ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

ELECTRONICS & COMMUNICATION
ENGINEERING

For
B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2017-2018)

JNTUH COLLEGE OF ENGINEERING HYDERABAD
(Autonomous)
Kukatpally, Hyderabad - 500085
TELANGANA, INDIA
JNTUH COLLEGE OF ENGINEERING HYDERABAD  
(Autonomous)  
Kukatpally, Hyderabad-500 085  

ACADEMIC REGULATIONS 2017  
for CBCS Based B.Tech. PROGRAMMES  
(Effective for the students admitted into I year from the Academic Year 2017-18 and onwards)  

1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T)  

JNTUH offers 4 Year (8 Semesters) Bachelor of Technology (B.Tech.) Degree Programme, under Choice Based Credit System (CBCS) at its Constituent Autonomous College - JNTUH College of Engineering, Hyderabad, with effect from the Academic Year 2017-18 onwards, in the following Branches of Engineering …  

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>II.</td>
<td>Computer Science and Engineering</td>
</tr>
<tr>
<td>III.</td>
<td>Electrical and Electronics Engineering</td>
</tr>
<tr>
<td>IV.</td>
<td>Electronics and Communication Engineering</td>
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<tr>
<td>V.</td>
<td>Mechanical Engineering</td>
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<tr>
<td>VI.</td>
<td>Metallurgical Engineering</td>
</tr>
<tr>
<td>VII.</td>
<td>Chemical Engineering</td>
</tr>
</tbody>
</table>

2.0 Eligibility for Admission  

2.1 Admission to the UGP shall be made either on the basis of the merit rank obtained by the qualifying candidate at an Entrance Test conducted by the Telangana State Government (EAMCET), OR the University, OR on the basis of any other order of merit approved by the University, subject to reservations as prescribed by the Government from time to time.  

2.2 The medium of instructions for the entire UGP in E&T will be ENGLISH only.  

3.0 B.Tech. Programme (UGP) Structure  

3.1 The B.Tech. Programmes of JNTUH-CEH are of Semester Pattern, with 8 Semesters constituting 4 Academic Years, each Academic Year having TWO Semesters (First/Odd and Second/Even Semesters). Each Semester shall be of 22 Weeks duration (inclusive of Examinations), with a minimum of 90 Instructional Days per Semester.  

3.2 UGC/AICTE specified Definitions/Descriptions are adopted appropriately for various terms and abbreviations used in these Academic Regulations/ Norms, which are as listed below.  

3.2.1 Semester Scheme:  
Each UGP is of 4 Academic Years (8 Semesters), with the year being divided into two Semesters of 22 weeks (> 90 working days) each, each Semester having - ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as denoted by UGC, and Curriculum/ Course Structure as suggested by AICTE are followed.  

3.2.2 Credit Courses:  
All Subjects/Courses are to be registered by a student in a Semester to earn Credits. Credits shall be assigned to each Subject/Course in a L: T: P: C (Lecture Periods: Tutorial Periods: Practicals Periods : Credits) Structure, based on the following general pattern ..  

- One Credit - for One hour/ Week/ Semester for Theory/ Lecture (L) Courses; and,  
- One Credit - for Two hours/ Week/ Semester for Laboratory/ Practical (P) Courses or Tutorials (T).  

Other student activities like NCC, NSS, NSO, Study Tour, Guest Lecture etc., and identified Mandatory Courses will not carry Credits.
3.2.3 Subject/ Course Classification:

All Subjects/ Courses offered for the UGP are broadly classified as: (a) Foundation Courses (FnC), (b) Core Courses (CoC), and (c) Elective Courses (EℓC).

- Foundation Courses (FnC) are further categorized as: (i) HS (Humanities and Social Sciences), (ii) BS (Basic Sciences), and (iii) ES (Engineering Sciences);

- Core Courses (CoC) and Elective Courses (EℓC) are categorized as PS (Professional Subjects), which are further subdivided as – (i) PC (Professional/ Departmental Core) Subjects, (ii) PE (Professional/ Departmental Electives), (iii) OE (Open Electives); and (iv) Project Works (PW);

- Minor Courses (1 or 2 Credit Courses, belonging to HS/ BS/ ES/ PC as per relevance); and
- Mandatory Courses (MC - non-credit oriented).

3.2.4 Course Nomenclature:

The Curriculum Nomenclature or Course-Structure Grouping for the each of the UGP E&T (B.Tech. Degree Programmes), is as listed below (along with AICTE specified % Range of Total Credits):

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Broad Course Classification</th>
<th>Course Group/ Category</th>
<th>Course Description</th>
<th>Range of Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Foundation Courses (FnC)</td>
<td>BS – Basic Sciences</td>
<td>Includes - Mathematics, Physics and Chemistry Subjects</td>
<td>15% - 20%</td>
</tr>
<tr>
<td>2)</td>
<td></td>
<td>ES – Engineering Sciences</td>
<td>Includes fundamental engineering subjects</td>
<td>15% - 20%</td>
</tr>
<tr>
<td>3)</td>
<td></td>
<td>HS – Humanities and Social Sciences</td>
<td>Includes subjects related to Humanities, Social Sciences and Management</td>
<td>5% - 10%</td>
</tr>
<tr>
<td></td>
<td>Core</td>
<td>PC –</td>
<td>Includes core subjects</td>
<td>30% - 40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Courses (CoC)</th>
<th>Professional Core related to the Parent Discipline/ Department/ Branch of Engg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4)</td>
<td>PE – Professional Electives includes Elective subjects related to the Parent Discipline/ Department/ Branch of Engg. 10% - 15%</td>
</tr>
<tr>
<td>5)</td>
<td>OE – Open Electives includes Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/ Department/ Branch of Engg. 5% - 10%</td>
</tr>
<tr>
<td>6)</td>
<td>Project Work B.Tech. Project or UG Project or UG Major Project</td>
</tr>
<tr>
<td>7)</td>
<td>Core Courses Industrial Training/ Internship/ UG Mini-Project/ Mini-Project 10% - 15%</td>
</tr>
<tr>
<td>8)</td>
<td>Seminar Seminar/ Colloquium based on core contents related to Parent Discipline/ Department/ Branch of Engg.</td>
</tr>
<tr>
<td>9)</td>
<td>Minor Courses 1 or 2 Credit Courses (subset of HS) included</td>
</tr>
<tr>
<td>10)</td>
<td>Mandatory Courses (MC) Mandatory Courses (non-credit)</td>
</tr>
</tbody>
</table>

Total Credits for UGP (B. Tech.) Programme 192 (100%)

4.0 Course Work

4.1 A student, after securing admission, shall pursue the B.Tech. UGP in a minimum period of 4 Academic Years, and a maximum period of 8 Academic Years (starting from the Date of Commencement of I Year).

4.2 Each student shall Register for and Secure the specified number of Credits required for the completion of the UGP and Award of the B.Tech. Degree in respective Branch of Engineering.
4.3 Each Semester is structured to provide typically 24 Credits (24 C), totaling to 192 Credits (192 C) for the entire B.Tech. Programme.

5.0 Course Registration

5.1 A ‘Faculty Advisor or Counselor’ shall be assigned to each student, who will advise him about the UGP, its Course Structure and Curriculum, Choice/Option for Subjects/Courses, based on his competence, progress, pre-requisites and interest.

5.2 Academic Section of the College invites ‘Registration Forms’ from students apriori (before the beginning of the Semester), through ‘ON-LINE SUBMISSIONS’, ensuring ‘DATE and TIME Stamping’. The ON-LINE Registration Requests for any ‘CURRENT SEMESTER’ shall be completed BEFORE the commencement of SEE(s) (Semester End Examinations) of the ‘PRECEDING SEMESTER’.

5.3 A Student can apply for ON-LINE Registration, ONLY AFTER obtaining the ‘WRITTEN APPROVAL’ from his Faculty Advisor, which should be submitted to the College Academic Section through the Head of Department (a copy of the same being retained with Head of Department, Faculty Advisor and the Student).

5.4 A Student may be permitted to Register for his Subjects/Course of CHOICE with a typical total of 24 Credits per Semester (Minimum being 20 C and Maximum being 28 C, permitted deviation being ± 17%), based on his PROGRESS and SGPA/CGPA, and completion of the ‘PRE-REQUISITES’ as indicated for various Subjects/Courses, in the Department Course Structure and Syllabus contents. However, a MINIMUM of 20 Credits per Semester must be registered to ensure the ‘STUDENTSHIP’ in any Semester.

5.5 Choice for ‘additional Subjects/Courses’ to reach the Maximum Permissible Limit of 28 Credits (above the typical 24 Credit norm) must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Counselor.

5.6 If the Student submits ambiguous choices or multiple options or erroneous entries - during ON-LINE Registration for the Subject(s)/ Course(s) under a given/ specified Course Group/Category as listed in the Course Structure, only the first mentioned Subject/Course in that Category will be taken into consideration.

5.7 Subject/Course Options exercised through ON-LINE Registration are final and CAN NOT be changed, and CAN NOT be inter-changed; further, alternate choices will also not be considered. However, if the Subject/Course that has already been listed for Registration (by the Head of Department) in a Semester could not be offered due to any unforeseen or unexpected reasons, then the Student shall be allowed to have alternate choice - either for a new Subject (subject to offering of such a Subject), or for another existing Subject (subject to availability of seats), which may be considered. Such alternate arrangements will be made by the Head of Department, with due notification and time-framed schedule, within the FIRST WEEK from the commencement of Class-work for that Semester.

5.8 Dropping of Subjects/Courses may be permitted, ONLY AFTER obtaining prior approval from the Faculty Advisor (subject to retaining a minimum of 20 C), ‘within 15 Days of Time’ from the beginning of the current Semester.

5.9 For Mandatory Courses like NCC/ NSS/ NSO etc., a ‘Satisfactory Participation Certificate’ from the concerned authorities for the relevant Semester is essential. No Marks or Grades or Credits shall be awarded for these activities.

6.0 Subjects/Courses to be offered

6.1 A typical Section (or Class) Strength for each Semester shall be 60.

6.2 A Subject/Course may be offered to the Students, ONLY IF a Minimum of 20 Students (1/3 of the Section Strength) opt for the same. The Maximum Strength of a Section is limited to 80 (60 + 1/3 of the Section Strength).

6.3 More than ONE TEACHER may offer the SAME SUBJECT (Lab./Practicals may be included with the corresponding Theory Subject in the same Semester) in any Semester.
However, selection choice for students will be based on - 'FIRST COME FIRST SERVE Basis and CGPA Criterion' (i.e., the first focus shall be on early ON-LINE ENTRY from the student for Registration in that Semester, and the second focus, if needed, will be on CGPA of the student).

6.4 If more entries for Registration of a Subject come into picture, then the concerned Head of Department shall take necessary action, whether to offer such a Subject/Course for TWO (or multiple) SECTIONS or NOT.

6.5 In case of options coming from Students of other Departments/ Branches/ Disciplines (not considering OPEN ELECTIVES), PRIORITY shall be given to the student of the 'Parent Department' first.

7.0 Attendance Requirements

7.1 A student shall be eligible to appear for the End Semester Examinations, if he acquires a minimum of 75% of attendance in aggregate of all the Subjects/Courses (excluding Mandatory or Non-Credit Courses) for that Semester.

7.2 Condoning of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each Semester may be granted by the College Academic Committee on genuine and valid grounds, based on the student's representation with supporting evidence.

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

7.4 Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

7.5 Students, whose shortage of attendance is not condoned in any Semester, are not eligible to take their End Examinations of that Semester, they get detained and their registration for that Semester shall stand cancelled. They will not be promoted to the next Semester. They may seek re-registration for all those Subjects registered in that Semester in which he got detained, by seeking re-admission for that Semester as and when offered; in case if there are any Professional Electives and/or 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 Subjects offered under that category.

8.0 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 shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to each Subject/Course, if he secures not less than 35% marks (25 out of 70 marks) in the End Semester Examination, and a minimum of 40% of marks in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of Letter Grades, this implies securing P Grade or above in that Subject/Course.

8.2 A student shall be deemed to have satisfied the Academic Requirements and earned the Credits allotted to Industry oriented Mini-Project/ Seminar, if he secures not less than 40% of the total marks (40 marks) to be awarded for each. The student would be treated as failed, if he - (i) does not submit a report on his Industry oriented Mini-Project, or does not make a presentation of the same before the Evaluation Committee as per schedule, or (ii) does not present the Seminar as required in the IV year II Semester, or (iii) secures less than 40% of marks (40 marks) in Industry oriented Mini-Project/ Seminar evaluations.

He may reappear once for each of the above evaluations, when they are scheduled again; if he fails in such ‘one reappearance’ evaluation also, he has to reappear for the same in the next subsequent Semester, as and when it is scheduled.

8.3 A Student will not be promoted from I Year to II Year, unless he fulfils the Attendance and Academic Requirements and secures a total of minimum 24 Credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
8.4 A Student will not be promoted from II Year to III Year, unless he fulfils the Attendance and Academic Requirements and secures a total of minimum 58 Credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

8.5 A Student will not be promoted from III Year to IV Year, unless he fulfils the Attendance and Academic Requirements and secures a total of minimum 86 Credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.

8.6 A Student shall - register for all Subjects covering 192 Credits as specified and listed (with the relevant Course/Subject Classifications as mentioned) in the Course Structure, put up all the Attendance and Academic requirements for 192 Credits securing a minimum of P Grade (Pass Grade) or above in each Subject, and ‘earn ALL 192 Credits securing SGPA ≥ 5.0 (in each Semester), and CGPA (at the end of each successive Semester) ≥ 5.0’, to successfully complete the UGP.

8.7 After securing the necessary 192 Credits as specified for the successful completion of the entire UGP, an exemption of maximum 8 secured Credits (in terms of two of their corresponding Subjects/Courses) may be permitted for optional drop out from these 192 Credits earned; i.e., the performance of the Student after the deduction of maximum 8 credits shall alone be taken into account for the calculation of ‘the final CGPA 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 Subjects/Courses listed as … i) Laboratories/Practicals, Industrial Training/Mini-Project, iii) Seminar, iv) Major Project.

8.8 If a Student registers for some more ‘extra Subjects’ (in the parent Department or other Departments/Branches of Engg.) other than those listed Subjects totaling to 192 Credits as specified in the Course Structure of his Department, the performances in those ‘extra Subjects’ (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 Subjects’ 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 – 8.7 above.

8.9 Students who fail to earn 192 Credits as per the Course Structure, and as indicated above, within 8 Academic Years from the Date of Commencement of their I Year shall forfeit their seats in B.Tech. Programme and their admissions shall stand cancelled.

8.10 When a Student is detained due to shortage of attendance in any Semester, he may be re-admitted into that Semester, as and when offered, with the Academic Regulations of the Batch into which he gets readmitted. However, no Grade Allotments or SGPA/CGPA calculations will be done for that entire Semester in which he got detained.

