speech, Television
- To differentiate the spectrum of input message signals, different modulated outputs and resulting demodulated message signals for SSB,VSB
- To differentiate the spectrum of input message signals, different modulated outputs and resulting demodulated message signals for FM
- To classify the functionality of modulators, demodulators of each modulation technique like Narrow band ,Wideband FM for selection of appropriate filters
- Summarize different Digital Coding of Analog Waveforms like PCM,DM,DPCM
  Assess different Receiver Models in Analog Modulation and Compare different Figure of Merits

TEXT BOOKS:

1. Communication Systems - Simon Haykin, 2 Ed, Wiley Publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2004.

REFERENCE BOOKS:

1. Electronic Communications - Dennis Roddy and John Coolean, 4th Edition, PEA, 2004.
2. Electrnic Communication Systems - Modulation and Transmission - Robert J. Schoenbeck, 2nd Edition, PHI.
3. Analog and Digital Communication - K. Sam Shanmugam, Wiley, 2005.
4. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
5. Principles of Communication Systems - H Taub & D. Schilling, Gautam Sahe, TMH, 2007, 3rd Edition

ANURAG ENGINEERING COLLEGE, KODAD

(**An Autonomous Institution**)

III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
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(A55009) LINEAR IC APPLICATIONS

Course Objectives:

- Study about electrical properties of analog ICs like Op-Amps, IC 555 timer, PLL.
- Analyze and know the design concepts of various applications of ICs.
- Study the design concepts Digital circuits using ICs.

UNIT - I:

Integrated Circuits: Classification, chip size and circuit complexity, Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate-Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tri-state outputs, CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT - II:

OP-AMP and Applications: Basic information of OP-AMP, ideal and practical OP-AMP, internal circuits, OP-AMP characteristics, DC and AC characteristics, 741 OP-AMP and its features, modes of operation-inverting, non-inverting, differential.

Basic application of OP-AMP, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, multipliers and dividers, Differentiators and Intergrators, Comparators, introduction to voltage regulators.

UNIT - III:

Active Filters & Oscillators: Introduction, 1st order LPF, HPF filters, Band pass, Band reject and all pass filters. Oscillator types and principle of operation - RC, Wien and quadrature type, waveform generators - triangular, sawtooth, square wave and VCO.

UNIT - IV:

Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

UNIT - V:

D-A and A-D Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type

ADC, counter type ADC, successive approximation ADC and slope ADC. DAC and ADC specifications.

Course Outcomes:

- To Summarize the basics of linear integrated circuits and explain operational amplifiers with applications
- Be able to explain the characteristics of op-amp
- Able to explain the comparator circuits like Schmitt trigger, astable multivibrator etc
- Able to construct filter circuits for particular application
- To describe analog to digital converters (ADC), and digital to analog converters (DAC) with its Specifications
- Be able to explain a stable voltage regulators
- To construct and explain the timer circuits
- To interpret the applications of PLL and special ICs like 565,566

TEXT BOOKS:

1. Linear Integrated Circuits, D. Roy Chowdhury, New Age International(p) Ltd.
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI

REFERENCES BOOKS:

1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.
2. Operational Amplifiers & Linear Intergrated Circuits: Theory & Applications, Denton J. Daibey, TMH.
3. Design with Operational Amplifiers & Analog Integrated Circuits, Sergio Franco, McGraw Hill.
4. Digital Fundamentals - Floyd and Jain, Pearson Education.

ANURAG ENGINEERING COLLEGE, KODAD

(**An Autonomous Institution**)

III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
	3	**- /-/ -**	**3**

(A55029)ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(PROFESSIONAL ELECITIVE-I)

Course Objectives:

- Develop an awareness to various electronic measurement Concepts
- Explain the operation and design of different electronic instruments
- Compare different ADC and DAC techniques and explain various circuits for conversion.
- Explain the transmission line effects pertaining to linear and non-linear loads in the context of bounce diagrams.

UNIT I:

Block Schematics of Measuring Systems: Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag; Measuring Instruments: DC Voltmeters, D'Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

UNIT II:

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators. Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator and Specifications.

UNIT III:

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency Specifications.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

UNIT IV:

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros,

Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers,.

UNIT V:

Bridges: Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Force, Pressure - High Pressure, Vacuum level, Temperature - Measurements, Data Acquisition Systems.

Course Outcomes:

- Able to calculate the basic parameters like voltage, resistance etc. And predict the behavior of the instrument.
- 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
- Able to explain signal analyzers
- Able to design different types of bridges and unknown components are determined
- Able to interpret working and design the CRO and Able to calculate the frequency and time by using CRO
- Able to explain different types of special purpose Oscilloscopes
- Explain the different types of the transducers and basic working principle.
- Able to measure physical parameters by using different methods

TEXTBOOKS:

1. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Edition 2004.
2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI, 5th Edition, 2003.

REFERENCE BOOKS :

1. Electronic Instrumentation and Measurements - David A. Bell, Oxford Uiv. Press, 1997.
2. Electronic Measurements and Instrumentation: B. M. Oliver, J. M. Cage TMH Reprint.
3. Measurement Systems - Emest O. Doebelin and Dhanesh N Manik, 6th Ed., TMH.
4. Electronic Measurements and Instrumentations by K. Lal Kishore, Pearson Education - 2010.
5. Industrial Instrumentation: T. R. Padmanabham Spiriger 2009.

ANURAG ENGINEERING COLLEGE, KODAD

(**An Autonomous Institution**)

III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
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(A55030)ARTIFICIAL NEURAL NETWORKS
(PROFESSIONAL ELECITIVE-I)

Course Objectives:

The objectives of this course are to:

- Understand the basic building blocks of artificial neural networks (ANNs)
- Understand the role of neural networks in engineering and artificial intelligence modelling
- Provide knowledge of supervised/unsupervised learning in neural networks
- Provide knowledge of single layer and multilayer perceptron.
- To know about self-organizational maps and Hopfield models.

UNIT -I:

Introduction:

A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process:

Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process

UNIT -II:

Single Layer Perceptron:

Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron – Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment

Multilayer Perceptron:

Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection

UNIT -III:

Back Propagation:

Back Propagation and Differentiation, Hessian Matrix, Generalization, Cross Validation, Network Pruning Techniques, Virtues and Limitations of Back Propagation Learning, Accelerated Convergence, Supervised Learning

UNIT -IV:

Self-Organization Maps (SOM):

Two Basic Feature Mapping Models, Self-Organization Map, SOM Algorithm, Properties of Feature Map, Computer Simulations, Learning Vector Quantization, Adaptive Patter Classification

UNIT -V:

Neuro Dynamics:

Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm

Hopfield Models – Hopfield Models, Computer Experiment

Course outcomes:

After the course the student should be able to:

- Explain the function of artificial neural networks of the Back-prop, Hopfield and SOM type
- Explain the difference between supervised and unsupervised learning
- Describe the assumptions behind, and the derivations of the ANN algorithms dealt with in the course
- Give example of design and implementation for small problems
- Implement ANN algorithms to achieve signal processing, optimization, classification and process modeling

TEXT BOOKS:

1. Neural Networks a Comprehensive Foundations, Simon Haykin, PHI edition.

REFERENCE BOOKS:

1. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural Networks in Computer Inteligance, Li Min Fu TMH 2003
3. Neural Networks -James A Freeman David M S Kapura Pearson Education 2004.
4. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.

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III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
	3	**-/-/ -**	**3**

(A55031)ELECTRO MAGNETIC INTERFERNCE & COMPATIBILITY (EMI / EMC)

(PROFESSIONAL ELECITIVE-I)

Course Objectives:

- To introduce important system concepts such as Electromagnetic interference and Electromagnetic compatibility (EMI&EMC).
- To familiarize with unavoidable and naturally happening sources of EMI and problems to ensure EMC.
- To study various techniques to reduce EMI from systems and to improve EMC of electronic systems.

UNIT -I:

Basic Concepts:

Definition of EMI and EMC with examples, Classification of EMI/EMC - CE, RE, CS, RS, Units of Parameters, Sources of EMI, EMI coupling modes - CM and DM, ESD Phenomena and effects, Transient phenomena and suppression.

UNIT –II:

EMI Measurements:

Basic principles of RE, CE, RS and CS measurements, EMI measuring instruments- Antennas, LISN, Feed through capacitor, current probe, EMC analyzer and detection t6echnique open area site, shielded anechoic chamber, TEM cell.

UNIT –III:

EMC Standard And Regulations:

National and Intentional standardizing organizations- FCC, CISPR, ANSI, DOD, IEC, CENEEC, FCC CE and RE standards, CISPR, CE and RE Standards, IEC/EN, CS standards, Frequency assignment - spectrum conversation.