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

8.12 A student eligible to appear in the End Semester Examination in any Subject/Course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that Subject/Course at the supplementary examination (SEE) as and when conducted. In such cases, his Internal Marks (CIE) assessed earlier for that Subject/Course will be carried over, and added to the Marks to be obtained in the SEE supplementary examination, for evaluating his performance in that Subject.
9.0 Evaluation - Distribution and Weightage of Marks

9.1 The performance of a student in each Semester shall be evaluated Subject-wise (irrespective of Credits assigned) with a maximum of 100 marks for Theory or Practicals or Seminar or Drawing/Design or Industry oriented Mini-Project or Minor Course, etc; however, the B.Tech. Project Work (Major Project) will be evaluated for 200 Marks. These evaluations shall be based on 30% CIE (Continuous Internal Evaluation) and 70% SEE (Semester End Examination), and a Letter Grade corresponding to the % marks obtained shall be given.

9.2 For all Subjects/Courses as mentioned above, the distribution shall be 30 marks for CIE, and 70 marks for the SEE. The semester end examinations will be conducted for 70 marks consisting of two parts viz. i) Part-A for 20 marks (10 x 2 marks), ii) Part-B for 50 marks. Part-B consists of five questions 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 "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

9.3 a) For Theory Subjects (inclusive of Minor Courses), during the Semester, there shall be 2 mid-term examinations for 25 marks each. Each mid-term examination consists of one objective paper for 10 marks, plus one subjective paper for 15 marks, with a duration of 120 minutes (20 minutes for objective and 100 minutes for subjective papers). Further, there will be an allocation of 5 marks for Assignment. Objective paper may be set with multiple choice questions, True/False, fill-in the blanks, matching type questions, etc. Subjective paper shall contain 5 questions, out of which the Student has to answer 3 questions, each for 5 marks.

b) The first mid-term examination shall be conducted for the first 50% of the syllabus, and the second mid-term examination shall be conducted for the remaining 50% of the syllabus.

c) First Assignment should be submitted before the conduct of the first mid-term examinations, and the Second Assignment should be submitted before the conduct of the second mid-term examinations. The Assignments shall be as specified by the concerned subject teacher.

d) The first mid-term examination Marks and first Assignment Marks shall make one set of CIE Marks, and the second mid-term examination Marks and second Assignment Marks shall make second set of CIE Marks; and the better of these two sets of marks shall be taken as the final marks secured by the Student towards Continuous Internal Evaluation in that Theory Subject.

9.4 For Practical Subjects, there shall be a Continuous Internal Evaluation (CIE) during the Semester for 30 internal marks, and 70 marks are assigned for Lab./Practical End Semester Examination (SEE). Out of the 30 marks for internals, day-to-day work in the laboratory shall be evaluated for 20 marks; and for the remaining 10 marks - two internal practical tests (each of 10 marks) shall be conducted by the concerned laboratory teacher and the better of these two tests is taken into account. The SEE for Practicals shall be conducted at the end of the Semester by Two Examiners appointed by Head of the Department.

9.5 For the Subjects having Design and/or Drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation), the distribution shall be 30 marks for CIE (20 marks for day-to-day work, and 10 marks for internal tests) and 70 marks for SEE. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.

9.6 Open Electives: Students are to choose One Open Elective (OE-I) during III Year I Semester, one (OE-II) during III Year II Semester, and one (OE-III) in IV Year II Semester, from the list of Open Electives given. However, Students can not opt for an Open Elective Subject offered by their own (parent) Department, if it is already listed under any category of the Subjects offered by parent Department in any Semester.

9.7 a) There shall be an Industry oriented Mini-Project, in collaboration with an Industry of the relevant specialization, to be registered immediately after III Year II Semester
examinations, and taken up during the summer vacation for about eight weeks duration.

b) The Industry oriented Mini-Project shall be submitted in a Report form, and a presentation of the same shall be made before a Committee, which evaluates it for 100 marks. The Committee shall consist of 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. The Mini-Project shall be evaluated in the IV Year I Semester.

9.8 There shall be a Seminar Presentation in IV Year II Semester. For the Seminar, the student shall collect the information on a specialized topic, prepare a Technical Report and submit to the Department at the time of Seminar Presentation. The Seminar Presentation (along with the Technical Report) shall be evaluated by Two Faculty Members assigned by Head of the Department, for 100 marks. There shall be no SEE or external examination for Seminar.

9.9 Each Student shall start the Project Work during the IV Year I Semester, as per the instructions of the Project Guide/Project Supervisor assigned by the Head of Department. Out of a total 200 marks allotted for the Project Work, 60 marks shall be for CIE (Continuous Internal Evaluation and 140 marks for the SEE (End Semester Viva-voce Examination). The Project Viva-voce shall be conducted by a Committee comprising of an External Examiner, Head of the Department and Project Supervisor. Out of 60 marks allocated for CIE, 30 marks shall be awarded by the Project Supervisor (based on the continuous evaluation of student’s performance throughout the Project Work period), and the other 30 marks shall be awarded by a Departmental Committee consisting of Head of the Department and Project Supervisor, based on the work carried out and the presentation made by the Student at the time of Viva-voce Examination.

9.10 For NCC/ NSS/ NSO types of Courses, and/or any other Mandatory Non-Credit Course offered in a Semester, a ‘Satisfactory Participation Certificate’ shall be issued to the Student from the concerned authorities, only after securing ≥ 65% attendance in such a Course. No marks or Letter Grade shall be allotted for these activities.

10.0 Grading Procedure

10.1 Marks will be awarded to indicate the performance of each student in each Theory Subject, or Lab/Practicals, or Seminar, or Project, or Mini-Project, Minor Course etc., based on the % marks obtained in CIE + SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified in Item 9 above, and a corresponding Letter Grade shall be given.

10.2 As a measure of the student’s performance, a 10-point Absolute Grading System using the following Letter Grades (UGC Guidelines) and corresponding percentage of marks shall be followed ...

<table>
<thead>
<tr>
<th>% of Marks Secured in a Subject / Course</th>
<th>Letter Grade As per UGC Guidelines</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than or equal to 90%</td>
<td>O (Outstanding)</td>
<td>10</td>
</tr>
<tr>
<td>80 and less than 90%</td>
<td>A (Excellent)</td>
<td>9</td>
</tr>
<tr>
<td>70 and less than 80%</td>
<td>A (Very Good)</td>
<td>8</td>
</tr>
<tr>
<td>60 and less than 70%</td>
<td>B’ (Good)</td>
<td>7</td>
</tr>
<tr>
<td>50 less than 60%</td>
<td>B (Average)</td>
<td>6</td>
</tr>
<tr>
<td>40 less than 50%</td>
<td>C (Pass)</td>
<td>5</td>
</tr>
<tr>
<td>Below 40%</td>
<td>F (Fail)</td>
<td>0</td>
</tr>
<tr>
<td>Absent</td>
<td>Ab</td>
<td>0</td>
</tr>
</tbody>
</table>

10.3 A student obtaining F Grade in any Subject shall be considered ‘failed’ and will be required to reappear as ‘Supplementary Candidate’ in the End Semester Examination (SEE), as and when offered. In such cases,
10.4 A Letter Grade does not imply any specific % of Marks.

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

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

Credit Points (CP) = Grade Point (GP) x Credits .... For a Course

10.7 The Student passes the Subject/ Course only when he gets GP ≥ 5 (P Grade or above).

10.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (ΣCP) secured from ALL Subjects/ Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is rounded off to TWO Decimal Places. SGPA is thus computed as

\[ SGPA = \frac{\sum_{i=1}^{N} C_i \times G_i}{\sum_{i=1}^{N} C_i} \] ... For each Semester,

where 'i' is the Subject indicator index (takes into account all Subjects in a Semester), 'N' is the no. of Subjects 'REGISTERED' for the Semester (as specifically required and listed under the Course Structure of the parent Department), is the no. of Credits allotted to the ith Subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that ith Subject.

\[ SGPA = \frac{\sum_{i=1}^{N} C_i \times G_i}{\sum_{i=1}^{N} C_i} \] ... For each Semester,

10.9 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student over all Semesters considered for registration. The CGPA is the ratio of the Total Credit Points secured by a student in ALL registered Courses in ALL Semesters, and the Total Number of Credits registered in ALL the Semesters. CGPA is thus computed from the 1 Year Second Semester onwards, at the end of each Semester, as per the formula

\[ CGPA = \frac{\sum_{i=1}^{M} \sum_{j=1}^{N} C_{ij} \times G_{ij}}{\sum_{i=1}^{M} \sum_{j=1}^{N} C_{ij}} \] ... for all S Semesters registered (ie., upto and inclusive of S Semesters, S ≥ 2),

where 'M' is the TOTAL no. of Subjects (as specifically required and listed under the Course Structure of the parent Department) the Student has 'REGISTERED' from the 1st Semester onwards upto and inclusive of the Semester S (obviously M > N), 'j' is the Subject indicator index (takes into account all Subjects from 1 to S Semesters), is the no. of Credits allotted to the jth Subject, and represents the Grade Points (GP) corresponding to the Letter Grade awarded for that jth Subject. After registration and completion of 1 Year I Semester however, the SGPA of that Semester itself may be taken as the CGPA, as there are no cumulative effects.
10.10 For Merit Ranking or Comparison Purposes or any other listing, ONLY the 'ROUNDED OFF' values of the CGPAs will be used.

10.11 For Calculations listed in Item 10.6 – 10.10, performance in failed Subjects/ Courses (securing F Grade) will also be taken into account, and the Credits of such Subjects/ Courses will also be included in the multiplications and summations. However, Mandatory Courses will not be taken into consideration.

10.12 Passing Standards:

10.12.1 A student shall be declared successful or ‘passed’ in a Semester, only when he 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 gets a CGPA ≥ 5.00; subject to the condition that he secures a GP ≥ 5 (P Grade or above) in every registered Subject/ Course in each Semester (during the entire UGP) for the Degree Award, as required.

10.12.2 In spite of securing P Grade or above in some (or all) Subjects/ 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 - by the College Academic Committee. 

(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 Subject(s) / 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 Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

11.0 Declaration of Results

11.1 Computation of SGPA and CGPA are done using the procedure listed in 10.6 – 10.10.

11.2 For Final % of Marks equivalent to the computed final CGPA, the following formula may be used …

\[ \text{% of Marks} = (\text{final CGPA} – 0.5) \times 10 \]

12.0 Award of Degree

12.1 A Student who registers for all the specified Subjects/ Courses as listed in the Course Structure, satisfies all the Course Requirements, and passes all the examinations prescribed in the entire UG E&T Programme (UGP), and secures the required number of 192 Credits (with CGPA ≥ 5.0), within 8 Academic Years from the Date of Commencement of the First Academic Year, shall be declared to have ‘QUALIFIED’ for the Award of the B.Tech. Degree in the chosen Branch of Engineering as selected at the time of Admission.

12.2 A Student who qualifies for the Award of the Degree as listed in Item 12.1, shall be placed in the following Classes …

12.3 Students with final CGPA (at the end of the UGP) ≥ 8.00:

(i) Shall be placed in ‘First Class with distinction’ if fulfilling the following conditions.
(a) should not fail in any Subjects/Courses and should complete the required credits for the Award of Degree within the first 4 Academic Years (or 8 Sequential Semesters) from the Date of Commencement of his First Academic Year,
(b) should not have been detained or prevented from writing the End Semester Examinations in any Semester due to shortage of attendance or any other reason.

(ii) Shall be placed in 'First Class' if not fulfilling the above a & b conditions

12.4 Students with final CGPA (at the end of the UGP) ≥ 6.50 but < 8.00, shall be placed in 'FIRST CLASS'.

12.5 Students with final CGPA (at the end of the UGP) ≥ 5.50 but < 6.50, shall be placed in 'SECOND CLASS'.

12.6 All other Students who qualify for the Award of the Degree (as per Item 12.1), with final CGPA (at the end of the UGP) ≥ 5.00 but < 5.50, shall be placed in 'PASS CLASS'.

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

12.8 Students fulfilling the conditions listed under Item 12.3 alone will be eligible candidates for - 'University Rank' and 'Gold Medal' considerations.

13.0 Withholding of Results

13.1 If the student has not paid fees to University/College at any stage, or has pending dues against his name due to any reason whatsoever, or if any case of indiscipline is pending against him, the result of the student may be withheld, and he will not be allowed to go into the next higher Semester. The Award or issue of the Degree may also be withheld in such cases.

14.0 Transitory Regulations

14.1 Student who has discontinued for any reason, or has been detained for want of attendance or lack of required credits as specified, or who has failed after having undergone the Degree Programme, may be considered eligible for readmission to the same Subjects/ Courses (or equivalent Subjects/ Courses, as the case may be), and same Professional Electives/ Open Electives (or from set/category of Electives or equivalents suggested, as the case may be) as and when they are offered (within the time-frame of 8 years from the Date of Commencement of his 1 Year 1 Semester).

15.0 Student Transfers

15.1 There shall be no Branch transfers after the completion of Admission Process.

15.2 There shall be no transfer among the Constituent Colleges and Units of Jawaharlal Nehru Technological University Hyderabad.

16.0 Scope

i) Where the words “he”, “him”, “his”, occur in the write-up of regulations, they include “she”, “her”, “hers”.

ii) Where the words “Subject” or “Subjects”, occur in these regulations, they also imply “Course” or “Courses”.

iii) The Academic Regulations should be read as a whole, for the purpose of any interpretation.

iv) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor/ Principal is final.

v) The College may change or amend the Academic Regulations, Course Structure or Syllabi at any time, and the changes or amendments made shall be applicable to all Students with effect from the dates notified by the College Authorities.
## MALPRACTICES RULES

<table>
<thead>
<tr>
<th>Nature of Malpractices</th>
<th>Punishment</th>
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<tbody>
<tr>
<td><strong>If the candidate:</strong></td>
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<tr>
<td>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 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)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td>1 (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.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject 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.</td>
</tr>
<tr>
<td>2 Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>3 Impersonates any other candidate in connection with the examination.</td>
<td>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 subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>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.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
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<tr>
<td>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.</td>
<td>Cancellation of the performance in that subject.</td>
</tr>
<tr>
<td>6 Refuses to obey the orders of the 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 others to walk out, or threatens the officer-</td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and</td>
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<td>Clause</td>
<td>Malpractice</td>
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<td>Injure any person on duty 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.</td>
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<td>2</td>
<td>Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.</td>
</tr>
<tr>
<td>3</td>
<td>Possess any lethal weapon or firearm in the examination hall.</td>
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<td>4</td>
<td>If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College / University for further action to award suitable punishment.</td>
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## JNTUH COLLEGE OF ENGINEERING HYDERABAD
(AUTONOMOUS)

### ELECTRONICS & COMMUNICATION ENGINEERING

#### COURSE STRUCTURE
(Applicable from the batch admitted during 2017-18 and onwards)

#### I YEAR

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<th>S.No.</th>
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#### II SEMESTER

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III YEAR       I SEMESTER

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III YEAR       II SEMESTER

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IV YEAR       I SEMESTER

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IV YEAR       II SEMESTER

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During Summer Vacation between III and IV Years: Industry Oriented Mini Project

Professional Elective (PE) Lists

PE-I
1. Cellular and Mobile Communications
2. Computer Organization and Operating Systems
3. Digital Image Processing
4. Television Engineering
PE-II
1. Computer Networks
2. Digital System Design
3. Electronic Measurements and Instrumentation
4. Scripting Languages

PE-III
1. Wireless Communications and Networks
2. Optical Communications
3. Digital Signal Processors and Controllers
4. Artificial Neural Networks

PE-IV
1. Satellite Communications
2. Embedded System Design
3. Adhoc Wireless Sensor Networks
4. RF Circuit Design

PE-V
1. Radar Systems
2. Data Analytics
3. Coding Theory and Techniques
4. Electromagnetic Interference & Electromagnetic Compatibility (EMI/EMC)

<table>
<thead>
<tr>
<th>OPEN ELECTIVE- I</th>
<th>Subject</th>
<th>Offering Department</th>
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<tbody>
<tr>
<td>S.No.</td>
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<tr>
<td>1</td>
<td>Disaster Management</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>2</td>
<td>Non – Conventional Power Generation</td>
<td>Electrical &amp; Electronics Engineering</td>
</tr>
<tr>
<td>3</td>
<td>Electrical Engineering Materials</td>
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<tr>
<td>4</td>
<td>Nano-Technology</td>
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<tr>
<td>5</td>
<td>Operations Research</td>
<td>Mechanical Engineering</td>
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<tr>
<td>6</td>
<td>Basics of Thermodynamics</td>
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<td>7</td>
<td>Fabrication Processes</td>
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<tr>
<td>8</td>
<td>Electronic Measuring Instruments</td>
<td>Electronics &amp; Communication Engineering</td>
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<tr>
<td>9</td>
<td>OOPS through JAVA</td>
<td>Computer Science &amp; Engineering</td>
</tr>
<tr>
<td>10</td>
<td>Computer Graphics</td>
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<td>11</td>
<td>Engineering Materials</td>
<td>Metallurgical Engineering</td>
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<td>Metallurgy for Non Metallurgists</td>
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<td>13</td>
<td>Industrial Pollution Control Engineering</td>
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<tr>
<td>1</td>
<td>Estimation, Quantity Survey &amp; Valuation</td>
<td>Civil Engineering</td>
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<tr>
<td>2</td>
<td>Design Estimation and Costing of Electrical Systems</td>
<td>Electrical &amp; Electronics Engineering</td>
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<td>3</td>
<td>Energy Storage Systems</td>
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<td>4</td>
<td>Mechatronics</td>
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<tr>
<td>5</td>
<td>Jet propulsion and Rocket Engineering</td>
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<td>6</td>
<td>Ergonomics</td>
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<td>7</td>
<td>Mechatronics</td>
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<td>8</td>
<td>Principles of Electronic Communications</td>
<td>Electronics &amp; Communication Engineering</td>
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<td>9</td>
<td>Cyber Security</td>
<td>Computer Science &amp; Engineering</td>
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<td>10</td>
<td>Database Management Systems</td>
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<td>Corrosion Engineering</td>
<td>Metallurgical Engineering</td>
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<td>Testing of Materials</td>
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<td>Solid Waste Management</td>
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<tr>
<td>1</td>
<td>Environmental Impact Assessment</td>
<td>Civil Engineering</td>
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<td>2</td>
<td>Entrepreneur Resource Planning</td>
<td>Electrical &amp; Electronics Engineering</td>
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<tr>
<td>3</td>
<td>Management Information Systems</td>
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<td>Organizational Behavior</td>
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<td>5</td>
<td>Fundamentals of Robotics</td>
<td>Mechanical Engineering</td>
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<td>6</td>
<td>Non-Conventional Energy Sources</td>
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<td>7</td>
<td>Aspects of Heat Transfer in Electrical/Electronically controlled units</td>
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<tr>
<td>8</td>
<td>Principles of Computer Communications and Networks</td>
<td>Electronics &amp; Communication Engineering</td>
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<td>9</td>
<td>Web technologies</td>
<td>Computer Science &amp; Engineering</td>
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<tr>
<td>10</td>
<td>Simulation &amp; Modeling</td>
<td>Metallurgical Engineering</td>
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<td>11</td>
<td>Surface Engineering</td>
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<td>12</td>
<td>Nano Materials</td>
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<tr>
<td>13</td>
<td>Industrial Safety &amp; Hazard Management</td>
<td>Chemical Engineering</td>
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</tbody>
</table>
Pre Requisites: NIL

Course Objectives:
- To train the students thoroughly in mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical Concepts of differential and integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information.

Course Outcomes:
At the end of the course, the student will be able to:
- Become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.
- Attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications.

UNIT–I: Differential calculus (12 lectures)
Rolle’s Mean value Theorem – Lagrange’s Mean Value Theorem – Cauchy’s mean value Theorem – (all theorems without proof but with geometrical interpretations), verification of the Theorems and testing the applicability of these theorem to the given function.
Curve tracing – Equations given in Cartesian, polar and parametric forms.
Functions of several variables – Functional dependence- Jacobian-Maxima and Minima of functions of two variables with constraints and without constraints-METHOD of Lagrange multipliers.

UNIT–II: Improper Integrals, Multiple Integration (12 lectures)
Gamma and Beta Functions –Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.

UNIT–III: Vector Calculus (12 lectures)

UNIT–IV: First Order Ordinary Differential Equations (10 lectures)
Linear and exact differential equations
Applications of first order differential equations – Newton’s Law of cooling, Law of natural growth and decay, orthogonal trajectories and electrical circuits

UNIT–V: Higher Order Ordinary Differential Equations (10 lectures)
Linear, homogeneous and non-homogeneous differential equations of second and higher order with constant coefficients. Non-homogeneous term of the type e^{ax}, \sin ax, \cos ax, and x^2, e^{ax}V(x), x^nV(x). Method of variation of parameters. Applications: Bending of beams, Electrical circuits and simple harmonic motion.

Text books:
1) HIGHER ENGINEERING MATHEMATICS BY B S GREWAL, KHANNA PUBLICATIONS.
2) ENGINEERING MATHEMATICS BY ERWIN KREYSZIG, WIELY PUBLICATIONS.
3) VECTOR ANALYSIS BY GHOSG & MAITY, NEW CENTRAL BOOK AGENCY.

References:
1) Engineering Mathematics By Srimantapal & Subodh C. Bhunia, Oxford University Press.
2) ADVANCED ENGINEERING MATHEMATICS BY PETER V O’NEIL, CENGAGE LEARNING.
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 the topics selected for discussion on their own 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:

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
- To develop the study skills and communication skills in formal and informal situations.
- To enable students to develop their listening skill so that they may appreciate its role in the LSWR skills approach to language and improve their pronunciation
- To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions.
- To make students aware of the role of speaking in English and its contribution to their success.
- To enable students to express themselves fluently and appropriately in social and professional contexts.
- To develop an awareness in the students about the significance of silent reading and comprehension.
- To develop the ability of students to guess the meanings of words from context and grasp the overall messages of the text, draw inferences etc.
- To develop an awareness in the students about writing a an exact and formal skill.
- To equip them with the components of different forms of writing, beginning with the lower order ones.

LEARNING OUTCOMES:

1. Use of English Language - written and spoken.
2. Enrichment of comprehension and fluency

SYLLABUS:

Listening Skills:

Objectives
1. To enable students develop their listening skills so that they may appreciate the 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 recognize them, to distinguish between them, to mark stress and recognize and use the right intonation in sentences.

- Listening for general content.
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 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
   - Scanning
   - Inferring lexical and contextual meaning
   - Understanding discourse features
   - 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:

In order to improve the proficiency of the student in the acquisition of the four skills mentioned above, the following texts and course content, divided into Five Units, are prescribed:

For Detailed study: First Textbook: “Skills Annexe -Functional English for Success”, Published by Orient Black Swan, Hyderabad

For Non-detailed study
Second Textbook “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad.
- The course content and study material is divided into Five Units.

Unit –I

1. Chapter entitled ‘Wit and Humour’ from ‘Skills Annexe’ - Functional English for Success, Published by Orient Black Swan, Hyderabad
2. Chapter entitled ‘Mokshagundam Visvesvaraya’ from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad.
Unit – II

1. Chapter entitled “Cyber Age” from “Skills Annexe -Functional English for Success” Published by Orient Black Swan, Hyderabad.
2. Report Writing (First & Second Textbooks)
   L - Listening for themes and facts
   S - Apologizing, interrupting, requesting and making polite conversation
   R - Reading for theme and gist- The 1 Thing Every Business Executive Must Understand about Social Media by Dave Kerpen from Skills Annexe is for Reading Comprehension
   W - Describing people, places, objects, events
   G - Verb forms
   V - Noun, Verb, Adjective and Adverb

Unit – III

1. Chapter entitled ‘Risk Management’ from “Skills Annexe - Functional English for Success” Published by Orient Black Swan, Hyderabad
2. Chapter entitled ‘Leela’s Friend’ by R.K. Narayan from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad
   L - Listening for main points and sub-points for note taking
   S - Giving instructions and directions; Speaking of hypothetical situations
   R - Reading for details- Sivakasi: Who to Blame for the Frequent Fire Accidents in India’s Largest Fireworks Industry Hub? by Amrutha Gayathri from Skills Annexe & Forensic Science from Epitome of Wisdom are for Reading Comprehension
   W - Note-making, Information transfer, Punctuation
   G - Present tense
   V - Synonyms and Antonyms

Unit – IV

1. Letter Writing – Writing formal letters, letter of application along with curriculum vitae (First & Second Textbooks)
2. Chapter entitled ‘The Last Leaf’ from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad
   L - Listening for specific details and information
   S - Narrating, expressing opinions and telephone interactions
   R - Reading for specific details and information- What I Cherish Most by V. S. Srinivasa Sastr from Skills Annexe & Choose How to Start Your Day from Epitome of Wisdom are for Reading Comprehension
   W - Writing e-mails
   G - Past and Future tenses
   V - Vocabulary - Idioms and Phrasal verbs

Unit – V

1. Chapter entitled ‘Sports and Health’ from “Skills Annexe - Functional English for Success” Published by Orient Black Swan, Hyderabad
2. Chapter entitled ‘The Convocation Speech’ by N.R. Narayanmurthy from “Epitome of Wisdom”, Published by Maruthi Publications, Hyderabad
   L - Critical Listening and Listening for speaker’s tone/attitude
   S - Group discussion and Making presentations
   R - Critical reading, reading for reference - Benefits of Physical Activity from Skills Annexe & What is meant by Entrepreneurship? from Epitome of Wisdom are for Reading Comprehension
   W - Project proposals; Project Reports and Research Papers
   G - Adjectives, Prepositions and Concord
   V - Collocations and Technical vocabulary, Using words appropriately

Exercises from the texts not prescribed shall be used for classroom tasks.

REFERENCES:

2. Murphy’s English Grammar with CD, Murphy, Cambridge University Press.
5. Practical English Usage, Michael Swan, Oxford University Press.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. ECE I-Sem

COMPUTER PROGRAMMING & DATA STRUCTURES

Prerequisites:
There are no prerequisites for this course, except that anyone who wants to learn C should have analytical skills and logical reasoning.

Course Objectives:
- This course starts from the basics of computers and program development.
- It covers various concepts of C programming language
- It introduces searching and sorting algorithms
- It provides an understanding of data structures such as stacks and queues.

Course Outcomes:
At the end of the course, the student will be able to:
- Develop C programs for computing and real life applications using basic elements like control statements, arrays, functions, pointers and strings; and data structures like stacks, queues and linked lists.
- Implement searching and sorting algorithms

UNIT - I
Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

UNIT – II
Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.
Designing Structured Programs- Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

UNIT – III
Arrays and Strings – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples. Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

Pointers – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.

UNIT - IV
Derived types – Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, enumerated types, C programming examples.

Input and Output – Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

UNIT – V
Sorting and Searching selection sort, bubble sort, insertion sort, linear and binary search methods.

Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

TEXT BOOKS:
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

REFERENCES:
6. C Programming & Data Structures,E.Balagurusamy,TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
ENGINEERING GRAPHICS

Pre-requisites: Nil

Course objectives:
- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

Course Outcomes:
At the end of the course, the student will be able to:
- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT – I
INTRODUCTION TO ENGINEERING DRAWING:

UNIT – II
ORTHOGRAPHIC PROJECTIONS:
Principles of Orthographic Projections – Conventions – Projections of Points and Lines
Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III
Projections of Regular Solids – Auxiliary Views.

UNIT – IV
Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT – V
ISOMETRIC PROJECTIONS:
Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions
Auto CAD: Basic principles only

TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar

REFERENCE BOOKS:
1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
I Year B.Tech. ECE I-Sem

ENVIRONMENTAL SCIENCE

Prerequisites : NIL

Objectives:
- Creating the awareness about environmental problems among students.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating students to participate in environment protection and environment improvement.

Outcomes:
At the end of the course, it is expected that students will be able to:
- Identify and analyze environmental problems as well as the risks associated with these problems
- Understand what it is to be a steward in the environment
- Studying how to live their lives in a more sustainable manner

UNIT - I
MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:
Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – 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, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies. 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 - II
ECOSYSTEMS: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem:
- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT - III

UNIT - IV
ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of:
- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT - V
SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development - Urban problems related to energy -Water


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. - Study of simple ecosystems pond, river, hill slopes, etc.

TEXT BOOK:
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission. , Universities Press
2. Environmental Studies by R. Rajagopalan, Oxford University Press

REFERENCE:
1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. ECE I-Sem

L T P C
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COMPUTER PROGRAMMING & DATA STRUCTURES LAB

Week 1:
1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C program to find the roots of a quadratic equation.

Week 2:
5. Write a C program to find the factorial of a given integer.
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement)

Week 3:
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
    i) Addition of Two Matrices
    ii) Multiplication of Two Matrices

Week 4:
11. Write a C program that uses functions to perform the following operations:
    i) To insert a sub-string in to a given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn’t contain T.
14. Write a C program to count the lines, words and characters in a given text.

**Week 5:**
15. Write a C program to generate Pascal’s triangle.
16. Write a C program to construct a pyramid of numbers.
17. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 
\[ 1 + x + x^2 + x^3 + \ldots \ldots \ldots + x^n \]
For example: if n is 3 and x is 5, then the program computes 
\[ 1 + 5 + 25 + 125. \]
Print x, n, the sum
Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal? If so, test for them too.

**Week 6:**
18. 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s complement of a binary number.
19. Write a C program to convert a Roman numeral to its decimal equivalent.

**Week 7:**
20. Write a C program that uses functions to perform the following operations:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iv) Multiplication of two complex numbers
   (Note: represent complex number using a structure.)

**Week 8:**
21. i) Write a C program which copies one file to another.
   ii) Write a C program to reverse the first n characters in a file.
   (Note: The file name and n are specified on the command line.)
22. i) Write a C program to display the contents of a file.