UNIT –IV:

EMI Control Methods And Fixes:

Shielding, Grounding, Bonding, Filtering, EMI gasket, Isolation transformer, opto isolator.

UNIT –V:

EMC Design and Interconnection Techniques:

Cable routing and connection, Component selection and mounting, PCB design- Trace routing, Impedance control, decoupling, Zoning and grounding.

Course Outcomes:

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

- Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems.
- Analyze various sources of EMI and various possibilities to provide EMC.
- 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.

TEXT BOOKS:

1. Prasad Kodali.V – Engineering Electromagnetic Compatibility – S.Chand&Co – New Delhi – 2000
2. Clayton R.Paul – Introduction to Electromagnetic compatibility – Wiley & Sons – 1992

REFERENCE BOOKS:

1. Keiser – Principles of Electromagnetic Compatibility – Artech House – 3rd Edition – 1994
2. Donwhite Consultant Incorporate – Handbook of EMI / EMC – Vol I – 1985.

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III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
	-	**- /3/ -**	**2**

(A55207) PULSE CIRCUITS & INTEGRATED CIRCUITS LAB

Note: Minimum 12 experiments should be conducted.

PART-A: PDC Experiments

1. Linear wave shaping.
2. a).Non Linear wave shaping- Clippers.
   b).Non Linear wave shaping –Clampers.
3. Transistor as a switch.
4. A stable Multivibrator.
5. Monostable Multivibrator.
6. Schmitt Trigger.
7. UJT Relaxation Oscillator.
8. Bootstrap Sweep Circuit.

PART-B: IC Experiments

1. IC 741 OP AMP Applications – Adder, Subtractor, Comparator.
2. Active Filter Applications – LPF, HPF (Second order)
3. RC Phase shift and Wein Bridge Oscillator using 741 Op-Amp
4. IC 555 Timer in Monostable Operation.
5. ADC/DAC 4 bit DAC
6. D Flip Flop (74LS74) and JK Master Slave Flip Flop (74LS73)
7. Decade counter (74LS90) and Up-Down Counter (74LS192)
8. Universal Shift Register-74LS194/195.
9. 3-8 Decoder-74LS138.
10. 4-bit comparator 74LS85.
11. BCD to Seven segment Decoder 7490-7447.

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III Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
	-	**- /3/ -**	**2**

(A55208)ANALOG COMMUNICATIONS LAB

Note: Minimum 12 experiments should be conducted:

All these experiments are to be simulated first either using MATLAB, Comsim or any other simulation package and then to be realized in hardware.

1. Amplitude modulation and demodulation.
2. DSB-SC Modulator & Detector
3. SSB-SC Modulator & Detector (Phase Shift Method)
4. Frequency modulation and demodulation.
5. Study of spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis & de-emphasis.
7. Time Division Multiplexing & De multiplexing
8. Frequency Division Multiplexing & De multiplexing
9. Verification of Sampling Theorem
10. Pulse Amplitude Modulation & Demodulation
11. Pulse Width Modulation & Demodulation
12. Pulse Position Modulation & Demodulation
13. Frequency Synthesizer.
14. AGC Characteristics
15. PLL as FM Demodulator

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Analog Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.
9. Spectrum Analyzer - 60 M Hz
10. Any one simulation package

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III Year B.Tech. ECE - II Sem

L	T/P/D	C
3	-/-/-	3

(A56022)MANAGEMENT SCIENCE

Course Objectives: The aim of this course is to enable the students to see that many managerial decision-making situations can be addressed using standard techniques and methods, provide a comprehensive and concise introduction to the key techniques and methods used within management science that are directly relevant to the managerial context, enable you to see both the benefits, and limitations, of the techniques and methods presented.

Unit-I:

Introduction to Management: Nature and importance of management, Functions of Management, Taylor's Scientific Management Theory, Fayol's principles of management, Maslow's theory of Human Needs, Douglas Mc Gregor's Theory X and Theory Y, Herzberg's Two factor Theory of Motivation. Systems Approach to Management, Leadership Styles, Social Responsibilities of Manager, Organization levels and types of organization structures.

Unit-II

A) Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass production), Work Study - Basic procedure involved in Method Study and Work measurement- Statistical Quality Control - X chart, R chart, C chart, P chart, (simple problems), Acceptance Sampling, Deming's contribution to quality.
B) Materials Management: Objectives, Need for inventory control, EOQ, ABC Analysis, Purchase procedure, Stores management and Stores records, Supply chain management.

Unit –III

A) Human Resources Management (HRM): Evolution of HRM, Concepts of HRM, Basic functions of HR Manager - Manpower Planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.
B) Marketing: Functions of Marketing, Marketing Mix, Marketing strategies based on Product Life cycle, Channels of distribution.

Unit –IV

Project Management(PERT/CPM): Network Analysis, Programme Evaluation and Review

Technique (PERT), Critical Path Method(CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing.(Simple problems)

Unit –V

Strategic & Contemporary Management Practices: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of corporate planning process, Environmental Scanning, SWOT analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives. Basic concepts of Just-In-Time(JIT) system, Total Quality Management(TQM), Six Sigma and Capability Maturity Model(CMM) levels, Value chain Analysis.

Course Outcomes: On completion of the course, the student should be able to discuss the main techniques and methods used within management science, critically appraise the strengths and limitations of these techniques and methods, carry out simple exercises using such techniques and methods themselves.

Text books:

1. Aryasri, Management Science, TMH, New Delhi, 2009

References:

1. Kotler Philip and Keller Kevin Lane, Marketing Management, Pearson, 2012.
2. Koontz and Weihrich, Essentials of Management, McGraw Hill, 2012.
3. Thomas N. Duening and John M. Ivancevich Management, Principles and Guidelines, Biztantra, 2012.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2012.
5. Samuel C. Certo, Modern Management, 2012.
6. Schermerhorn, Capling, Poole and Wiesner, Management, Wiley, 2012.
7. Parnell, Strategic Management, Cengage, 2012.
8. Lawrence R Jauch, R. Gupta and William F. Glueck: Business Policy and Strategic Management Science, McGraw Hill, 2012.

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III Year B.Tech (ECE), II Semester	**L**	**T/P/D**	**C**
	3	**1 /-/ -**	**3**

(A56023)MICROPROCESSORS AND MICROCONTROLLERS

Course Objectives:

- To develop an in-depth understanding of the operation of microprocessors and microcontrollers, machine language programming & interfacing techniques.

UNIT -I:

8086 Architecture:

8086 Architecture-Functional diagram, Register Organization, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Signal descriptions of 8086- Common Function Signals, Timing diagrams, Interrupts of 8086.

UNIT -II:

Instruction Set and Assembly Language Programming of 8086:

Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT -III:

I/O Interface:

8255 PPI, Various Modes of Operation of 8255 and Interfacing to 8086, Interfacing Keyboard, Display, D/A and A/D Converter.

Interrupt and Communication Interface:

8259 Priority Interrupt control, 8251 USART Architecture and Interfacing to 8086.

UNIT -IV:

Introduction to Microcontrollers:

Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051, Simple Programs

UNIT -V:

8051 Real Time Control:

Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

Course Outcomes:

- The student will learn the internal organization of popular 8086/8051 microprocessors/microcontrollers.
- The student will learn hardware and software interaction and integration.
- The students will learn the design of microprocessors/microcontrollers-based systems.

TEXT BOOKS:

1. D. V. Hall, Microprocessors and Interfacing, TMGH, 2nd Edition 2006.
2. Kenneth. J. Ayala, The 8051 Microcontroller, 3rd Ed., Cengage Learning.

REFERENCE BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, TMH, 2nd Edition 2006.
2. The 8051Microcontrollers, Architecture and Programming and Applications -K.Uma Rao, Andhe Pallavi, Pearson, 2009.
3. Micro Computer System 8086/8088 Family Architecture, Programming and Design - Liu and GA Gibson, PHI, 2nd Ed.
4. Microcontrollers and Application - Ajay. V. Deshmukh, TMGH, 2005.

The 8085 Microprocessor: Architecture, programming and Interfacing – K.Uday Kumar, B.S.Umashankar, 2008, Pearson

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III Year B.Tech (ECE), II Semester	**L**	**T/P/D**	**C**
	4	**1 /-/ -**	**4**

(**A56024**)**DIGITAL COMMUNICATIONS**

Course Objectives:

- To learn about various pulse and digital modulation techniques
- To study about concepts of base band transmissions
- To learn about information theory and various block codes

UNIT-I

Pulse Digital Modulation: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Comparing in PCM systems. Differential PCM systems (DPCM).