**Week 9:**
23. Write a C program that uses functions to perform the following operations on singly linked list:
   i) Creation    ii) Insertion    iii) Deletion
   iv) Traversal
24. Write C programs that implement stack (its operations) using
   i) Arrays    ii) Pointers
25. Write C programs that implement Queue (its operations) using
   i) Arrays    ii) Pointers

**Week 10:**
26. Write a C program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort    ii) Selection sort
27. Write C programs that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search    ii) Binary search
ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

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

Learning Outcomes
- Better understanding of nuances of language through audio-visual experience and group activities
- Neutralization of accent for intelligibility
- 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
ICS Lab: Ice-Breaking activity and JAM session

Exercise – II
CALL Lab: Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.
Concord (Subject in agreement with verb) and Words often misspelt-confused/misused

Exercise - III
CALL Lab: Minimal Pairs- Word accent and Stress Shifts- Listening Comprehension.
ICS Lab: Descriptions- Narrations- Giving Directions and guidelines.
Sequence of Tenses, Question Tags and One word substitutes

Exercise – IV
CALL Lab: Intonation and Common errors in Pronunciation.
ICS Lab: Extempore- Public Speaking
Active and Passive Voice, –Common Errors in English, Idioms and Phrases

Exercise – V
CALL Lab: Neutralization of Mother Tongue Influence and Conversation Practice
ICS Lab: Information Transfer- Oral Presentation Skills
Reading Comprehension and Job Application with Resume preparation

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:
The Computer aided Language Lab for 40 students with 40 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

Articles, Prepositions, Word formation- Prefixes & Suffixes, Synonyms & Antonyms

Page 26 of 139
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.

Suggested Software:

- Cambridge Advanced Learners’ English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley
- Punctuation Made Easy by Darling Kindersley
- Clarity Pronunciation Power – Part I
- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 8th 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)
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge
- Raman, M & Sharma, S. 2011. Technical Communication, OUP

SUGGESTED READING:

4. Sasi Kumar, V & Dhamija, P.V. How to Prepare for Group Discussion and Interviews. Tata McGraw Hill
10. A textbook of English Phonetics for Indian Students by T. Balasubramanian (Macmillan)

DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Examination:
1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the Language lab sessions, there shall be a continuous evaluation during the year for 30 sessional marks and 70 semester-end Examination marks. Of the 30 marks, 20 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The year-end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

* * * * *
ENGINEERING WORKSHOP

Pre-requisites: Practical skill

Objectives:
- To study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
- To understanding the computer hardware and practice the Assembly of computer parts.
- To practice the process of Installation of operating system windows.

Outcomes:
At the end of the course, the student will be able to:
- Better understanding the process of assembly of computer parts and installation of different software’s.
- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including plumbing, fitting, carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

I. TRADES FOR EXERCISES:
(Any six trades from the following with minimum of two exercises in each trade)
1. Carpentry
2. Fitting
3. Tin-Smithy
4. Black Smithy
5. House-wiring
6. Foundry
7. Plumbing

II. Trades for Demonstration & Exposure
1. Demonstration of power tools & wiring
2. Welding
3. Machine Shop

III. IT Workshop I:
Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, simple diagnostic exercises.

IT Workshop II:
Installation of operating system windows and linux simple diagnostic exercises.
Pre Requisites: NIL

Course Objectives:
- Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and solution of partial differential equations.

Course Outcomes:
At the end of the course, the student will be able to:
- gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

UNIT–I: Linear ODE with variable coefficients and series solutions (8 lectures)
Equations reducible to constant coefficients-Cauchy’s and Legendre’s differential equations. Motivation for series solutions, Ordinary point and Regular singular point of a differential equation, Transformation of non-zero singular point to zero singular point. Series solutions to differential equations around zero, Frobenius Method about zero.

UNIT–II: Special Functions (8 lectures)
Bessel’s Differential equation, Bessel functions properties: – Recurrence relations, Orthogonality, Generating function, Trigonometric expansions involving Bessel functions.

UNIT–III: Laplace Transform (8 lectures)
Definition of Integral transform. Domain of the function and Kernel for the Laplace transforms, Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied or divided by “t”. Laplace transforms of derivatives and integrals of functions. – Unit step function – second shifting theorem – Dirac’s delta function, Periodic function – Inverse Laplace transform by Partial fractions( Heaviside method) Inverse Laplace transforms of functions when they are multiplied or divided by “s”. Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem-solving differential equations by Laplace transforms

UNIT – IV: Fourier series and Fourier Transforms (8 lectures)

UNIT-V: Partial Differential Equations (10 lectures)

Text books:
1) HIGHER ENGINEERING MATHEMATICS BY B S GREWAL, KHANNA PUBLICATIONS.
2) ENGINEERING MATHEMATICS BY ERWIN KREYSZIG, WIELY PUBLICATIONS

References:
1) ENGINEERING MATHEMATICS BY SRIMANTAPAL & SUBODH C. BHUNIA, OXFORD UNIVERSITY PRESS.
2) ADVANCED ENGINEERING MATHEMATICS BY PETER V O’NEIL, CENGAGE LEARNING
UNIT- I ELECTRICAL and SINGLE PHASE AC CIRCUITS

Electrical Circuits: R-L-C Parameters, Voltage and Current, Independent and Dependent Sources, Source Transformation – V-I relationship for passive elements, Kirchoff’s Laws, Network reduction techniques – series, parallel, series-parallel, star-to-delta, delta-to-star transformation, Nodal Analysis,

Single Phase AC Circuits: R.M.S. and Average values, Form Factor, steady state analysis of series, parallel and series-parallel combinations of R, L and C with sinusoidal excitation, concept of reactance, impedance, susceptance and admittance – phase and phase difference, Concept of power factor, j-notation, complex and polar forms of representation.

UNIT- II RESONANCE and NETWORK THEOREMS

Resonance: Series resonance and Parallel resonance circuits, concept of bandwidth and Q factor, Locus Diagrams for RL, RC and RLC Combinations for Various Parameters.

Network Theorems: Thevenin’s, Norton’s, Maximum Power Transfer, Superposition, Reciprocity, Tellegen’s, Millman’s and Compensation theorems for DC and AC excitations.
REFERENCES:
1. Introduction to Electronic Devices and Circuits - Robert T. Paynter, Pearson Education.
3. Electronic Devices and Circuits – Anil K. Maini, Varsha Agarwal –
4. Wiley India Pvt. Ltd. 1/e 2009.
7. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.

UNIT-I
principle, Schrödinger’s Time-Independent Wave Equation, Physical Significance of the Wave Function, Particle in One Dimensional Potential Box. Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (Qualitative).


UNIT-II

UNIT-III
5. Dielectric Properties: Basic definitions, Electronic, Ionic (Quantitative) and Orientation Polarizations (Qualitative) and Calculation of Polarizabilities - Internal Fields in Solids, Clausius-Mosotti Equation, Piezoelectricity, Pyroelectricity and Ferroelectricity.
7. Superconductivity: Introduction to Superconductivity, Properties of Superconductors, Meissner Effect, BCS theory, Type-I and Type-II Superconductors, Magnetic Levitation and Applications of Superconductors.

UNIT-IV


UNIT-V
10. Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Volume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-Gel, Precipitation, Combustion Methods; Top-Down Fabrication: Chemical Vapor Deposition, Physical Vapor Deposition, Characterization Techniques (XRD, SEM & TEM) and Applications of Nanotechnology.

Text books:
4. Solid State Physics by A.J. Dekker, MACMILLAN INDIA LTD.

References:
1. Modern Engineering Physics by Dr.K.Vijaya Kumar, Dr. S. Chandralingam, S.CHAND & COMPANY LTD
4. Introduction to Nanotechnology by Charles P.Poole, Jr.Frank J ownes, John Wiley & sons
Prerequisites: Nil

Course objectives:
- To inculcate the basic concepts of Chemistry required to make the student to develop the innovative materials for the development of technological arena.
- The latest techniques and skills for the treatment of raw water, facing the endanger of corrosion of structures and producing the polymers in varied applications.

Course Outcomes:
At the end of the course, the student will be able to:
- Gain knowledge of various skills to control the corrosion of huge structures. The analysis of raw water and its treatment to provide soft water. The technologies to result polymers with multiple applications are understood. The principles of electrochemistry and batteries are clearly understood by the students.

Unit-I: Water and its treatment

Unit-II: Electrochemistry and corrosion


Unit-III: High Polymers
Definition – Classification of polymers with examples – Types of polymerisation – Chain growth (free radical addition mechanism), step growth polymerization, Plastics, fibres and elastomers - definition and characteristics. Plastics – thermoplastic and thermostetting plastics, compounding of plastics. Fibre reinforced plastics. Preparation, properties and Engineering applications of PVC, Teflon, Bakelite, Nylon 6:6 and terylene (Dacron); Rubber – Natural rubber , its processing and vulcanization. Elastomers: Preparation, properties and applications of Styrene butadiene, butyl and thiolok rubbers. Conducting polymers – Classification with examples; mechanism of conduction in trans-polyacetylene and applications of conducting polymers. Biodegradable polymers – concept and advantages - Polylactic acid and its applications.

Unit-IV: Chemistry of Energy sources


Unit-V : Batteries and Materials
Batteries : Cell and battery - Primary battery (dry cell, alkaline cell and Lithium cell). Secondary battery ( lead acid, Ni-Cd and lithium ion cell)
Liquid crystal polymers: classification, characteristics and applications.

Insulators: Characteristics and applications of thermal and electrical insulators.

Nanomaterials: Introduction. Preparation of nanomaterials by top down and bottom up approaches. Carbon nano fibres, and fullerenes - Applications of nanomaterials.

Text Books:

Reference Books:

Prerequisites: Nil

Course Objectives:
During this course, students should develop the ability to:
- Work comfortably with basic engineering mechanics concepts required for analyzing static structures.
- Identify an appropriate structural system to studying a given problem and isolate it from its environment.
- Model the problem using good free-body diagrams and accurate equilibrium equations.
- Identify and model various types of loading and support conditions that act on structural systems.
- Communicate the solution to all problems in an organized and coherent manner and elucidate the meaning of the solution in the context of the problem.

Course Outcomes:
At the end of the course, the student will be able to:
- solve problems dealing with forces in a plane or in space and equivalent force Systems.
- solve beam and cable problems and understand distributed force systems.
- solve friction problems and determine moments of Inertia and centroid using intergration methods.
- understand and know how to solve three-dimension force and moment problems.
- understand and know how to use vector terminology.

UNIT-I
different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II


UNIT – III


MOMENT OF INERTIA: Moment of Inertia of Areas and Masses - Transfer Formula for Moments of Inertia - Moment of inertia of composite areas and masses.

UNIT – IV


UNIT – V


TEXT BOOKS:

REFERENCES:
1. Engineering Mechanics (Statics and Dynamics) by Hibbler; Pearson Education.
UNIT–III: Numerical techniques (5 lectures)
Solution of Algebraic and Transcendental Equations and Linear system of equations.
Solving system of non-homogeneous equations by L-U Decomposition method (Crout’s Method) Jacobi’s and Gauss-Seidel Iteration method.

UNIT- IV: Numerical Differentiation, Integration: (5 lectures)

UNIT – V: Numerical solutions of First order differential equations (5 lectures)

Text Books:
1) Introductory Methods Of Numerical Analysis By Ss Sastry
3) Numerical Methods, Principles, Analysis And Algorithms By Srimantapal & Subodh C. Bhunia, Oxford University Press.

References:
1) Advanced Engineering Mathematics By Alan Jeffery
3) Numerical Methods In Science And Engineering – A practical Approach By S.Rajasekharan, S.Chand Publications

PART A: ELECTRONIC WORKSHOP PRACTICE (in 3 lab sessions):
- Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB’s
- Identification, Specifications and Testing of Active Devices, Diodes, BJT’s, Low power JFET’s, MOSFET’s, Power Transistors, LED’s, LCD’s, SCR, UJT.
- Study and operation of
  - Multimeters (Analog and Digital)
  - Function Generator
  - Regulated Power Supplies
  - CRO.

PART B: (For Laboratory examination – Minimum of 09 experiments to be conducted)
1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Input & Output characteristics of Transistor in CB / CE configuration
4. Full Wave Rectifier with & without filters
5. Input and Output characteristics of FET in CS configuration
6. Measurement of h-parameters of transistor in CB, CE, CC configurations
7. SCR Characteristics.
8. Verification of KVL and KCL.
10. Verification of Superposition and Reciprocity theorems.
11. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
12. Experimental determination of Thévenin’s and Norton’s equivalent circuits and verification by direct test.
LIST OF EXPERIMENTS:

1. Study of characteristics of LED and LASER sources.
2. Magnetic field along the axis of current carrying coil-Stewart and Gee’s method.
3. Study of characteristics of p-i-n diode detectors.
4. Determination of frequency of A.C Mains-Sonometer.
5. Torsional pendulum.
8. L-C-R circuit.
9. Time constant of an R-C Circuit.
10. Characteristics of solar cell

UNIT- I: Interpolation
Programming Tasks:
A) Write a program to determine y for a given x, if two arrays of x and y of same size are given (using Newton’s interpolation both forward and backward).
B) Write a program to determine y for a given x, if two arrays of x and y of same size are given (using Lagrange’s interpolation).
C) Write a program to determine y for a given x, if two arrays of x and y of same size are given (using Gauss interpolation).
(Selection criteria of the interpolation formula are important.)

UNIT- I: Curve fitting
Programming Tasks:
A) Write a program to find a line of best fit from the given two arrays of x and y of same size.
B) Write a program to find a curve of the form \( y = Ae^{Bx} \) from the given two arrays of x and y of same size.
C) Write a program to find a curve of the form \( y = Ax^B \) from the given two arrays of x and y of same size.
D) Write a program to find a curve of the form \( y = Ax^2 + Bx + C \) from the given two arrays of x and y of same size.

UNIT- III: Solution of Algebraic and Transcendental Equations
Programming Tasks:
A) Write a program to find the root of a given equation using bisection method.  
(Write this program such that the initial values given to the system are not usable, then the system should ask us to give new set of initial values).
B) Write a program to find the root of a given equation using method of false position (regula false position).
C) Write a program to find the root of a given equation using iteration method.
D) Write a program to find the root of a given equation using Newton Rophson method.
UNIT-IV: Linear system of equations
Programming Tasks:
A) Write a program to find the solution of given system of linear equations using L-U decomposition method.
B) Write a program to find the solution of given system of linear equations using Jacobi’s method.
C) Write a program to find the solution of given system of equations using Gauss Sidel iteration method.
D) Write a program to find the solution of given system of equations using Gauss Jordan elimination method.

UNIT-V: Numerical Differentiation, Integration and Numerical solutions of First order differential equations
Programming Tasks:
A) Write a program to evaluate definite integral using trapezoidal rule, Simpson’s 1/3rd rule and 3/8th rule.
B) Write a program to solve a given differential equation using Taylor’s series.
C) Write a program to solve a given differential equation Euler’s and modified Euler’s method.
D) Write a program to solve a given differential equation using Runge-Kutta method.

Pre-Requisites: Nil
Course Objectives:
- To enable the students to understand the concepts of probability distributions, statistical Inferences, and testing of hypothesis.
- To enable the students to understand the key concepts of Complex functions and the calculus of complex functions.

Course Outcomes:
- The student achieves the knowledge to testing the hypothesis and form the probability distributions to make inferences.
- The students can study some problems of engineering using the concepts of residue theorem, Laurent series of functions of complex variables.

UNIT-I: Single Random variables and probability distributions.

UNIT-II: Multiple Random variables, Correlation & Regression
Joint probability distributions- Joint probability mass / density function, Marginal probability mass / density functions, Covariance of two random variables, Correlation -Coefficient of correlation, The rank correlation. Regression- Regression Coefficient, The lines of regression and multiple correlation & regression.

UNIT-III: Sampling Distributions and Testing of Hypothesis
Sampling: Definitions of population, sampling, statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance.
Parameter estimations – likelihood estimate, interval estimations.
Testing of hypothesis: Null hypothesis, Alternate hypothesis, type I, & type II errors – critical region, confidence interval, Level of significance. One sided test, Two sided test,

Large sample tests:
(i) Test of Equality of means of two samples equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances)
(ii) Tests of significance of difference between sample S.D and population S.D.
(iii) Tests of significance difference between sample proportion and population proportion & difference between two sample proportions.

Small sample tests:
Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples.
Snedecor’s F- distribution and it’s properties. Test of equality of two population variances.
Chi-square distribution, it’s properties, Chi-square test of goodness of fit.

UNIT-IV: Functions of Complex Variables
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 – V: Contour Integration
Evaluation of integrals of the type
(a) Improper real integrals \( \int_{-\infty}^{\infty} f(x)dx \)  
(b) \( \int_{-\infty}^{\infty} f(\cos \theta, \sin \theta) d\theta \)

Conformal mapping.
Transformation of z-plane to w-plane by a function, Conformal transformation. Standard transformations- Translation; Magnification and rotation; inversion and reflection. Properties of Bilinear transformation. Determination of bilinear transformation when mappings of 3 points are given.

Text Books:
1) Fundamentals of mathematical statistics by s c gupta and v.k.kapoor
2) Probability and statistics for engineers and scientists by sheldon m.ross, academic press
3) Probability and statistics for engineering and the science by jay l.devore.
4) Higher engineering mathematics by b s grewal.
5) Advanced engineering mathematics by peter v o’neil, cengage learning
6) Engineering mathematics by erwin kreyszig, 10th edition wiely publications

References:
1) Mathematics for engineers series – probability statistics and stochastic process by k.b.datta and m.a s.srinivas,cengage publications
2) Probability, statistics and stochastic process by prof.a r k prasad., wiely india
3) Advanced engineering mathematics by sahanaz bathul, phi publication
4) Probability and statistics by t.k.v.iyengar &b.krishna gandhi etel
5) Mathematics for engineers series- advanced mathematics for engineers by k.b.datta and m.a s.srinivas, cengage publications
6) Advanced engineering mathematics for engineers by prof.a r k prasad., wiely india
Prerequisite: Mathematics – II

Course Objectives:
- This gives the basics of Signals and Systems required for all Electrical Engineering related courses.
- This gives concepts of Signals and Systems and its analysis using different transform techniques.
- This gives basic understanding of random process which is essential for random signals and systems encountered in Communications and Signal Processing areas.

Course Outcomes:
Upon completing his course, the student will be able to
- Represent any arbitrary analog or Digital time domain signal in frequency domain.
- Understand the importance of sampling, sampling theorem and its effects.
- Understand the characteristics of linear time invariant systems.
- Determine the conditions for distortion less transmission through a system.
- Understand the concepts of Random Process and its Characteristics.
- Understand the response of linear time Invariant system for a Random Processes.

UNIT-I: Signal Analysis
Signal Analysis:
Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

Fourier Series:
Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series, Complex Fourier spectrum.


TEXT BOOKS:
1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.

REFERENCE BOOKS:

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. ECE I-Sem

ELECTRICAL TECHNOLOGY

Pre-requisite: Nil

Course Objectives: Objectives of this course are
- To Know the basic principle of DC Generators and motors.
- To Know the basic principle of Single Phase Transformers.
- To Understand the basic principle of three-phase induction motor and alternators.
- To understand the basic principle of special motors and electrical instruments.

Course OUTCOMES: After this course, the student
- To analyze the performance of DC generators and motors.
- To analyze the performance of Transformers.
- To learn the in-depth knowledge on three phase induction motors.
- To analyze the performance of special motors and electrical instruments in real time applications.

UNIT I
D.C Generators and DC Motors: Principle of operation of DC Machines-EMF equation – Types of generators – Magnetization and load characteristics of DC generators, DC Motors – Types of DC Motors – Characteristics of DC motors – 3-point starters for DC shunt motor – Losses and efficiency – Swinburne’s test – Speed control of DC shunt motor – Flux and Armature voltage control methods.

UNIT II

UNIT III
UNIT IV

UNIT V
Special Motors & Electrical Instruments: Principle of operation - Shaded pole motors – Capacitor motors, AC servomotor, AC tachometers, Synchros, Stepper Motors – Characteristics,Basic Principles of indicating instruments – Moving Coil and Moving iron Instruments (Ammeters and Voltmeters).

TEXT BOOKS

REFERENCES
3. Essentials of Electrical and Computer Engineering - David V. Kerns, JR. J. David Irwin

JNTUH COLLEGE OF ENGINEERING HYDERABAD
II Year B.Tech. ECE I-Sem

ANALOG ELECTRONICS

Pre Requisites: Basic Electrical and Electronics Engineering.

Course Objectives:
- To introduce circuit realizations with components such as diodes, BJTs and transistors studied earlier.
- To give understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

Course Outcomes:
Upon completion of the Course, the students will be able to:
- Design and analyze small signal amplifier circuits applying the biasing techniques learnt earlier.
- Cascade different amplifier configurations to obtain the required overall specifications like Gain, Bandwidth, Input and Output interfacing Impedances.
- Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.
- Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations.

UNIT – I: ANALYSIS AND DESIGN OF SMALL SIGNAL LOW FREQUENCY BJT AMPLIFIERS

UNIT – II: FET AMPLIFIERS
with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascade and Folded Cascode Amplifier – frequency response.

UNIT – III: POSITIVE & NEGATIVE FEEDBACK IN AMPLIFIERS

UNIT – IV: LARGE SIGNAL AMPLIFIERS

UNIT – V: TUNED AMPLIFIERS
Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading single Tuned amplifiers on Bandwidth, Effect of Cascading Double Tuned amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned amplifiers

TEXT BOOKS:
2. Electronic Devices and Circuits, S. Salivahanan, N.Suresh Kumar, A Vallvaraj, 2nd Edition, TMH.

REFERENCES:
1. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH

JNTUH COLLEGE OF ENGINEERING HYDERABAD
UNIT V
Standard T, π, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network, T and π Conversion, LC Networks and Filters: Properties of LC Networks, Foster’s Reactance theorem, design of constant K, LP, HP and BP Filters, Composite filter design.

TEXT BOOKS

REFERENCES
4. Network Theory – Sudarshan and Shyam Mohan, TMH.
Gender: Why Should We Study It?  (Towards a World of Equals: Unit -1)
Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2)

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.

Unit – III: GENDER AND LABOUR

Housework: the Invisible Labour (Towards a World of Equals: Unit -3)
"My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics (Towards a World of Equals: Unit -7)

Unit – IV: ISSUES OF VIOLENCE

Sexual Harassment: Say No! (Towards a World of Equals: Unit -6)
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".
Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8)
Thinking about Sexual Violence (Towards a World of Equals: Unit -11)
Blaming the Victim-"I Fought for my Life..." - Additional Reading: The Caste Face of Violence.

Unit – V: GENDER : CO-EXISTENCE

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

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 from engineering departments.

Reference Books:


**JNTUH COLLEGE OF ENGINEERING HYDERABAD**

**II Year B.Tech. ECE I-Sem**

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**ANALOG ELECTRONICS LAB - I**

List of Experiments (Twelve experiments to be done):
Design (any six) and Simulation (any Ten) using Multisim or Pspice or Equivalent Simulation Software:

1. Common Emitter Amplifier
2. Common Base Amplifier
3. Common Source amplifier
4. Two Stage RC Coupled Amplifier
5. Current Shunt and Voltage Series Feedback Amplifier
6. Cascode Amplifier
7. Wien Bridge Oscillator using Transistors
8. RC Phase Shift Oscillator using Transistors
9. Class A Power Amplifier (Transformer less)
10. Class B Complementary Symmetry Amplifier
11. Hartley and Colpitt’s Oscillator
12. Single Tuned Voltage Amplifier

**Equipments required for Laboratories:**

1. For software simulation of Electronic circuits
   i) Computer Systems with latest specifications
   ii) Connected in LAN (Optional)
   iii) Operating system (Windows XP)
   iv) Simulations software (Multisim / TINAPRO) Package

2. For Hardware simulations of Electronic Circuits
   i) RPSs
   ii) CROs
   iii) Functions Generators
   iv) Multimeters
   v) Components
### ELECTRICAL TECHNOLOGY LAB

**PART – A**

2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6. Experimental determination of Thévenin’s and Norton’s equivalent circuits and verification by direct test.

**PART – B**

2. Swinburne’s Test on DC shunt machine (Predetermination of efficiency of a given DC Shunt machine working as motor and generator).
4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
5. Brake test on 3-phase Induction motor (performance characteristics).
6. Regulation of alternator by synchronous impedance method.

**Note:** Any TEN of the above experiments are to be conducted

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### BASIC SIMULATION LAB

**Note:**
- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 15 experiment are to be completed

**List of Experiments:**

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realizability and stability properties.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
17. Verification of Weiner-Khinchine Relations.
Pre Requisites: Nil

Course Objectives:
This course provides in-depth knowledge of switching theory and the design techniques of digital circuits, which is the basis for design of any digital circuit. The main objectives are:

- To learn basic techniques 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.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

Course Outcomes:
Upon completion of the course, students should possess the following skills:

- Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray and BCD.
- Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
- Be able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
- Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

UNIT-I:
Number System and Boolean Algebra And Switching Functions:
Review of number systems, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes.


UNIT-II:
Minimization and Design of Combinational Circuits:

UNIT-III:
Sequential Machines Fundamentals and Applications:

Registers and Counters: Shift Registers, Data Transmission in Shift Registers, Operation of Shift Registers, Bidirectional Shift Registers, Applications of Shift Registers, Design and Operation of Ring and Twisted Ring Counter, Operation Of Asynchronous And Synchronous Counters.

UNIT-IV:
Sequential Circuits-I:

UNIT-V:
Sequential Circuits-II:
Finite state machine-capabilities and limitations, Mealy and Moore models-minimization of completely specified and incompletely specified sequential machines, Partition techniques and Merger chart methods-concept of minimal cover table.
Algorithmic State Machines: Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.

TEXT BOOKS:

REFERENCE BOOKS:
4. Digital Logic Design - Ye Brian and Holdsworth, Elsevier

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. ECE II-Sem

PULSE AND DIGITAL CIRCUITS

Prerequisite: Analog Electronics

Course Objectives:
- To explain the complete response of R-C and R-L-C transient circuits.
- To explain clipping, clamping, switching characteristics of transistors and sampling gates.
- To construct various multivibrators using transistors, design of sweep circuits and sampling gates.
- To discuss and realize logic gates using diodes and transistors.

Course Outcomes:
At the end of the course, the student will be able to:
- Understand the applications of diode as integrator, differentiator, clippers, clamer circuits..
- Learn various switching devices such as diode, transistor, SCR. Difference between logic gates and sampling gates
- Design multivibrators for various applications, synchronization techniques and sweep circuits.
- Realizing logic gates using diodes and transistors.
- Understanding of time and frequency domain aspects.
- Importance of clock pulse and its generating techniques.

UNIT-I:
Linear Wave Shaping: High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, High pass RC network as Differentiator, Low pass RC circuit as an Integrator, Attenuators and its application as a CRO Probe, RL and RLC Circuits and their response for Step Input ,Ringing Circuit.

UNIT-II:
Non-Linear Wave Shaping: Diode clippers, Transistor clippers, Clipping at two independent levels, Comparators, Applications of Voltage comparators. Clamping Operation, Clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits, Effect of Diode Characteristics on Clamping Voltage, Synchronized Clamping.
UNIT-III:
Switching Characteristics of Devices: Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, Break down voltages, Transistor in Saturation, Temperature variation of Saturation Parameters, Transistor-switching times, Silicon-controlled-switch circuits.
Sampling Gates: Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits

UNIT-IV:
Time Base Generators: General features of a Time base Signal, Methods of Generating Time Base Waveform, Transistor Miller Time Base generator, Transistor Bootstrap Time Base Generator, Transistor Current Time Base Generators, Methods of Linearity improvement.

UNIT-V:
Synchronization and Frequency Division: Pulse Synchronization of Relaxation Devices, Frequency division in Sweep Circuits, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation.
Realization of Logic Gates Using Diodes & Transistors: AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison.

TEXT BOOKS:
2. Solid State Pulse Circuits –David A. Bell, 4 Ed., 2002 PHI.

REFERENCE BOOKS:
1. Pulse and Digital Circuits – A. Anand Kumar, 2005, PHI.
• Analyze the Wave Equations for good conductors and good dielectrics, and evaluate the UPW Characteristics for several practical media of interest.
• Establish the proof and estimate the polarization features, reflection and transmission coefficients for UPW propagation, distinguish between Brewster and Critical Angles, and acquire knowledge of their applications.
• Determine the Transmission Line parameters for different lines, characterize the distortions and estimate the characteristics for different lines.
• Analyze the RF Line features and configure them as SC, OC Lines, QWTs and HWTs, and design the same for effective impedance transformation.
• Study the Smith Chart profile and stub matching features, and gain ability to practically use the same for solving practical problems.

UNIT–I:

UNIT–II:

UNIT–III:

UNIT–IV:

UNIT–V:

TEXT BOOKS:

REFERENCE BOOKS:
ANALOG COMMUNICATIONS

Prerequisite: Signals and Systems

Course Objectives:
- To develop ability to analyze system requirements of analog communication systems.
- To understand the need for modulation.
- To understand the generation, detection of various analog modulation techniques and also perform the mathematical analysis associated with these techniques.
- To acquire knowledge to analyze the noise performance of analog modulation techniques.
- To acquire theoretical knowledge of each block in AM and FM receivers.
- To understand the pulse modulation techniques.

Course Outcomes:
- Able to analyze and design various modulation and demodulation analog systems.
- Understand the characteristics of noise present in analog systems.
- Study of signal to Noise Ratio (SNR) performance, of various Analog Communication systems.
- Analyze and design the various Pulse Modulation Systems.
- Understand the concepts of Multiplexing: Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM).

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, Envelope detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

UNIT II
SSB MODULATION

UNIT III
ANGLE MODULATION

UNIT IV
NOISE
Resistive Noise Source (Thermal), Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties Noise in Analog communication System, Noise in DSB and SSB System Noise in AM System, Noise in Angle Modulation System, Threshold effect 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.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. ECE II-Sem

CONTROL SYSTEMS

Pre-requisite: Network Analysis

Course Objectives: Objectives of course are
- To introduce the principles and applications of control systems in everyday life
- To introduce the basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems
- To understand different aspects of stability analysis of systems in frequency domain and time domain.

Course Outcomes: After this course, the student gets a thorough knowledge of
- Open loop and closed loop control systems.
- Modeling and transfer function derivations of translational and rotational systems.
- Represent transfer functions through block diagrams and signal flow graphs.
- Design a control systems using time domain and frequency domain techniques.
- Time response analysis, stability analysis, frequency response analysis of different ordered systems through their characteristic equation and time-domain specifications.
- Applications of concepts to electrical and electronics problems.

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, Feed-Back Characteristics, Effects of feedback.
Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems.