Delta Modulation: Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT-II

Digital Modulation Techniques: Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT-III

Data Transmission : Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK,QPSK. Differential PSK

Information Theory : Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties,

UNIT IV

Source Coding : Introductions, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off

Linear Block Codes : Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.

Convolution Codes : Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

UNIT V

Spread Spectrum Modulation: Use Of Spread Spectrum, Direct Sequence Spread Spectrum (DSSS),Code Division Multiple Access, ranging Using DSSS,Frequency Hopping Spread Spectrum,PN Sequences, Generation And Characteristics, Synchronization In Spread Spectrum.

Course Outcomes:

- Describe the process of Sampling, Quantization and PCM techniques
- Determine the error rate due to noise in the Baseband Pulse transmission
- Understand the Passband transmission model and detection of signals in noise
- Describe the generation and detection of various shift keying techniques and determine their performance in terms of BER
- Understand and Implement the concepts of information theory for source coding and discrete memoryless channels
- understand channel coding theorem and Information capacity theorem
- Implement linear block codes and Convolutional codes for error detection and correction
- Understand and implement the decoding of different channel codes

TEXT BOOKS :

1. Digital communications - Simon Haykin, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003

REFERENCES :

1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.
2. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh & Sapre, TMH, 2004.
3. Modern Analog and Digital Communication – B.P.Lathi, Oxford reprint, 3rd edition, 2004.

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III year B.Tech (ECE), II Semester	**L**	**T/P/D**	**C**
	4	**1 /-/ -**	**4**

(**A56025**)**DIGITAL SIGNAL PROCESSING**

Course Objectives:

- To understand characteristics of discrete time signals and systems
- To analyze and process signals using various transform techniques
- To understand various factors involved in design of digital filters
- To understand the effects of finite word length implementation**.**

UNIT I:

Introduction: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

Realization Of Digital Filters: Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,

UNIT II

Discrete Fourier Series: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Z-transform and DFS

Fast Fourier Transforms: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT with General Radix N

UNIT III

IIR Digital Filters: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Step and Impulse Invariant Techniques, Bilinear Transformation Techniques, Spectral transformation, Design Examples: Analog-Digital transformations.

UNIT IV

FIR Digital Filters : Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V: Finite Word Length Effects:

Limit Cycles, Overflow Oscillations, Round Off Noise In IIR Filters, Computational Output Round Off Noise, Methods To Prevent Overflow, Trade Off Between Round Off And Overflow Noise, Dead Band Effects.

Course Outcomes:

- Perform time frequency and Z transform analysis on signals and systems
- Understanding the inter-relationship between DFT and various transforms
- Understand the significance of various filter structures and effects of round-off errors.
- Design a digital filter for a given specification.
- Understand the fast computation of DFT and appreciate the FFT processing.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI

REFERENCE BOOKS:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. Digital Signal Processing: Litan
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
5. Digital Signal Processing – Nagoor Kani

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
3	1/-/-	3

(A56026)TELECOMMUNICATION SWITCHING SYSTEMS
(PROFESSIONAL ELECTIVE-II)

Course Objectives:

- To study about the basic concepts of telephony switching.
- To learn about the telecommunication networks.
- To learn about the telecommunication signalling.

UNIT I

Switching Systems: Evolution of Telecommunications; Basics, functions, types and design parameters of switching system. 100/1000/10,000 Line exchange. Principles of Crossbar switching; A general trunking; Electronic and digital switching systems.

UNIT II

Telecommunications Traffic: Introduction; Unit of traffic; congestion; Traffic measurement; Mathematical model; Lost call systems-Theory; Traffic performance; Loss systems in Tandem; Use of traffic tables; Queuing systems-the second Erlang distribution ; Probability of delay; Finite queue capacity; some other useful results; Systems with a single server; queues in tandem; Delay tables; Applications of delay formulae.

Switching Networks: Introduction, Single stage networks; Grading Principles; Design of progressive grading; other forms of grading; Traffic capacity of Grading; Applications of grading; Link systems-grading; Two, Three and four stage networks; Grades of service of link systems.

UNIT III

Time Division switching: Basics of time division space switching; basics of time division time switching; Time multiplexed space switch; Time multiplexed time switch; Combination switching; Three stage Combination switching. Control of switching systems; call processing functions; sequence of operations; signal exchanges; State transition diagrams; common control; reliability; availability and security ; Stored program control.

UNIT IV

Signalling: Introduction; Customer Line signalling; Audio frequency Junction and trunk circuits; FDM carrier systems-Out band signalling; In band (VF) signalling; PCM signalling; Inter Register signalling; Common channel signalling principles- General signalling
networks; CCITT signalling system number 6; CCITT signalling system number 7; High level data link control; Signal units; The signalling information field.

UNIT V

Packet Switching: Introduction; Statistical multiplexing; Local and wide Area networks- network topologies and their comparison; Routing; Flow control; Standards; Frame relay;

Broadband networks-general; Asynchronous Transfer mode; ATM switches; ISDN; Cellular radio networks; private networks; charging; Routing-general, automatic, Alternative routing.

Course Outcomes:

- Describe the Elements of switching systems.
- Calculate network traffic load and parameters
- Classify different switching systems
- Interpret the switching network configurations
- Explain subscriber loop systems and routing
- Explain the signalling techniques
- Summarize LAN, WAN and MAN
- Describe network architectures and protocol for ISDN & SONET

TEXT BOOKS

1. Telecommunication Switching and Traffic Networks, J.E Flood, Pearson Eduction, 2006.
2. Telecommunication Switching system and Networks, Tyagarajan Viswanathan Prentice hall of India Pvt. Ltd., 2006

REFERENCES

1. Digital Telephony, John C Bellamy, John Wiley International Student Edition, 3rd Edition,2000.
2. Data Communications and Networking, Behrouz A. Ferouzan, TMH, 2nd Edition,2000.
3. Introduction to Data Communications and Networking, Tomasi, Pearson Education, 1st Edition, 2007.

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III Year B.Tech. ECE - II Sem

L	T/P/D	C
3	1/-/-	3

(A56027)SATELLITE COMMUNICATIONS
(PROFESSIONAL ELECTIVE-II)

Course Objectives:

- Know, design understand the construction and principles of Satellites used for communications, GPS and other applications
- Know the tracking techniques of satellites
- Learn about various multiple accessing techniques

UNIT I

Introduction: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

Orbital Mechanics and Launchers: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbital determination, Launches and Launch vehicles, Orbital effects in communication systems performance.

UNIT II

Satellite Subsystems: Attitude and Orbit control system, Telemetry, Tracking, Commanding and Monitoring, Power Systems, Communication Subsystems, Satellite antennas, Equipment reliability and Space qualification.

UNIT III

Satellite Link Design: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, Uplink design, Design of satellite links for specified C/N, System design examples.

Earth Station Technology: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial Interface, Primary Power test methods.

UNIT IV

Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit considerations, Coverage and Frequency Consideration, Delay and Throughput considerations, Systems considerations, Operational NGSO Constellation Designs.

UNIT V

Satellite Navigation and Global Positioning System: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and Codes, Satellite Signal Acquisition, GPS Navigation Message, GPS Signal Levels, GPS Receiver Operation, GPS C/A code accuracy, Differential GPS.

Course Outcomes:

- Understand the communication satellite mechanics
- Know about the satellite internal sub systems for communication applications
- Design the power budget for satellite links
- Know about the principles of GPS
- Understand various constellations of satellite and their applications

TEXT BOOKS

1. Satellite Communications- Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering- Wilbur L. Pritchard, Robert A Nelson and Henri G. Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES

1. Satellite Communications: Design Principles- M. Richharia, B S publications, 2nd Edition, 2003.
2. Satellite Communication- D.C Agarwal, Khanna Publications, 5th Edition.
3. Fundamentals of Satellite Communications- K.N. Raja Rao, PHI, 2004
4. Satellite Communications- Dennis Roddy, McGraw Hill, 4th Edition, 2009

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III Year B.Tech (ECE), II Semester	**L**	**T/P/D**	**C**
	3	**1/-/ -**	**3**

(A56020)NANOTECHNOLOGY

(PROFESSIONAL ELECTIVE-II)

Course Objectives:

- To introduce basics in nano science with some of the pre- requisite principles and concepts
- To understand the size dependent physical properties of materials with nano dimensions
- To learn the principles of various preparation methods of nano materials
- To know the different characterization techniques of nano materials and related instruments
- To study the basic electronic devices at nano scale.

UNIT I

Introduction to Nanotechnology: Importance of Nano scale, Electronic, Magnetic, Optical Properties of Nano materials, Approaches to Nanostructures.

Quantum Mechanical Phenomenon in Nanostructures: Quantum Confinement of Electrons in Semiconductor Nanostructures, Quantum Wells, Quantum Wires, Quantum Dots.