TRANSFER FUNCTION EPRESENTATION:
Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples - Block diagram algebra –
UNIT-II TIME RESPONSE ANALYSIS:

UNIT – III STABILITY ANALYSIS:
The concept of stability - Routh stability criterion – qualitative stability and conditional 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.

Frequency Response Analysis:
Introduction, Frequency domain specifications-Bode diagrams- Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT-IV STABILITY ANALYSIS IN FREQUENCY DOMAIN:
Polar Plots, Nyquist Plots and applications of Nyquist criterion to find the stability –Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams.

Classical Control Design Techniques:
Compensation techniques – Lag, Lead, and 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 its Properties.

TEXT BOOKS:

REFERENCE BOOKS:
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
14. AGC Characteristics.
15. PLL as FM Demodulator

Minimum Twelve experiments to be conducted:

1. Linearwave Shaping
   a. RC Low Pass Circuit for different time constants
   b. RC High Pass Circuit for different time constants
2. Non-linear wave shaping
   a. Transfer characteristics and response of Clippers:
      i) Positive and Negative Clippers
      ii) Clipping at two independent levels
   b. The steady state output waveform of clamps for a square wave input
      i) Positive and Negative Clampers
      ii) Clamping at different reference voltage
3. Comparison Operation of different types of Comparators
4. Switching characteristics of a transistor
5. Design a Bistable Multivibrator and draw its waveforms
6. Design an Astable Multivibrator and draw its waveforms
7. Design a Monostable Multivibrator and draw its waveforms
8. Response of Schmitt Trigger circuit for loop gain less than and greater than one
9. UJT relaxation oscillator
10. The output-voltage waveform of Boot strap sweep circuit
11. The output-voltage waveform of Miller sweep circuit
12. Pulse Synchronization of An Astable circuit
13. Response of a transistor Current sweep circuit
14. Sampling gates
   a. Response of Unidirectional gate
   b. Response of Bidirectional gate using transistors
15. Study of logic gates
ANALOG ELECTRONICS LAB - II

List of Experiments (Twelve experiments to be done):

Hardware Testing in Laboratory:
Part A: Minimum of 6 out of the 10 experiments listed on breadboard.
1. Current Shunt Feedback amplifier
2. Voltage Series Feedback amplifier
3. Cascode amplifier
4. Darlington Pair
5. RC Phase shift Oscillator
6. Hartley and Colpitt’s Oscillators
7. Class A power amplifier
8. Class B Complementary symmetry amplifier

Part B: Testing of any 2 circuits designed and simulated out of the 4 experiments listed.
1. Common Emitter Amplifier
2. Common Source Amplifier
3. Two Stage RC Coupled Amplifier
4. Wien Bridge Oscillator using Transistors

Part C:
1. Introduction to PCB fabrication methods
2. Translation of any tested/designed and tested circuits on a PCB.

HUMAN VALUES AND PROFESSIONAL ETHICS

Prerequisite: Nil

Course Objectives:
1. To introduce the basic concepts of universal human values
2. To familiarize the students with desirable business and professional ethics, rights and responsibilities
3. To prepare students against possible gaps and unethical practices in contemporary times
4. To sensitize the students so that they can protect themselves and the organization from the possible professional crime malpractices

Course Outcomes:
1. The students learn about diverse ethical issues rooted in society, trade, business, and environment on local as well as a global platform.
2. The students appreciate their role as a responsible citizen, professional, and as managers, advisors, experts and consultants.
3. The students will reflect and learn major values and ethics from their observations of a spiritual discourse and a visit to a business organization as a practical part of this course.


Unit III Professional Responsibilities: Ethical standards Vs Professional Conduct – Zero Tolerance for Culpable Mistakes – Hazards
Unit IV Professional Rights: professional rights and employee rights communicating risk and public policy – Whistle blowing - Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Regulatory compliances, Monitoring and control- Mini-Cases

Unit V Ethics in global context: Global issues in MNCs- Problems of bribery, extortion, and grease payments – Problem of nepotism, excessive gifts – paternalism – different business practices – negotiating taxes. Mini-Cases

Mini-projects
Project 1: The student of this course should invariably attend (or watch on internet/any TV channel/youtube/social media) two speeches of 30 minutes duration each dealing with spiritual discourse and submit a report on the contents of the lecture proceedings.

Project 2: Visit any organization (including shops/ hotels or shopping malls in your region) of your choice and observe how the professionals perform the given job with a focus on professional ethics and human values.

References
1. Aryasri, Human Values and Professional Ethics, Maruthi Publications.
2. S B George, Human Values and Professional Ethics, Vikas Publishing.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. ECE I-Sem

LINEAR AND DIGITAL IC APPLICATIONS

Prerequisite: Pulse and Digital Circuits

Course Objectives:
The main objectives of the course are:
1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non-linear applications of operational amplifiers.
3. To introduce the theory and applications of analog multipliers and PLL.
4. To teach the theory of ADC and DAC.
5. To introduce the concepts of waveform generation and introduce some special function ICs.
6. To understand and implement the working of basic digital circuits.

Course Outcomes:
On completion of this course, the students will have:
1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Understanding of the different families of digital integrated circuits and their characteristics.
3. Also students will be able to design circuits using operational amplifiers for various applications.

UNIT I:
Operational Amplifier

UNIT II:
Op-Amp, IC-555 & IC 565 Applications
Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations,
UNIT -III: 
Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT -IV: 
Digital Integrated Circuits

Classification of Integrated Circuits, Comparison of Various Logic Families, CMOS Transmission Gate, IC interfacing- TTL Driving CMOS & CMOS Driving TTL, Combinational Logic ICs – Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT -V:
Sequential Logic IC's and Memories

Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.
Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS:

REFERENCE BOOKS:
1. Op Amps and Linear Integrated Circuits-Concepts and Applications
3. Linear Integrated Circuits and Applications – Salivahanan, TMH.
Course Outcomes: Having gone through this course on Antenna Theory and Techniques, and Wave Propagation, the students would be able to

- Explain the mechanism of radiation, distinguish between different antenna characteristic parameters, establish their mathematical relations, estimate them for different practical cases.
- Distinguish between short dipoles, half-wave dipoles, quarter-wave monopoles and small loops, configure their current distributions, derive their far fields and radiation characteristics and sketch their patterns.
- Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of folded dipole, Yagi-Uda Antenna, Helical Antennas, Horn Antennas, and to acquire the knowledge of their analysis, design and development.
- Analyse a microstrip rectangular patch antenna and a parabolic reflector antenna, identify the requirements and relevant feed structure, carry out the design and establish their patterns.
- Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory.
- Carry out the Linear Array Analysis, estimate the array factor and characteristics and sketch the pattern for 2-element array, N-element BSA, EFA, modified EFA, Binomial Arrays.
- Classify the different wave propagation mechanisms, identify their frequency ranges, determine the characteristic features of ground wave, ionospheric wave, space wave, duct and tropospheric propagations, and estimate the parameters involved.

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

Fields from Oscillating Dipole, Field Zones, Front - to-back Ratio, Antenna Theorems, Radiation, Retarded Potentials – Helmholtz Theorem

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 Width, Directivity, Effective Area and Effective Height, Natural Current Distributions, Far 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 Loops (Qualitative Treatment).


UNIT -IV: Antenna Arrays: Point Sources – Definition, Patterns, 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, BSA with Non-uniform Amplitude Distributions – General Considerations and Binomial Arrays. Illustrative Problems.

Antenna Measurements: Introduction, Concepts - Reciprocity, Near and Far Fields, Coordinate System, Sources of Errors. Patterns to be Measured, 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 (Qualitative Treatment) – Introduction, Plane Earth Reflections, Space and Surface Waves,

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.

TEXT BOOKS:

REFERENCE BOOKS:

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. ECE I-Sem

DIGITAL COMMUNICATIONS

Prerequisite: Analog Communications

Course Objectives:
- To understand the functional block diagram of Digital communication system.
- To understand the need for source and channel coding.
- To study various source and channel coding techniques.
- To understand a mathematical model of digital communication system for bit error rate analysis of different digital communication systems.

Course Outcomes:
At the end of the course, the student will be able to:
- Design optimum receiver for Digital Modulation techniques.
- Analyze the error performance of Digital Modulation Techniques.
- Understand the redundancy present in Digital Communication by using various source coding techniques.
- Know about different error detecting and error correction codes like block codes, cyclic codes and convolution codes.

UNIT I:

Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT II:
Digital Modulation Techniques: Introduction, ASK, ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and Frequency Spectrum of FSK, Non Coherent FSK Detector, Coherent
FSK Detector, FSK Detection using PLL, BPSK, Coherent PSK Detection, QPSK, Differential PSK.

UNIT III:

UNIT IV:
Entropy, Information rate, Source coding: Huffman coding, Shannon Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade-off between bandwidth and SNR.

UNIT V:
Error Control Codes
Linear Block Codes: Matrix Description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes.
Cyclic Codes: Algebraic Structure, Encoding, Syndrome Calculation, Decoding.
Convolution Codes: Encoding, Decoding using State, Tree and Trellis Diagrams, Decoding using Viterbi Algorithm, Comparison of Error Rates in Coded and Uncoded Transmission.

TEXT BOOKS:

REFERENCES:
Unit V Introduction to Financial Accounting & Financial Analysis:

TEXT BOOKS:
1. Aryasri: Managerial Economics and Financial Analysis, TMH.,

REFERENCES:
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson,
3. Lipsey & Chrystel, Economics, Oxford University Press, Domnick Salvatore: Managerial Economics In a Global Economy, Thomson.,

LINEAR IC APPLICATIONS LAB

Note:
- Verify the functionality of the IC in the given application.

Design and Implementation of:
1. Inverting and Non-inverting Amplifiers using Op Amps.
4. Integrator Circuit using IC 741.
6. Active Filter Applications – LPF, HPF (first order)
7. IC 741 Waveform Generators – Sine, Square wave and Triangular waves.
11. IC 565 – PLL Applications.
12. Voltage Regulator using IC 723.
Design the following:

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: Generation and Detection
6. Phase Shift Keying: Generation and Detection
7. Amplitude Shift Keying: Generation and Detection
8. Study of the spectral characteristics of PAM,
9. Study of the spectral characteristics of QAM.
10. DPSK: Generation and Detection
11. QPSK: Generation and Detection
12. OFDM: Generation and Detection

Design and Implementation of the following experiments using Integrated Circuits (ICs):

1. Design a 16 x 4 priority encoder using two 8 x 3 priority encoder.
2. Design an 16 bit comparator using 4 bit Comparators.
3. Design a model to 53 counter using two decade counters.
4. Design a 450 KHz clock using NAND / NOR gates.
5. Design a 4 bit pseudo random sequence generator using 4 – bit ring counter.
6. Design a 16 x 1 multiplexer using 8 x 1 multiplexer.
7. Design a 16 bit Adder / Subtractor using 4 – bit Adder / Subtractor IC’s
8. Plot the transform Characteristics of 74H,LS,HS series IC’s.
9. Design a 4 – bit gray to Binary and Binary to Gray Converter.
10. Design a two Digit 7 segment display unit using this display the Mod counter output of experiment 3.
12. Design a 4 digit hex Counter using synchronous and Asynchronous one digit hex counters. Compute the display between Asynchronous counter and Synchronous counter.
CELLULAR AND MOBILE COMMUNICATIONS
(PE - I)

Prerequisite: Digital Communications

Course Objectives:
The course objectives are:

- To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
- To enable the student to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel.
- To provide the student with an understanding of Co-channel and Non-Co-channel interferences.
- To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
- To give the student an understanding of frequency management, Channel assignment and types of handoff.

Course Outcomes:
By the end of the course,

- The student will be able to analyze and design wireless and mobile cellular systems.
- The student will be able to understand impairments due to multipath fading channel.
- The student will be able understand the fundamental techniques to overcome the different fading effects.
- The student will be able to understand Co-channel and Non-Co-channel interferences.
- The student will be able to familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.
- The student will have an understanding of frequency management, Channel assignment and types of handoff.

UNIT-I:
Introduction to Cellular Mobile Radio Systems:

Fundamentals of Cellular Radio System Design:
Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT-II:
Co-Channel Interference:

Non-Co-Channel Interference:
Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

UNIT-III:
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 a Point to Point Prediction Model in Different Conditions, Merits of Lee Model.

Cell Site and Mobile Antennas:
Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile Antennas.

UNIT-IV:
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 Assignment.

UNIT-V:
Handoffs and Dropped Calls:
TEXT BOOKS:

REFERENCE BOOKS:

III Year B.Tech. ECE II-Sem

COMPUTER ORGANIZATION AND OPERATING SYSTEMS (PE - I)

Prerequisite : Nil

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 including cache memories and virtual memory.
- To implement a significant portion of an Operating System.

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.

UNIT-I:
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:

UNIT -IV:

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


UNIT -V:


TEXT BOOKS:

REFERENCE BOOKS:
DIGITAL IMAGE PROCESSING  
(PE - I)  

Prerequisite : Signals and Systems  

Course Objectives:  
- To comprehend the relation between human visual system and machine perception and processing of digital images.  
- To provide a detailed approach towards image processing applications like enhancement, segmentation and compression.  

Course Outcomes:  
- Exploration of the limitations of the computational methods on digital images.  
- Expected to implement the spatial and frequency domain image transforms on enhancement and restoration of images.  
- Elaborate understanding on image enhancement techniques.  
- Expected to define the need for compression and evaluate the basic compression algorithms.  


TEXT BOOKS:  

REFERENCE BOOKS:  
5. Introductory Computer Vision Imaging Techniques and Solutions-Adrian low, 2008, 2nd Edition  
TELEVISION ENGINEERING  
(PE - I)  

Prerequisite : Nil  

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.  

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.,  

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 and 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.

TEXT BOOKS:  

REFERENCE BOOKS:  

JNTUH COLLEGE OF ENGINEERING HYDERABAD  
III Year B.Tech. ECE II-Sem  
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COMPUTER NETWORKS
(PE - II)

Prerequisite : Digital Communications

Course Objectives:
- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits.
- To explore the various layers of OSI Model.
- To introduce UDP and TCP Models.
- To have the concept of different routing techniques for data communications.

Course Outcomes:
- Students should understand and explore the basics of Computer Networks and Various Protocols. He/She will be in a position to understand the World Wide Web concepts.
- Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and ad hoc networks.

UNIT I:

UNIT II:
Data Link Layer: Introduction, Checksum, Framing, Flow and Error Control, Noiseless Channels, Noisy Channels, Random Access Controlled Access, Channelization, IEEE Standards, Ethernet, Giga-Bit Ethernet, Wireless LANs, SONET-SDH, Frame Relay and ATM.

UNIT III:

UNIT IV:
Transport Layer: Process to Process Delivery, UDP, TCP and SCTP Protocols, Congestion, Congestion Control, Quality of Service.

Application Layer: Domain Name Space, DNS in Internet, Electronic Mail, File Transfer Protocol, WWW, HTTP, SNMP, Multi-Media.

UNIT V:

TEXT BOOKS:

REFERENCES:
3. Computer and Communication Networks, Nader F. Mir, Pearson Education
6. Data Communications and Computer Networks, P.C.Gupta, PHI.
Prerequisite: Switching Theory and Logic Design

Course Objectives:
- To provide extended knowledge of digital logic circuits in the form of state model approach.
- To provide an overview of system design approach using programmable logic devices.
- To provide and understand of fault models and test methods.