UNIT II

Carbon Nanostructures: CNTs ,Fullerenes, C60, C80, C240 nanostructures, Properties (Mechanical, Optical and Electrical) and applications.

UNIT II

Fabrication of Nanomaterials: Physical Methods: Inert Gas Condensation, Arc Discharge, RF plasma, Plasma arc technique, Ion sputtering, Laser ablation, Laser Pyrolysis, Molecular beam epitaxial, CVD method.

UNIT III

Nanoscale Characterization Techniques: Scanning Probe Techniques (AFM ,MFM, STM, SEM,TEM) , XRD.

Nanomedicine: Lab on chip for bio analysis, Core/Shell Nanoparticles in drug delivery systems, Targeted drug delivery, cancer treatment , and bone tissue treatment.

UNIT IV

Nano and Molecular Electronics: Resonant Tunnelling Structures, Single Electron Tunnelling, SET, Coulomb Blockade, Giant Magneto Resistance, Tunnelling Magneto Resistance.

UNIT V:

Nanolithography and Nanomanipulation: e- beam lithography an SEM based nanolithography and nanomanipulation, ion beam lithography, Oxidation and metallization, Mask and its application, Deep UV lithography, X ray based lithography.

Course outcomes:

- Appreciate the importance of nano dimensional materials and their applications.
- Realize and explain that the properties of nano materials are size dependent and vary from corresponding bulk materials
- Demonstrate the skills required to prepare some of the nano materials in the laboratory
- Characterize and study the properties with respect to their size and shapes.
- Appreciate the applications of nano electronic devices and understand their basic principles.

TEXT BOOKS:

1. Charles.p.Poole, Introuction to nanotechnology, Springer publications.
2. Springer Handbook of Nanotechnology- Bharath Bhushan.
3. Phani Kumar,Principles of Nanotechnology, Scietech publications.

REFERENCE BOOKS :

1. David Ferry " Transport in Nanostructures " Cambridge University press 2000.
2. Nan biotechnology, ed. C.M.Neimeyer, C.A. Mirkin.
3. Nanofabrication towards bio medical applications: Techniques,tools,Application and impact,t-E. Challa S.S.R.Kumar ,J.H Carola.
4. Encyclopedia of Nanotechnology-Hari Singh Nawla.
5. Carbon Nanotubes:Properties and applications- Michael J. O'Connell.
6. S.Dutta " Electron Transport in microscopic System " Cambridge University press.
7. H. Grabert and Devoret " Single Charge Tunnelling " Plenum press 1992.

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III Year B.Tech (ECE), II Semester	**L**	**T/P/D**	**C**
	-	**- /3/ -**	**2**

(**A56208)MICROPROCESSORS AND MICROCONTROLLERS LAB**

Note: Minimum 12 experiments should be conducted:

The Following programs are to be written for assembler and to be executed the same with 8086 and 8051 kits

List of Experiments:

1. Programmes for 16 bit arithmetic operations for 8086 (Using Various Addressing Modes).
2. Program for sorting an array for 8086.
3. Program for searching for a number or character in string for 8086.
4. Program for string manipulations for 8086.
5. Program for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Interfacing 8255 to 8086.
8. Serial communication between two microprocessor kits using 8251.
9. Interfacing to 8086 an programming to control stepper motor.
10. Interfacing LCD to 8086
11. Interfacing 8259 PIC to 8086.
12. Interfacing 8279 keyboard controller to 8086.
13. SRAM/DRAM Interfacing to 8086.
14. Programming using arithmetic, logical and bit manipulation instructions of 8051.
15. Program and verify Timer/counter in 8051.
16. Program and verify Interrupt handling in 8051.
17. Communication between 8051 kit and PC.
18. Interfacing Matrix/Keyboard to 8051.
19. Data Transfer from Peripheral to Memory through DMA controller 8237/8257.

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III Year B.Tech (ECE), II Semester	**L**	**T/P/D**	**C**
	-	**- /3/ -**	**2**

(**A56207**)**DIGITAL SIGNAL PROCESSING LAB**

Note:

- Minimum 12 experiments are to be conducted.
- The programs shall be implemented in software(Using MATLAB/Lab view/C programming/OCTAVE Equivalent) and hardware (Using TI / Analog devices/Motorola/Equivalent DSP processor)

List of Experiments:

1. Generation of Sinusoidal waveform/ signal based on recursive difference equations.
2. Impulse response of first order and second order systems.
3. To find DFT/IDFT of given DT signal.
4. To verify Linear convolution of given sequence.
5. To verify Circular convolution of given sequence.
6. To find frequency response of given system given in(Transfer Function/Differential equation form).
7. Implementation of FFT of given sequence.
8. Determination of power spectrum of a given signal(s).
9. Implementation of LP FIR filters for a given sequence.
10. Implementation of HP FIR filters for a given sequence.
11. Implementation of LP IIR filters for a given sequence.
12. Implementation of HP IIR filters for a given sequence.
13. Generation of Sinusoidal signal through filtering.
14. Generation of DTMF signals.
15. Noise removal: Add noise above 3 KHz and then remove, interference suppression using 400 Hz tone.

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
3	-/-/-	3

(A57033)COMPUTER NETWORKS

Course Objectives:

The subject aims to provide the student with:

- An understanding the evolution of early networks and the Internet.
- The capability to express the Fundamentals of networks and the problems involved in the networks.
- The ability to express the Fundamental functionality of the layers and protocols involved with the case study like UDP, TCP, HTTP.
- Demonstrating the ability to use effectively a range of common networked applications.

UNIT -I:

Introduction to Networks:

Internet, Protocols and Standards, The OSI Model, Layers in OSI Model, TCP/IP Suite, Addressing.

Physical Layer:

Multiplexing, Transmission Media, Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT -II:

Data Link Layer:

Introduction, Checksum, Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols.

Medium Access Sub Layer:

Random Access Controlled Access, Channelization, IEEE Standards, Ethernet, Fast Ethernet, Giga-Bit Ethernet, Wireless LANs.

UNIT -III:

Network Layer:

Logical Addressing, Internetworking, Tunneling, Address Mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.

UNIT -IV:

Transport Layer:

Process to Process Delivery, UDP and TCP Protocols, SCTP, Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

UNIT -V:

Application Layer:

Domain Name Space, DNS in Internet, Electronic Mail, FTP, WWW, HTTP, SNMP, Multi-Media, Network Security.

Course Outcomes:

At the end of the course student should be able to:

- Explain the hierarchical, layered structure of typical network architecture.
- Perform Data correction and error detection techniques due to problems in the medium.
- Explain data link layer protocols like Stop and wait HDLC and PPP.
- Improving the performance in MAC using techniques like Random access and controlled access etc.
- Explain the Theory involved in network, transport and application layers and protocols.

TEXT BOOKS:

1. Data Communications and Networking – Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks -- Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Education
2. Understanding Communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning.
3. Computer and Communication Networks - Nader F. Mir, Pearson Education
4. Computer Networking: A Top-Down Approach Featuring the Internet - James F.Kurose, K.W.Ross, 3rd Edition, Pearson Education.
5. Data and Computer Communications - G. S. Hura and M. Singhal, CRC Press, Taylor and Francis Group.

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
4	-/-/-	4

(A57029)MICROWAVE ENGINEERING

Course Objectives:

- To present a cohesive overview of the required fundamentals on Transmission lines and Wave Propagation Theory in the case of Wave guides.
- To familiarize the students with various coupling mechanisms used in waveguides.
- To introduce the basic properties of Polarization and Ferrite materials composition in the case of waveguide components.
- To introduce the multiport junction concept for splitting the microwave energy in a desired direction.
- To get the exposure on Microwave components in building a Microwave test bench setup for measurements.
-

UNIT I: **Microwave Transmission Lines**

Introduction, Microwave Spectrum and Bands, Applications of Microwaves.

Rectangular Waveguides: Solution of Wave Equations in Rectangular coordinates. TE/TM mode Analysis, Expression for fields, Characteristic Equation and Cut-off Frequencies. Filter characteristics, Dominant and Degenerate Modes, Mode Characteristics: Phase and Group Velocities, Wavelengths and Impedance Relations. Power Transmission and Power Losses in Rectangular Waveguides.

Micro strip Lines- Introduction, Z0 Relations, Effective Dielectric Constant, Q Factor and Losses. Illustrative Problems.

UNIT II: **Waveguide components-I**

Cavity Resonators: Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Illustrative Problems.

Coupling Mechanisms: Probe, Loop, Aperture types.

Waveguide Discontinuities: Waveguide Windows, Tuning Screws and Posts, Matched Loads.