Course Outcomes:
- To understand the minimization of Finite state machine.
- To expose the design approaches using ROM’s, PAL’s and PLA’s.
- To provide in depth understanding of Fault models.
- To understand test pattern generation techniques for fault detection.
- To design fault diagnosis in sequential circuits.

UNIT- I:
Minimization and Transformation of Sequential Machines
The Finite State Model – Capabilities and limitations of FSM – State equivalence and machine minimization – Simplification of incompletely specified machines.

UNIT- II:
Digital Design
Digital Design Using ROMs, PALs and PLAs, BCD Adder, 32 – bit adder, State graphs for control circuits, Scoreboard and Controller, A shift and add multiplier, Array multiplier, Keypad Scanner, Binary divider.

UNIT - III:
SM Charts
State machine charts, Derivation of SM Charts, Realization of SM Chart, Implementation of Binary Multiplier, dice game controller.

UNIT- IV:
Fault Modeling & Test Pattern Generation
Logic Fault model – Fault detection & Redundancy- Fault equivalence and fault location –Fault dominance – Single stuck at fault model – Multiple stuck at fault models – Bridging fault model.

UNIT- V:
Fault Diagnosis in Sequential Circuits
Circuit Test Approach, Transition Check Approach – State identification and fault detection experiment, Machine identification, Design of fault detection experiment

TEXT BOOKS:
3. Logic Design Theory – N. N. Biswas, PHI

REFERENCE BOOKS:
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION  
(PE - II)  

Prerequisite : Basic Electrical and Electronics Engineering  

Course Objectives:  
- It provides an understanding of various measuring systems functioning and metrics for performance analysis.  
- Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.  
- Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.  

Course Outcomes:  
On completion of this course student can be able to  
- Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.  
- Measure various physical parameters by appropriately selecting the transducers.  
- Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.  

UNIT I:  

UNIT II:  

UNIT III:  
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, Synchrons, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Stricitive Transducers.  

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

TEXT BOOKS:  

REFERENCES:  

JNTUH COLLEGE OF ENGINEERING HYDERABAD  
III Year B.Tech. ECE II-Sem
SCRIPTING LANGUAGES
(PE - II)

Prerequisite : Nil

Course Objectives:
The goal of the course is to study:
• 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.

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.

Unit – 1 : 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 – 2 : Linux Networking

Unit – 3 : 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 – 4 : 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 – 5 : 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.

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 Yourself Perl in 21 days by David Till.

Reference Books:
MICROPROCESSORS AND MICROCONTROLLERS

Prerequisite: Computer Organization and Operating Systems

Course Objectives:
- To develop an understanding of the operations of microprocessors and micro controllers; machine language programming and interfacing techniques.

Course Outcomes:
- Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers.
- Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller based systems.

UNIT -I:

Instruction Set and Assembly Language Programming of 8086: Instruction formats, Addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT -II:
Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.

8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters

UNIT –III:
I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

UNIT –IV:

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

Unit – V:

TEXT BOOKS:

REFERENCE BOOKS:
2. Introduction to Embedded Systems, Shibu K.V, TMH, 2009
4. ARM Reference Manuals
5. Digital Signal Processing and Applications with the OMAP-L138 Experimenter, Donald Reay,WILEY.
**Course Objectives:**

This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous-time and discrete time signals and systems.
- To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- The impetus is to introduce a few real-world signal processing applications.
- To acquaint in FFT algorithms, Multi-rate signal processing techniques and finite word length effects.

**Course Outcomes:**

On completion of this subject, the student should be able to:

- Perform time, frequency and Z -transform analysis on signals and systems.
- Understand 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.
- Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.

**Unit I:**

**Introduction:** Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems


**Unit II:**


**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 – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

**Unit IV:**

**FIR Digital Filters:** Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

**Unit V:**

**Multirate Digital Signal Processing:** Introduction, Down Sampling, Decimation, Upsampling, Interpolation, Sampling Rate Conversion, Conversion of Band Pass Signals, Concept of Resampling.

**Finite Word Length Effects:** Limit cycles, Overflow Oscillations, Round-off Noise in IIR Digital Filters, Computational Output Round Off Noise, Methods to Prevent Overflow, Trade Off Between Round Off and Overflow Noise, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

**TEXT BOOKS:**


**REFERENCES:**
1. **Introduction**

The introduction of the Advanced Communication Skills 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 a laboratory course to enable students to use ‘good’ English and perform the following:

- Gathering ideas and information to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. **Objectives:**

This Lab focuses on using multi-media 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.
- To prepare all the students for their placements.

**Learning Outcomes**

- Accomplishment of sound vocabulary and its proper use contextually.
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities

3. **Syllabus:**
The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. **Activities on Reading Comprehension** – General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.


4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ e-mails/assignments etc.

5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

4. **Minimum Requirement:**
The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- T. V, a digital stereo & Camcorder
- Headphones of High quality


6. **Suggested Software:**
The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 8th 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'
  - Preparing for being Interviewed
  - Positive Thinking
  - Interviewing Skills
  - Telephone Skills
  - Time Management

7. **Books Recommended:**
2. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

Advanced Communication Skills Lab Practicals:

1. The practical examinations for the ACS Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned, by inviting the External Examiner from outside. In case of the non-availability of the External Examiner, other teacher of the same department can act as the External Examiner.

Mini Project: As a part of Internal Evaluation

1. Seminar/ Professional Presentation
2. A Report on the same has to be prepared and presented.

* Teachers may use their discretion to choose topics relevant and suitable to the needs of students.
* Not more than two students to work on each mini project. 
* Students may be assessed by their performance both in oral presentation and written report.

DIGITAL SIGNAL PROCESSING LAB

The Programs shall be implemented in Software (Using MATLAB / Lab View / C Programming/ Equivalent) and Hardware (Using TI / Analog Devices / Motorola / Equivalent DSP processors).

1. Generation of Sinusoidal Waveform / Signal based on Recursive Difference Equations
3. To find DFT / IDFT of given DT Signal
4. To find Frequency Response of a given System given in Transfer Function/ Differential equation form.
5. Obtain Fourier series coefficients by formula and using FET and compare for half sine wave.
6. Implementation of FFT of given Sequence
7. Determination of Power Spectrum of a given Signal(s).
8. Implementation of LP FIR Filter for a given Sequence/Signal.
9. Implementation of HP IIR Filter for a given Sequence/Signal
10. Generation of Narrow Band Signal through Filtering
11. Generation of DTMF Signals
12. Implementation of Decimation Process
13. Implementation of Interpolation Process
14. Implementation of I/D Sampling Rate Converters
15. Impulse Response of First order and Second Order Systems.

Note: - Minimum of 12 experiments has to be conducted.
MICROPROCESSORS AND MICROCONTROLLERS LAB

Cycle 1: Using 8086 Processor Kits and/or Assembler (5 Weeks)
- Assembly Language Programs to 8086 to Perform
  1. Arithmetic, Logical, String Operations on 16 Bit and 32 Bit Data.
  2. Bit level Logical Operations, Rotate, Shift, Swap and Branch Operations.

Cycle 2: Using 8051 Microcontroller Kit (6 weeks)
- Introduction to Keil IDE
  1. Assembly Language Programs to Perform Arithmetic (Both Signed and Unsigned) 16 Bit Data Operations, Logical Operations (Byte and Bit Level Operations), Rotate, Shift, Swap and Branch Instructions
  2. Time delay Generation Using Timers of 8051.
  3. Serial Communication from / to 8051 to / from I/o devices.
  4. Program Using Interrupts to Generate Square Wave 10 KHZ Frequency on P2.1 Using Timer0 8051 in 8bit Auto reload Mode and Connect a 1HZ Pulse to INT1 pin and Display on Port0. Assume Crystal Frequency as 11.0592MHZ

Cycle 3: Interfacing I/O Devices to 8051(5 Weeks)
- 7 Segment Display to 8051.
- Matrix Keypad to 8051.
- Sequence Generator Using Serial Interface in 8051.
- 8bit ADC Interface to 8051.
- Triangular Wave Generator through DAC interfaces to 8051.

BOOKS:
2. The 8051 Microcontrollers: Architecture, Programming & Applications by Dr. K. Uma Rao,

MICROWAVE ENGINEERING

Prerequisite : Electromagnetic Theory and Transmission Lines; Antennas and wave Propagation

Course Objectives:
This is a core course in Microwave Communications domain, and covers contents related to Microwave Theory and Techniques. The main objectives of the course are ....
- To get familiarized with microwave frequency bands, their applications and to understand the limitations and losses of conventional tubes at these frequencies.
- To develop the theory related to microwave transmission lines, and to determine the characteristics of rectangular waveguides, microstrip lines, and different types of waveguide components and ferrite devices.
- To distinguish between different types of microwave tubes, their structures and principles of microwave power generation, and to characterize their performance features and applications - at tube levels as well as with solid state devices.
- To impart the knowledge of Scattering Matrix, its formulation and utility, and establish the S-Matrix for various types of microwave junctions.
- To understand the concepts of microwave measurements, identify the equipment required and precautions to be taken, and get familiarized with the methods of measurement of microwave power and various other microwave parameters.

Course Outcomes:
Having gone through this course covering different aspects of microwave theory and techniques, the students would be able to
- To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical microwave transmission line problems.
- To distinguish between the different types of waveguide and ferrite components, explain their functioning and select proper components for engineering applications.
- To distinguish between the methods of power generation at microwave frequencies, derive the performance characteristics of 2-Cavity and Reflex Klystrons, Magnetrons, TWTs and estimate their efficiency levels, and solve related numerical problems.
- To realize the need for solid state microwave sources, understand the concepts of TEDs, RWH Theory and explain the salient features of Gunn Diodes and ATT Devices.
To establish the properties of Scattering Matrix, formulate the S-Matrix for various microwave junctions, and understand the utility of S-parameters in microwave component design.

To set up a microwave bench, establish the measurement procedure and conduct the experiments in microwave lab for measurement of various microwave parameters.

UNIT I:

UNIT II:
Cavity Resonators– Introduction, Rectangular Cavities, Dominant Modes and Resonant Frequencies, Q Factor and Coupling Coefficients, Illustrative Problems


Ferrites– Composition and Characteristics, Faraday Rotation, Ferrite Components – Gyraotor, Isolator, Circulator.

UNIT III:

TEXT BOOKS:

REFERENCES:

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. ECE I-Sem

WIRELESS COMMUNICATIONS AND NETWORKS
Prerequisite: Digital Communications

Course objectives:
The course objectives are:
- To provide the students with the fundamental treatment about many practical and theoretical concepts that forms basic of wireless communications.
- To equip the students with various kinds of wireless networks and its operations.
- To prepare students to understand the concept of frequency reuse, and be able to apply it in the design of mobile cellular system.
- To prepare students to understand various modulation schemes and multiple access techniques that are used in wireless communications.
- To provide an analytical perspective on the design and analysis of the traditional and emerging wireless networks, and to discuss the nature of, and solution methods to, the fundamental problems in wireless networking.
- To train students to understand the architecture and operation of various wireless wide area networks such as GSM, IS-95, GPRS and SMS.
- To train students to understand wireless LAN architectures and operation.
- To prepare students to understand the emerging technique OFDM and its importance in the wireless communications.

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 networks 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.

UNIT -I:
The Cellular Concept-System Design Fundamentals

UNIT –II:
Mobile Radio Propagation: Large-Scale Path Loss
Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference, Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems-Cell Splitting, Sectoring

UNIT –III:
Mobile Radio Propagation: Small-Scale Fading and Multipath
Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel-Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke’s model for flat fading, spectral shape due to Doppler spread in Clarke’s model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model

UNIT -IV:
Equalization and Diversity

UNIT -V:
Wireless Networks
Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, Hiper Lan, WLL.

TEXT BOOKS:

REFERENCE BOOKS:
1. Wireless Digital Communications – Kamilo Feher, 1999, PHI.

UNIT -I:


UNIT -II:

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, Reliability of LED & ILD.

Source to Fiber Power Launching: Output Patterns, Power Coupling, Power Launching, Equilibrium Numerical Aperture, Laser Diode to Fiber Coupling.

UNIT -IV:

UNIT -V:

TEXT BOOKS:

REFERENCE BOOKS:
DIGITAL SIGNAL PROCESSORS AND CONTROLLERS
(PE-III)

Prerequisite: Digital Signal Processing and Microprocessors and Microcontrollers

Course Objectives:
- To enable the student to quickly understand the basic concepts of digital signal processing using a DSP processor, specifically the TMS320C54xx.
- To introduce ARM Cortex M4 processors architectures, programming and detailed uses of floating point unit and DSP instruction.

Course Outcomes:
- Student can use DSP operations on TMS320C54xx processors.
- Gets introduced to cortex M4 processors along with ARM architectures supporting DSP operations.
- DSP instructions can be used by the students, for floating point unit.
- DSP applications can be developed by the students.

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.

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. [TEXTBOOK-1]

UNIT-II: Programmable Digital Signal Processors:
Commercial Digital signal-processing Devices, 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. [TEXTBOOK-1]

UNIT-III: Architecture of ARM Processors:
Introduction to the architecture, Programmer’s model- operation modes and states, registers, special registers, floating point registers, Behaviour of the application program status register(APSR)- Integer status flags, Q status flag, GE bits, Memory system-Memory system features, memory map, stack memory, memory protection unit (MPU), Exceptions and Interrupts-what are exceptions?, nested vectored interrupt controller(NVIC), vector table, Fault handling, System control block (SCB), Debug, Reset and reset sequence.

Technical Details of ARM Processors:
General information about Cortex-M3 and cortex M4 processors-Processor type, processor architecture, instruction set, block diagram, memory system, interrupt and exception support, Features of the cortex-M3 and Cortex-M4 Processors-Performance, code density, low power, memory system, memory protection unit, interrupt handling, OS support and system level features, Cortex-M4 specific features, Ease of use, Debug support, Scalability, Compatibility. [TEXTBOOK-2]

UNIT-IV: Instruction SET:
Background to the instruction set in ARM Cortex-M Processors, Comparison of the instruction set in ARM Cortex-M Processors, understanding the assembly language syntax, Use of a suffix in instructions, Unified assembly Language (UAL), Instruction set, Cortex-M4-specific instructions, Barrel shifter, Accessing special instructions and special registers in Programming. [TEXTBOOK-2]

UNIT-V: Floating Point Operations:
About Floating Point Data,Cortex-M4 Floating Point Unit (FPU)-overview, FP registers overview, CPACR register, Floating point register bank, FPSCR, FPU->FPCCR, FPU-> FPCR, FPU->FPDSCR, FPU->MVFR0, FPU->MVFR1.

ARM Cortex-M4 and DSP Applications:
DSP on a microcontroller, Dot Product example, writing optimised DSP code for the Cortex-M4-Biquad filter, Fast Fourier transform, FIR filter. [TEXTBOOK-2]

TEXTBOOKS:
REFERENCES:

Prerequisite : Nil

Course Objectives:
- To understand the biological neural network and to model equivalent neuron models.
- To understand the architecture, learning algorithm and issues of various feed forward and feedback neural networks.