Waveguide Attenuators: Different types, Resistive Card and Rotary vane Attenuators;

Waveguide Phase shifters: Types, Dielectric and Rotary vane Phase shifters.

Ferrite materials –Composition and Characteristics, Faraday rotation, Ferrite Components -Isolator, Circulator, Gyrator.

UNIT III:

Microwave Tubes: Limitations of Conventional tubes at Microwave frequencies, Microwave Tubes-Classifications, 2 cavity Klystrons –Structure, Velocity Modulation process and Applegate diagram, Bunching process, Power output and efficiency. Reflex Klystrons-Structure, Velocity Modulation, Applegate diagram and Principle of Working, Mode Characteristics, Power Output and Efficiency, Oscillating Modes and output characteristics.

Travelling Wave tubes: Significance, Types of Slow wave structures, Amplification Process, Gain considerations (Qualitative analysis only)

UNIT IV

Microwave crossed field tubes: Classification, Cylindrical Magnetron-Structure and characteristics, PI mode operation. Illustrative problems.

Microwave Solid State Devices:

Transferred Electronic Devices: Introduction, Gunn Diode-Principle, Two valley theory, High field domain, Basic modes of operation. Avalanche transit time devices:

UNIT V

Scattering Matrix: Significance, Scattering Parameters, Formulation and Properties of S Matrix. **Waveguide Multiport Junctions:** E- plane, H-Plane and Magic Tee; Directional coupler –two hole, Bethe Hole types. S matrix calculations of Two port and Multiport Junctions.

Microwave Measurements

Description of Microwave Bench – Different Blocks and their Features, Microwave power measurement- Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q and Impedance Measurements.

Course Outcomes:

- Learn the applications and advantages of microwaves and study the characteristics of waveguide and their mode patterns etc.
- Ability to describe the characteristics of cavities and microstrip lines.
- Develop an ability to assess reciprocal and nonreciprocal devices at microwave frequencies(attenuators, circulators Power dividers, Phase shifters etc).
- Describe and derive the waveguide multi port networks and their Scattering parameters
- Learn the principle of operation of klystron theory for microwave signal generation and amplification
- Learn the principle of operation of magnetron and TWT for microwave signal generation and amplification
- Differentiate the principle of operation of solid state devices and Interpret the theory for microwave signal generation and amplification
- Ability to do experiments for the measurement of RF power, Impedance, Attenuation, Frequency, VSWR etc

TEXT BOOKS

1. Microwave Devices and Circuits – by Samuel Y. Liao, Pearson,3rd Edition,2003

2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and distributors, New Delhi, 2004.
3. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.

REFERENCES

1. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New age
2. International PublishersLtd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Microwave Engineering – A.Das and S.K.Das, TMH, 2nd Edition, 2009.

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IV Year B.Tech. ECE - I Sem

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3	1/-/-	3

(A57030)VLSI DESIGN

Course Objectives:

- To learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
- To study the concepts of stick diagrams and layouts with the knowledge of MOS layers through design rules.
- To study gate level design of subsystem, integrated circuit and CMOS testing.

UNIT I

Introduction: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and Bi-CMOS technologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ion implantation, Metallization and Encapsulation.

Basic Electrical Properties : Basic Electrical Properties of MOS ,CMOS and Bi-CMOS Circuits: IDS-VDS relationships, MOS transistor threshold Voltage, g_m, g_{ds}, figure of merit, Pass transistor, NMOS inverter, Various pull - ups, Determination of pull-up to pull-down ratio(Z_{pu} / Z_{pd}) , CMOS Inverter analysis and design, Bi-CMOS inverters, Latch-up in CMOS circuits.

UNIT II

VLSI Circuit Design Processes : VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts, Lambda based design rules, Contact cuts , CMOS Lambda based design rules, Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling of MOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

UNIT III

Gate Level Design And Layout: Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit: Pseudo-NMOS , Dynamic CMOS logic. Basic circuit concepts, Sheet Resistance RS and its concept to MOS, Area Capacitance Units, Calculations, The delay unit T, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers.

UNIT IV

Subsystem Design: Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, Serial-Parallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/Down Counter, Memory elements.

Semiconductor Integrated Circuit Design: PLDs, FPGAs, CPLDs, Standard Cells, Programmable

Array Logic, Programmable Logic Array Design Approach.

UNIT V

CMOS Testing : CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Over view of Chip level Test Techniques and System-level Test Techniques, Layout Design for Improved Testability.

Course Outcomes:

- Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
- Choose an appropriate inverter depending on specifications required for a circuit.
- Draw the layout of any logic circuit which helps to understand and estimate parasitic of any circuit.
- Design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- Provide design concepts required to design building blocks of data path using gates.
- Design simple memories using MOS transistors and can understand design of large memories.
- Design simple logic circuit using PLA, PAL, FPGA and CPLD.
- 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.

TEXTBOOKS

1. Essentials of VLSI circuits and systems – Kamran Eshraghian, Dougles and A. Pucknell, PHI Edition, 2005.
2. Modern VLSI Design –Wayne Wolf, Pearson Education , 3rd Edition, 1997.
3. CMOS VLSI Design – A circuits and systems perspective, Neil H.E Weste , David Harris , Ayan Banerjee, pearson ,2009.

REFERENCES

1. CMOS logic circuit Design – John P. Uyemura , Springer , 2007
2. VLSI DESIGN – K.Lal Kishore , VSV Prabhakar – I.K..International ,2009
3. VLSI Design – A.Albert Raj, Latha PHI, 2008.
4. Introduction to VLSI Design- Mead and Convey , BS Publcations, 2010.
5. VLSI Design – M. Michal Vai, CRC Press, 2009.

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
3	-/-/-	3

(A57031) EMBEDDED SYSTEMS DESIGN
(PROFESSIONAL ELECTIVE-III)

Course Objectives:

For embedded systems, the course will enable the students to:

- Understand the basics of an embedded system
- Program an embedded system
- To learn the method of designing an Embedded System for any type of applications.
- To understand operating systems concepts, types and choosing RTOS.
- Design, implement and test an embedded system.

UNIT -I: Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT -II: Typical Embedded System:

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT -III: Embedded Firmware:

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT -IV: RTOS Based Embedded System Design:

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT -V:

Task Communication: Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

Course Outcomes:

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

- Understand and design embedded systems.
- Learn basic of OS and RTOS
- Understand types of memory and interfacing to external world.
- Understand task synchronization techniques, device drivers and how to choose an RTOS

TEXT BOOKS:

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

REFERENCE BOOKS:

1. Embedded Systems - Raj Kamal, TMH.

2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.

3. Embedded Systems – Lyla, Pearson, 2013

4. An Embedded Software Primer - David E. Simon, Pearson Education

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
3	-/-/-	3

(A57032) BIOMETRIC SYSTEM
(PROFESSIONAL ELECTIVE-III)

Course Objectives:

For Biometric system, the course will enable the students:

- to introduce the principles of biometric authentication
- to study those biometric characteristics which have commercial implementations, as well as emerging techniques, discussing hopes and fears related to the presented modalities.
- to show how to apply statistics for biometric reliability evaluation

UNIT -I:

Biometric Fundamentals : Key Biometric terms and Processes – Definitions-verification and identification – matching, Accuracy in Biometric Systems – False match rate - False nonmatch rate - Failure to enroll rate – Derived metrics - An Introduction to Biometric Authentication Systems- a taxonomy of application environment, a system model, biometrics and privacy.

UNIT -II:

Fingerprint Identification Technology:

History, Components, Application of Fingerprints, The Technology- Finger Scan Strengths and Weaknesses, Criminal Applications, Civil Applications, Commercial Applications, Technology Evaluation of Fingerprint Verification Algorithms.

UNIT -III:

IRIS Recognition:

Introduction, Anatomical and Physiological underpinnings, Components, Sensing, Iris Scan Representation and Matching, Iris Scan Strengths and Weaknesses, System Performance, Future Directions.

UNIT -IV:

Face Recognition:

Introduction, components, Facial Scan Technologies, Face Detection, Face Recognition-Representation and Classification, Kernel- based Methods and 3D Models, Learning the Face

Spare, Facial Scan Strengths and Weaknesses, Methods for assessing progress in Face Recognition.

UNIT -V:

Voice Scan:

Introduction, Components, Features and Models, Addition Method for managing Variability, Measuring Performance, Alternative Approaches, Voice Scan Strengths and Weaknesses, NIST Speaker Recognition Evaluation Program, Biometric System Integration.

Course Outcomes:

At the end of the course students should be able to:

- describe principles of the selected physical and behavioral biometric methods, and know how to deploy them in authentication scenarios,
- organize and conduct biometric data collection processes, and understand how to use biometric databases in system evaluation,
- understand differences between a biometric method and a biometric system,
- itemize the most up-to-date examples of real biometric applications in human authentication

TEXT BOOKS:

1. James Wayman & Anil Jain, Biometric Systems – Technology, Design and Performance Evaluation, Springer-verlag London Ltd, USA, 2005
2. Sanir Nanavati, Michael Thieme, Biometrics Identity Verification in a Networked world, Wiley Computer Publishing Ltd, New Delhi, 2003.

REFERENCE BOOKS:

1. John D. Woodword Jr., Biometrics, Dreamtech Press, New Delhi, 2003.

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
3	-/-/-	3

(A57028)OPTICAL COMMUNICATIONS

(PROFESSIONAL ELECTIVE-III)

Course Objectives:

- To learn about the basic elements of optical fiber transmission link, fiber modes configurations and structures
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors
- To learn about various optical sources and photo detectors
- To learn about the fiber optical network components and networking of optical fibers.

UNIT I :

Optical fiber communication - The general system, Advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, V number, Mode coupling, Step Index fibers, Graded Index fibers. Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

UNIT II :

Group delay, Types of Dispersion – Intra model dispersion:Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss. Fiber Splicing- Splicing techniques, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

UNIT III:

Optical sources - LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies. Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

UNIT IV:

Optical detectors - Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors. Optical receiver operation-fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers

UNIT V:

Optical system design — System Considerations, Component choice, Multiplexing. Point-to-point links, System specifications, Link power budget with examples, Rise time budget with examples. WDM - Principles, Types of WDM, Measurement of Attenuation and Dispersion

Course Outcomes:

- Posses and understanding various fiber optic components used in optical fiber communication systems. Evaluate and design analog and digital optical fiber communication system..
- Summarize the optical fiber waveguide transmission through SM & MM fibers
- Ability to analyze the Types of Dispersions
- Understand basics of LASER Diodes & LEDs and study their characteristics. Ability to analyze characteristics of optical fiber
- Ability to Understand the how to Launch the Power into Optical Fiber
- Understand basics of Optical Detectors and their characteristics
- To gain the Knowledge of Optical System Design
- Explain the WDM concepts

TEXT BOOKS

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

RERFERENCES

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
3	-/-/-	3

(A57034)DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES
(PROFESSIONAL ELECTIVE-IV)

Course Objectives:

The objectives of the course are:

- To recall digital transform techniques.
- To introduce architectural features of programmable DSP Processors of TI and Analog Devices..
- To give practical examples of DSP Processor architectures for better understanding.
- To develop the programming knowledge using Instruction set of DSP Processors.
- To understand interfacing techniques to memory and I/O devices.

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UNIT –I:

Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT –II:

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT -III:

Programmable Digital Signal Processors: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT –IV:

Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.

Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT –V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

Course Outcomes:

Upon completion of the course, the student

- Be able to distinguish between the architectural features of General purpose processors and DSP processors.
- Understand the architectures of TMS320C54xx and ADSP 2100 DSP devices.
- Be able to write simple assembly language programs using instruction set of TMS320C54xx.

Can interface various devices to DSP Processors

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Embedded Signal Processing with the Micro Signal Architecture Publisher: Woon-Seng Gan, Sen M. Kuo, Wiley-IEEE Press, 2007

REFERENCE BOOKS:

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing – Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. 2000, S. Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
5. *The Scientist and Engineer's Guide to Digital Signal Processing* by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997
6. *Embedded Media Processing* by David J. Katz and Rick Gentile of Analog Devices, Newnes.

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
3	-/-/-	3

(A57035)DIGITAL IMAGE PROCESSING

(PROFESSIONAL ELECTIVE-IV)

Course Objectives

- Able to acquire and represent the image in spatial domain.
- Able to transform images from spatial to frequency domains.
- To introduce students to a large variety of processing techniques of practical interest related to recent developments in Digital image processing

UNIT I

Fundamentals of Image Processing: Digital Image Fundamentals, Basic steps of Image Processing System, Sampling and Quantization of an image, relationship between pixels, Imaging Geometry.

Image Transforms: 2 D- Discrete Fourier Transform, Discrete Cosine Transform (DCT), Haar Transform, Hadmard Transform, Hostelling Transform and slant transform.

UNIT II

Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.

Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.

UNIT III

Image Segmentation: Segmentation concepts, Point, Line and Edge Detection, Edge Linking using Hough Transform, Thresholding, Region Based segmentation.

UNIT IV

Image Compression: Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, Run length coding, Bit plane coding, Transform coding, Predictive coding, JPEG Standards.

UNIT V

Image Restoration: Image Restoration Degradation model, Algebraic approach to restoration, Inverse Filtering, Least Mean square filters.

Morphological Image Processing: Dilation and Erosion, Opening and closing, the hit or miss Transformation, Overview of Digital Image Watermarking Methods.

Course Outcomes:

- Apply to current technologies and issues that are specific to image processing systems.
- Leverage the student's knowledge of image processing to a practical system.
- Compress the Digital image which is required for storage and transmission of digital images.

TEXT BOOKS

1. Digital Image Processing- Rafael C. Gonzalez and Richard E.Woods, 3rd Edition, Pearson, 2008.
2. Digital Image Processing- S.Jayaraman, S Esakkirajan, T Veerakumar, TMH, 2010.

REFERENCES

1. Digital Image Processing-William K.Pratt, 3rd Edition, John Willey, 2004.
2. Fundamentals of Digital Image Processing-A.K.Jain, PHI, 1989.
3. Digital Image Processing using MATLAB - Rafael C. Gonzalez, Richard E.Woods and Steven L.Edding 2nd , TMH. 2010.
4. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyl, Cengage Learning, 2008.
5. Introduction to image Processing and Analysis – John C. Russ, J. Christian Russ, CRC Press, 2010

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IV Year B.Tech. ECE - I Sem

L	T/P/D	C
3	-/-/-	3

(A57036) TV ENGINEERING
(PROFESSIONAL ELECTIVE-IV)

Course Objectives:

- Study the different camera and picture tubes.
- Know about various standard TV channels.
- Study about TV receiver, sync separation, detector etc.,
- Study about color signal encoding ,decoding and receiver.

UNIT–I: Introduction:

TV transmitter and receivers, synchronization. Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal, TV standards. Camera tubes: image Orthicon, Plumbicon, vidicon, silicon Diode Array vidicon, Comparison of camera tubes, Monochrome TV camera,

TV Signal Transmission a**nd Propagation**:

Picture Signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW,TV transmitter, TV signal propagation, interference, TV broadcast channels, TV transmission Antennas.

UNIT –II: Monochrome TV Receiver:

RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits, AGC, noise cancellation, video and inter carrier sound signal detection, vision IF subsystem of Black and White receivers, Receiver sound system: FM detection, FM Sound detectors, and typical applications.

UNIT –III: Sync Separation and Detection:

TV Receiver Tuners, Tuner operation, VHF and UHF tuners, digital tuning techniques, remote control of receiver functions. Sync Separation, AFC and Deflection Oscillators: Synchronous separation, k noise in sync pulses, separation of frame and line sync pulses. AFC, single ended AFC circuit, Deflection Oscillators, deflection drive Ics, Receiver Antennas, Picture Tubes.

UNIT–IV: Color Television:

Colour signal generation, additive colour mixing, video signals for colours, colour difference signals, encoding, Perception of brightness and colours luminance signal, Encoding of colour difference signals, formation of chrominance signals, color cameras, Colour picture tubes.

Color Signal Encoding and Decoding:

NTSC colour system PAL colour system, PAL encoder, PAL-D Decoder, chrome signal amplifiers, separation of U and V signals, colour burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and colour killer circuits, U& V demodulators.

UNIT –V: Color Receiver:

Introduction to colour receiver, Electron tuners, IF subsystem, Y-signal channel, Chroma decoder, Separation of U & V Color, Phasors, synchronous demodulators, Sub carrier generation, raster circuits.

Digital TV: Introduction to Digital TV, Digital Satellite TV, Direct to Home Satellite TV, Digital TV Transmitter, Digital TV Receiver, Digital Terrestrial TV, LCD TV, LED TV, CCD Image Sensors, HDTV.

Course Outcomes:

- Expected to understand the concept of TV transmission and reception.
- Acquired knowledge about complete TV receiver.
- Expected to learn about color separation, color coding etc.,

TEXT BOOKS:

1. Television and Video Engineering- A.M.Dhake, 2nd Edition.
2. Modern Television Practice – Principles, Technology and Service- R.R.Gallatin, New Age International Publication, 2002.
3. Monochrome and Colour TV- R.R. Gulati, New Age International Publication, 2002.

REFERENCE BOOKS:

1. Colour Television Theory and Practice-S.P.Bali, TMH, 1994.
2. Basic Television and Video Systems-B.Grob and C.E.Herndon, McGraw Hill, 1999.

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(A57211) MICROWAVE AND DIGITAL COMMUNICATIONS LAB

Note:- minimum 12 experiments to be conducted

Part-A: Microwave Engineering Lab (Any 6 experiments)

1. Reflex klystron characteristics
2. Gunn diode characteristics
3. Directional coupler characteristics
4. VSWR measurement
5. Measurement of waveguide parameters
6. Measurement of impedance of a given load
7. Measurement of a scattering parameters of a magic tee
8. Measurement of scattering parameters of circulator
9. Attenuation measurement
10. Microwave frequency measurement

Part-B: Digital Communication Lab (Any 6 Experiments)

1. PCM generation and detection
2. Differential pulse code modulation
3. Delta modulation
4. Time division multiplexing of 2 band limited signals
5. Frequency shift keying
6. Phase shift keying
7. Amplitude shift keying
8. DPSK: generation and detection
9. QPSK: generation and detection
10. Study of the spectral characteristics of PAM,QAM

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IV Year B.Tech (ECE), I Semester	**L**	**T/P/D**	**C**
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(A57210)ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

1. Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be an integrated theory and lab course to enable students to use ‗good' English and perform the following:

- Gather ideas and information, to organize ideas relevantly and coherently.
- Engage in debates.
- Participate in group discussions.
- Face interviews.
- Write project/research reports/technical reports.
- Make oral presentations.
- Write formal letters.
- Transfer information from non-verbal to verbal texts and vice versa.
- To take part in social and professional communication.

2. Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

1. **Vocabulary Building** – synonyms and antonyms, Word Roots, One-Word Substitutes, Prefixes and Suffixes, Study of Word Origin, Analogy, Idioms and Phrases.
2. **Reading Comprehension –** Reading for Facts, Guessing meanings from context, Scanning, Skimming, Inferring Meaning, and Critical Reading.
3. **Writing Skills** –Structure and presentation of different types of writing - Resume Writing /E-Correspondence/Statement of Purpose.
4. **Technical Writing**- Technical Report Writing, Research Abilities/Data Collection/Organizing Data/Tools/Analysis.
5. **Group Discussion** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Coherence.
6. **Presentation Skills** – Oral presentations (individual and group) through JAM sessions/Seminars, Written Presentations through Projects/ PPTs/e-mails etc.
7. **Interview Skills** – Concept and Process, Pre-Interview Planning, Opening Strategies, Answering Strategies, Interview through Telephone and Video-Conferencing.

4. Minimum Requirement: The English Language Lab shall have two parts:

i) The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component): Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

ii) Headphones of High quality

5. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- Clarity Pronunciation Power – part II
- Oxford Advanced Learner‘s Compass, 7th Edition
- DELTA‘s key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech.

- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from train2success.com‘
  i. Preparing for being Interviewed,
  ii. Positive Thinking,
  iii. Interviewing Skills,
  iv. Telephone Skills,
  v. Time Management
  vi. Team Building,
  vii. Decision making
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

6. **Books Recommended:**

Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.

1. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
2. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
3. English Vocabulary in Use series, Cambridge University Press 2008.
4. Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
5. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
6. Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
7. Job Hunting by Colm Downes, Cambridge University Press 2008.
8. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
9. English for Technical Communication for Engineering Students, Aysha Vish hwamohan, Tata Mc Graw-Hil 2009.
10. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron‘s/DELTA/Cambridge University Press.
11. International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

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IV Year B.Tech. ECE - II Sem

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(A58019) CELLULAR AND MOBILE COMMUNICATIONS (PROFESSIONAL ELECTIVE-V)

Course Objectives:

- To understand concepts of cellular and mobile radio systems
- To design cellular radio system and the required antennas
- To learn about digital cellular networks
- To understand concepts of cellular and mobile radio systems
- To design cellular radio system and the required antennas

UNIT I:

Cellular Mobile Radio Systems: Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

Elements Of Cellular Radio System Design : General description of the problem, concept of frequency reuse, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni-directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT II:

Interference: Introduction to Co-Channel Interference, real time Co-Channel interference, measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

Cell Coverage For Signal And Traffic : Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, path loss from of a point to point prediction model.

UNIT III:

Cell Site And Mobile Antennas : Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

Frequency Management And Channel Assignment: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel ssignment.

UNIT IV:

Handoffs And Dropped Calls:

Handoff, dropped calls and cell splitting, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assisted handoff, Intersystem handoff, micro cells, vehicle locating methods, dropped call rates and their evaluation.

UNIT V:

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, GSM Standards, multiple access schemes -TDMA, CDMA.

Course Outcomes:

- Understanding the cellular and frequency reuse concept
- Understanding of wireless propagation of Electromagnetic wave (reflection, diffraction, and scattering) and associated losses
- Understanding and application of trunking theory and application of Erlang B, and Erlang C formulas
- Basic Design and Planning of a wireless cellular system
- Understanding some of the contemporary issues in the cellular communications engineering profession
- Applying analog and digital communications principles to cellular and wireless communications
- Successfully conduct and present term project
- Differentiate the generations of cellular communications

TEXTBOOKS

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2nd Edition, 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

REFERENCES

1. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edition, 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
3. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.

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IV Year B.Tech. ECE - II Sem

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(A58020) RADAR SYSTEMS
(PROFESSIONAL ELECTIVE-V)

Course Objectives:

• To derive and discuss the Range equation and the nature of detection.
• To apply Doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars
• To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.
• To understand principles of navigation, in addition to approach and landing aids as related to navigation
• To understand navigation of ships from shore to shore

UNIT I

Basics of Radar: Introduction, Radar block diagram and operation, Maximum Unambiguous Range, Simple form of Radar Equation, Radar frequencies and Applications. Prediction of Range Performance, Minimum detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems.

Radar Equation: SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets: sphere, cone–sphere), Transmitter Power, PRF and Range Ambiguities. Systems Losses (qualitative treatment) Illustrative Problems.

UNIT II

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and receiver, Non zero IF Receiver , Receiver Bandwidth Requirements, Applications of CW Radar. Illustrative Problems.

FM-CW Radar: Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

UNIT III

MTI and Pulse Doppler radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated
Doppler Filter. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

Tracking Radar: Tracking with Radar, Sequential Lobbing, Conical Scan, Monopulse Tracking Radar

– Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse. Tracking in Range, Acquisition and Scanning Patterns. Comparison of Trackers.

UNIT V

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

Radar Receivers – **Noise** Figure and Noise Temperature. Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Applications, Advantages and Limitations.

Electronic Warfare: Introduction to ESM, ECM and ECCM systems.

COURSE OUTCOMES:

- Explain principles of navigation, in addition to approach and landing aids as related to navigation
- Derive and discuss the Range equation and the nature of detection.
- Describe about the navigation systems using the satellite.

TEXT BOOKS

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd ed., 2007.
2. Radar Principles – Peebles, Jr., P.Z., Wiley, New York, 1998.

REFERENCES

1. Introduction to Radar Systems – Merrill I. Skolnik, 3rd ed., TMH, 2001.
2. Radar : Principles, Technology, Applications – Byron Edde, Pearson Education, 2004.

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IV Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
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(A58021) NETWORK SECURITY
(PROFESSIONAL ELECTIVE-V)

Objectives

1. To impart knowledge on network security issues, services, goals and mechanisms.
2. To analyze the security of communication systems, networks and protocols.
3. To apply algorithms used for secure transactions in real world applications

UNIT-I:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT-II: Conventional Encryption:

Conventional encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.

UNIT-III:

Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.

UNIT-IV:

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

UNIT-V:

Web Security: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Intruders, Viruses and related threats, Firewall Design principles, Trusted Systems, Intrusion Detection Systems.

Outcomes

1. Demonstrate the knowledge of cryptography and network security concepts and applications.
2. Ability to apply security principles in system design.
3. Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

Text Books:

1. "Cryptography and Network Security" by William Stallings 3rd Edition, Pearson Education.
2. "Applied Cryptography" by Bruce Schneier.

References:

1. Cryptography and Network Security by Behrouz A.Forouzan
2. Network Security and Cryptography: Bernard Menezes
3. Network security-Private communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner ,Pearson/PHI

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IV Year B.Tech. ECE - II Sem

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(A58022) WIRELESS COMMUNCIATIONS AND NETWORKS
(PROFESSIONAL ELECTIVE-VI)

Course Objectives:

The Course Objectives are:

- To Provide the Students with the fundamental treatment about many Practical and theoretical concepts .
- To equip the students with various kinds of wireless networks and its operations.
- To prepare students to understand the concept of frequency reuse techniques.
- To prepare students to understand various modulation schemes and multiple access techniques.
- To improve an analytical perspective on the design and analysis of the traditional and emerging wireless networks.
- To train students to understand architecture and operation of various wireless wide area networks such as GSM, GPRS and SMS.
- To train students to understand wireless LAN architecture and operation.
- To prepare students to understand the emerging technique OFDM and its importance in the wireless communications.

UNIT I:

The cellular concept sytem design fundamentals: Introduction,Frequency reuse,channel assignment stratagies,hand off stratagies-priritsing hand offs,pracitical hand off considarations,interference and system capacity-co channel interference and system capacity,channel planning for wireless systems,adjacent channel interference,power control for reduced interference,trunking and grade off service,improvind coverage in capacity in cellular systems-cell splitting,sectoring.

UNIT II:

Mobile radio propagation:Large scale path loss: Introduction to radio wave propagation,freespace propagation model,relating power to E.F,the 3 basic propagation mechanisms,reflections from dielectric,brewster angle,reflection from prefect conductors,ground reflection(tworay)model,diffraction-fresnel zone geometry,knofe edge defraction model,multiple knife

edge defraction,scattering,outdoor propagation models-longly-ryce models,okamura model,hata model,pcs extension to hata model,wafisch and bertoni model,white band pcs microcell model,indoor oropagation model-partition losses,same floor,partition losses between floor,log distance path loss model,Ericson multiple break point model,attenuation factor model,signal penetration into buildings,retracing and sight specific modeling.

UNIT III:

Moble radio propagation:small scale fading and multipath: Small scale multipath propagation,factors influencing smaal scale fading,Doppler shift,impulse respose model of a multipath channel-relation ship bewen bandwidth and received power.,Introduction to multiple access,FDMA,TDMA,Spred spectrum multiple access,space division multiple access,packet radio,capacity of a cellular systemsnetworks,Transmission hierarchy,traffic routing in wireless networks,wireless data services,common channel signaling.Differnce between wireless and fixed telephonelevel crossing and fadind characterstics ,Tworayleigh fadind model

UNIT IV:

Equalisation and diversity: Introduction, fundamentals of equalization,training a generic adaptive equaiser,equalizer in a communication receiver,linear equalizers,non liner equailisation-decision,feeedback equalization(DFE)Mechanism to sipport a mobile environment, communication in the infrastructure,IS-95 CDMA forward channel,IS-95 CDMA reverse channel,Packet and frame formats in IS-95,IMT-2000,forward channel in W-CDMA and CDMA 2000,Reverce channels in W-CDMA and CDMA-2000,GPRS and higher data rates,Short messaging sevice In GPRS mobile application protocols,polarisastion diversty,frequency diversity,,Time diversity,RAKE Reciever

UNIT V:

Wireless Networks: Introduction to wirelss networks,Adventages and dis adventages of wireless lan,wlan tropolagies,wlan standard ieee 802.11.iee802.11 medium access control,comparision of ieee802.11 a,b,g and n standard,ieeee802.16 and its enhancements wireless pans ,hyper lan,WLL.

Course Outcomes:

Upon Completion of the Course, the student will be able to:

- Understand the Principles of wireless communications.
- Understand fundamentals of wireless networking.
- Understand cellular system design concepts.
- Analyze various multiple access schemes used in wireless communication.
- Understand wireless wide area network and their performance analysis.
- Demonstrate wireless local area networks and their specifications.
- Familiar with some of the existing and emerging wireless standards.
- Understand the concept of orthogonal frequency division multiplexing.

TEXT BOOKS:

1. Theodore s Rappaport ,"Wireless Communication and Applications." Pearson Education -2002.
2. Upen Datal,"Wireless Communications,"camebride University Press,2005.
3. Mobile cellular communications – gottapu shashibhushan rao,person education 2012.

REFERENCES:

1. P.Nicopolitidies, M.SObaidat,G.I.Papadimitria, A.S. Pomportsis,"Wireless Networks", Jhon Wiley & Sons, 2003.
2. X. Wang and H.V.poor, "Wireless Communication Systems," Pearson education, 2004.
3. Dr. Sunil Kumar S. Manavi, Mahaballeshwar S. Kakasageri,"Wireless and Mobile Networks: concepts and protocols,"Wiley India,2010.
4. Jhon W.Mark and Weilhua Zhqung,"Wireless Communiation and Networking,"PHI, 2005.
5. Jochen Schiller, "Mobile Communications," Pearson Education,2nd Edition,2003.

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IV Year B.Tech. ECE - II Sem

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(A58023) INTERNET OF THINGS
(PROFESSIONAL ELECTIVE-VI)

Course Objectives:

To understand the fundamentals of Internet of Things.

- To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To apply the concept of Internet of Things in the real world scenario•

UNIT -I:

Fundamentals of IOT:

Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

UNIT -II:

IOT Design Methodology:

IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

UNIT -III:

Building IOT with Raspberry Pi:

Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services –

UNIT -IV:

Building IOT with Galileo/Arduino:

Intel Galileo Gen2 with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks

UNIT -V:

Case Studies and Advanced Topics:

Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for Iot – Data Analytics for IoT – Software & Management Tools for IoT

Course Outcomes:

Upon the completion of the course the student should be able to:

- Design a portable IoT using Arduino/ equivalent boards and relevant protocols.
- Develop web services to access/control IoT devices.
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

REFERENCE BOOKS:

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. Manoel Carlos Ramon, “Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers”, Apress, 2014.
3. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014.

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IV Year B.Tech. ECE – II Sem	**L**	**T/P/D**	**C**
	3	**1/-/-**	**3**

(A58024)SCRIPTING LANGUAGES

(PROFESSIONAL ELECTIVE-VI)

Course Objectives:

- The principles of scripting languages.
- Motivation for and applications of scripting.
- Difference between scripting languages and non- scripting languages.
- Types of scripting languages.
- Scripting languages such as PERL, TCL/TK, python and BASH.
- Creation of programs in the Linux environment.
- Usage of scripting languages in IC design flow.

Unit I : Linux Basics

Introduction to Linux , File System of the Linux, General usage of Linux kernel & basic commands, Linux users and group, Permissions for file, directory and users, searching a file & directory, zipping and unzipping concepts.

Unit II : Linux Networking

Introduction to Networking in Linux, Network basics & Tools, File Transfer Protocol in Linux, Network file system, Domain Naming Services, Dynamic hosting configuration Protocol & Network information Services.

Unit III : Perl Scripting.

Introduction to Perl Scripting, working with simple values, Lists and Hashes, Loops and Decisions, Regular Expressions, Files and Data in Perl Scripting, References & Subroutines, Running and Debugging Perl, Modules, Object – Oriented Perl.

Unit IV : Tcl / Tk Scripting

Tcl Fundamentals, String and Pattern Matching, Tcl Data Structures, Control Flow Commands, Procedures and Scope, Evel, Working with Unix, Reflection and Debugging, Script Libraries, Tk Fundamentals, Tk by examples, The Pack Geometry Manager, Binding Commands to X Events, Buttons and Menus, Simple Tk Widgets, Entry and List box Widgets Focus, Grabs and Dialogs.

Unit V : Python Scripting.

Introduction to Python, using the Python Interpreter, More Control Flow Tools, Data Structures, Modules, Input and Output, Errors and Exceptions, Classes, Brief Tour of the Standard Library.

Course Outcomes:
Upon learning the course, the student will have the:

- Ability to create and run scripts using PERL/TCl/Python in IC design flow.
- Ability to use Linux environment and write programs for automation of scripts in VLSI tool design flow.

Text Books:

1. Python Tutorial by Guido Van Rossum, Fred L. Drake Jr. editor , Release 2.6.4
2. Practical Programming in Tcl and Tk by Brent Welch, Updated for Tcl 7.4 and Tk 4.0.
3. Teach Yorself Perl in 21 days by David Till.
4. Red Hat Enterprise Linux 4 : System Administration Guide Copyright, 2005 Red Hat Inc.

Reference Books:

1. Learning Python – 2nd Ed., Mark Lutz and David Ascher, 2003, O'Reilly.
2. Perl in 24 Hours – 3rd Ed., Clinton Pierce, 2005, Sams Publishing.
3. Learning Perl – 4th Ed. Randal Schwartz, Tom Phoenix and Brain d foy. 2005.
4. Jython Essentials – Samuele Pedroni and Noel Pappin.2002. O'Reilly.
5. Programming Perl – Larry Wall, Tom Christiansen and John Orwant, 3rd Edition, O'Reilly, 2000. (ISBN 0596000278)