Course Outcomes:
By completing this course the student will be able to:
- Create different neural networks of various architectures both feed forward and feed backward.
- Perform the training of neural networks using various learning rules.
- Perform the testing of neural networks and do the perform analysis of these networks for various pattern recognition applications.

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 Perceptrons: 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 Pattern 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

TEXT BOOKS:

REFERENCE BOOKS:
1. Artificial Neural Networks - B. Vegganarayana Prentice Hall of India P Ltd 2005
2. Neural Networks in Computer Inteligence, Li Min Fu TMH 2003

Prerequisite: Analog Communications and Digital Communications

Course Objectives:
The course objectives are:
- To prepare students to excel in basic knowledge of satellite communication principles
- To provide students with solid foundation in orbital mechanics and launches for the satellite communication
- To train the students with a basic knowledge of link design of satellite with a design examples.
- To provide better understanding of multiple access systems and earth station technology
- To prepare students with knowledge in satellite navigation and GPS & and satellite packet communications.

Course Outcomes:
At the end of the course,
- Students will understand the historical background, basic concepts and frequency allocations for satellite communication
- Students will demonstrate orbital mechanics, launch vehicles and launchers
- Students will demonstrate the design of satellite links for specified C/N with system design examples.
- Students will be able to visualize satellite sub systems like Telemetry, tracking, command and monitoring power systems etc.
- Students will understand the various multiple access systems for satellite communication systems and satellite packet communications.

UNIT I:

UNIT II:
Satellite Subsystems: Attitude and Orbit Control System, Telemetry, Tracking, Command And Monitoring, Power Systems, Communication
UNIT III:
Multiple Access: Frequency Division Multiple Access (FDMA), Intermodulation, Calculation of C/N, Time Division Multiple Access (TDMA), Frame Structure, Examples, Satellite Switched TDMA Onboard Processing, DAMA, Code Division Multiple Access (CDMA), Spread Spectrum Transmission and Reception.

Unit IV:

Unit V:
Low Earth Orbit and Geo-Stationary Satellite Systems: Orbit Considerations, Coverage and Frequency Consideration, Delay & Throughput Considerations, System Considerations, Operational NGSO Constellation Designs.

TEXT BOOKS:

REFERENCES:

JNTUH COLLEGE OF ENGINEERING HYDERABAD
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.

TEXT BOOKS:
1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

REFERENCE BOOKS:
1. Embedded Systems - Raj Kamal, TMH.
4. An Embedded Software Primer - David E. Simon, Pearson Education.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech ECE I-Semester

AD-HOC WIRELESS AND SENSOR NETWORKS

(PE- IV)

Prerequisite : Computer Networks

Course Objectives:
- To study the fundamentals of wireless Ad-Hoc Networks.
- To study the operation and performance of various Adhoc wireless network protocols.
- To study the architecture and protocols of Wireless sensor networks.

Course Outcomes:
- Students will be able to understand the basis of Ad-hoc wireless networks.
- Students will be able to understand design, operation and the performance of MAC layer protocols of Adhoc wireless networks.
- Students will be able to understand design, operation and the performance of routing protocol of Adhoc wireless network.
- Students will be able to understand design, operation and the performance of transport layer protocol of Adhoc wireless networks.
- Students will be able to understand sensor network Architecture and will be able to distinguish between protocols used in Adhoc wireless network and wireless sensor networks.

UNIT - I:
Wireless LANs and PANs

UNIT - II:
MAC Protocols
UNIT - III:
Routing Protocols

UNIT – IV:
Transport Layer Protocols

UNIT – V:
Wireless Sensor Networks

TEXT BOOKS:

REFERENCE BOOKS:

UNIT I:  Introduction:

Review of Transmission Lines:

UNIT II:  Single and Multi-Port Networks:

RF Filter Design:
UNIT III: Active RF Component Modelling:

UNIT IV: Matching and Biasing Networks:
Impedance Matching Using Discrete Components: Two Component Matching Networks, Forbidden Regions, Frequency Response and Quality Factor, T and Pi Matching Networks-Amplifier Classes of Operation and Biasing Networks: Classes of Operation and Efficiency of Amplifiers, Biasing Networks for BJT, Biasing Networks for FET.

UNIT V: RF Transistor Amplifier Design:
Characteristics of Amplifiers- Amplifier Power Relations: RF Source, Transducer Power Gain, Additional Power Relations-Stability Considerations: Stability Circles, Unconditional Stability, And Stabilization Methods-Unilateral and Bilateral Design for Constant Gain- Noise Figure Circles- Constant VSWR Circles.

RF Oscillators and Mixers:

TEXT BOOKS:

REFERENCES:
1. Radio Frequency and Microwave Electronics – Illustrated by Matthew M. Radmanesh – PEI.
2. RF Circuit Design – Christopher Bowick, Cheryl Aljuni and John Byler, Elsevier Science, 2008.
UNIT – I:

**Radar Equation**: SNR, Envelope Detector – False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets, Transmitter Power, PRF and Range Ambiguities, System 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


UNIT – III:

UNIT – IV:
**Tracking Radar**: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT – V:

**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.

**TEXT BOOKS**:

**REFERENCE BOOKS**:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. ECE I-Sem

DATA ANALYTICS
(PE – V)

Prerequisite : Nil

Course Objectives: The student should be made to :
- Be exposed to conceptual framework of big data.
- Understand different techniques of Data Analysis.
- Be familiar with concepts of data streams.
- Be exposed to itemsets, Clustering, frame works and Visualization.

Course Outcomes: Upon completion of this course the students will be able to

- Understand Big data fundamentals.
- Learn various Data Analysis Techniques
- Implement various Data streams.
- Understand itemsets, Clustering, frame works & Visualizations.

Unit – I : Introduction to Big Data

Unit – II : Data Analysis

Unit – III : Mining Data Streams

Unit – IV : Frequent Itemsets and clustering

Unit – V : Frame Works and Visualization

Text Books:

Reference Books:
CODING THEORY AND TECHNIQUES
(PE-V)

Prerequisite: Digital Communications

Course Objectives:
- To acquire the knowledge in measurement of information and errors.
- To study the generation of various code methods.
- To study the various application of codes.

Course Outcomes:
- Learning the measurement of information and errors.
- Obtain knowledge in designing various codes like block codes, cyclic codes, convolution codes, turbo codes and space codes.

UNIT – I:
Coding for Reliable Digital Transmission and storage
Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT - II:
Cyclic Codes
Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT – III:
Convolutional Codes
Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority-logic decoding of Convolution codes, Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT – IV:
Turbo Codes
LDPC Codes- Codes based on sparse graphs, Decoding for binary erasure channel, Log-likelihood algebra, Brief propagation, Product codes, Iterative decoding of product codes, Concatenated convolutional codes- Parallel concatenation, The UMTS Turbo code, Serial concatenation, Parallel concatenation, Turbo decoding

UNIT - V:
Space-Time Codes
Introduction, Digital modulation schemes, Diversity, Orthogonal space-time block codes, Alamouti’s schemes, Extension to more than Two Transmit Antennas, Simulation Results, Spatial Multiplexing : General Concept, Iterative APP Preprocessing and Per-layer Decoding, Linear Multilayer Detection, Original BLAST Detection, QL Decomposition and Interface Cancellation, Performance of Multi-Layer Detection Schemes, Unified Description by Linear Dispersion Codes.

TEXT BOOKS:

REFERENCE BOOKS:
2. Digital Communications-Fundamental and Application - Bernard Sklar, PE.
4. Introduction to Error Control Codes-Salvatore Gravano-oxford
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech ECE I-Sem

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ELECTRO MAGNETIC INTERFERENCE & ELECTROMAGNETIC COMPATIBILITY (EMI / EMC) (PE – V)

Prerequisite : Electromagnetics Theory and Transmisson Lines

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

Course Outcomes:
Upon completion of this course, the student will be able to
1. Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems.
2. Analyze various sources of EMI and various possibilities to provide EMC.
3. Understand and analyze possible EMI prevention techniques such as grounding, shielding, filtering and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.

UNIT I: Sources of EMI:
Definition of EMI and EMC, Classification, Natural and Man-Made EMI Sources, Switching Transients, Electrostatic Discharge, Nuclear Electromagnetic Pulse and High Power Electromagnetics.

EMI/EMC Standards

UNIT II: EMI Coupling Modes:

UNIT III: EMI Controlling Techniques-1:

UNIT IV: EMI Controlling Techniques-2:

UNIT V: EMI Measurements:

TEXT BOOKS:
IV Year B.Tech. ECE I-Sem
L T P C
4 0 0 4

VLSI DESIGN

Prerequisite: Analog Electronics; Switching Theory and Logic Design

Course Objectives:
The objectives of the course are to:
1. Give exposure to different steps involved in the fabrication of ICs using MOS transistor, CMOS/BICMOS transistors and passive components.
2. Explain electrical properties of MOS and BICMOS devices to analyze the behavior of inverters designed with various loads.
3. Give exposure to the design rules to be followed to draw the layout of any logic circuit.
4. Provide concept to design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
5. Provide design concepts to design building blocks of data path of any system using gates.
6. Understand basic programmable logic devices and testing of CMOS circuits.

Course Outcomes:
Upon successfully completing the course, the student should be able to:
1. Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.
2. Choose an appropriate inverter depending on specifications required for a circuit.
3. Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit.
4. Design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
5. Provide design concepts required to design building blocks of data path using gates.
6. Design simple memories using MOS transistors and can understand design of large memories.
7. Design simple logic circuit using PLA, PAL, FPGA and CPLD.
8. Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

UNIT –I:
Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BICMOS

Basic Electrical Properties: Basic Electrical Properties of MOS and BICMOS Circuits: $I_{ds}-V_{ds}$ relationships, MOS transistor threshold Voltage, $g_m$, $g_{ds}$. Figure of merit $\omega_0$; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT –II:

UNIT –III:

UNIT –IV:
Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.
Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

UNIT –V:
Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

TEXT BOOKS:

REFERENCE BOOKS:
List of Experiments

Design and implementation of the following CMOS digital/analog circuits using Cadence / Mentor Graphics / Synopsys / Equivalent CAD tools. The design shall include Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification, Scaling of CMOS Inverter for different technologies, study of secondary effects (temperature, power supply and process corners), Circuit optimization with respect to area, performance and/or power, Layout, Extraction of parasitics and back annotation, modifications in circuit parameters and layout consumption, DC/transient analysis, Verification of layouts (DRC, LVS).

E-CAD programs:

Programming can be done using any complier. Down load the programs on FPGA/CPLD boards and performance testing may be done using pattern generator (32 channels) and logic analyzer apart from verification by simulation with any of the front end tools.

1. HDL code to realize all the logic gates
2. Design of 2-to-4 decoder
3. Design of 8-to-3 encoder (without and with priority)
4. Design of 8-to-1 multiplexer and 1-to-8 demultiplexer
5. Design of 4 bit binary to gray code converter
6. Design of 4 bit comparator
7. Design of Full adder using 3 modeling styles
8. Design of flip flops: SR, D, JK, T
9. Design of 4-bit binary, BCD counters (synchronous/ asynchronous reset) or any sequence counter
10. Finite State Machine Design

VLsi programs:

- Introduction to layout design rules. Layout, physical verification, placement & route for complex design, static timing analysis, IR drop analysis and crosstalk analysis of the following:
  1. Basic logic gates
  2. CMOS inverter
  3. CMOS NOR/ NAND gates
  4. CMOS XOR and MUX gates
  5. Static / Dynamic logic circuit (register cell)
MICROWAVE ENGINEERING LAB

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 Scattering Parameters of a Magic Tee
8. Measurement of Scattering Parameters of a Circulator
9. Attenuation Measurement
10. Microwave Frequency Measurement
11. Antenna Pattern Measurements.
12. Study of HFSS.
13. Simulation of Radiation Patterns for some Standard Antennas
   a) Dipole
   b) Rectangular Patch
   c) Circular Patch

MANAGEMENT SCIENCE

Prerequisite : Nil

Course Objective:
- The course introduces the basic concepts of Management Science and Operations Management and its application to business.
- The topics include human resource management, project and strategic management; the course develops problem solving and spreadsheet skills, an invaluable tool for modern business.

Course Outcomes:
- To enable students see that many managerial decisions making situations can be addressed using standard techniques and problem structuring methods
- Students will be able to gain an understanding of the core concepts of Management Science and Operations Management;
- To discuss applications in many functional areas (operations and Human resources, strategy, marketing,)
- To get familiar with Project management techniques and strategic management

Unit I Introduction to Management & Organisation:
- Basic concepts related to Organisation - Types and Evaluation of Organisation structures.

Unit II Operations & Marketing Management:

Unit III Human Resources Management (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.

Unit IV Project Management (PERT/CPM): PERT Vs CPM- Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).


TEXT BOOKS:

REFERENCES:
Pre Requisites: NIL

Course Objectives:
The subject provide different disasters, tools and methods for disaster management

Course Outcomes:
Estimate, perform quantity survey & valuate various engineering works

UNIT 1: Understanding Disaster
Concept of Disaster
Different approaches
Concept of Risk
Levels of Disasters
Disaster Phenomena and Events (Global, national and regional)

Hazards and Vulnerability
Natural and man-made hazards; response time, frequency and forewarning levels of different hazards
Characteristics and damage potential or natural hazards; hazard assessment
Dimensions of vulnerability factors; vulnerability assessment
Vulnerability and disaster risk
Vulnerabilities to flood and earthquake hazards

UNIT 2: Disaster Management Mechanism
Concepts of risk management and crisis managements
Disaster Management Cycle
Response and Recovery
Development, Prevention, Mitigation and Preparedness
Planning for Relief

UNIT 3: Capacity Building
Capacity Building: Concept
Structural and Nonstructural Measures
Capacity Assessment; Strengthening Capacity for Reducing Risk
Counter-Disaster Resources and their utility in Disaster Management

UNIT 4: Coping with Disaster
Coping Strategies; alternative adjustment processes
Changing Concepts of disaster management
Industrial Safety Plan; Safety norms and survival kits
Mass media and disaster management

UNIT 5: Planning for disaster management
Strategies for disaster management planning
Steps for formulating a disaster risk reduction plan
Disaster management Act and Policy in India
Organizational structure for disaster management in India
Preparation of state and district disaster management plans

Text Books

References
OPEN ELECTIVE-I
NON CONVENTIONAL POWER GENERATION

Pre-requisite: Nil.

OBJECTIVES:
- To introduce various types of renewable technologies available.
- The technologies of energy conversion from these resources and their quantitative analysis.

UNIT - I

UNIT - II

UNIT - III

UNIT - IV

UNIT - V

OUTCOMES:
- The student will be able analyse solar thermal and photovoltaic systems and related technologies for energy conversion.
- Wind energy conversion and devices available for it.
- Biomass conversion technologies.
- Geo thermal resources and energy conversion principles and technologies.
- Power from oceans (thermal, wave, tidal) and conversion and devices.
- Fundamentals of fuel cells and commercial batteries.

TEXT BOOKS

REFERENCE BOOKS
2. F.C.Treble, Generating Electricity from Sun.
4. S.P.Sukhatme, Solar Energy Principles and Application - TMH
OPEN ELECTIVE-I

ELECTRICAL ENGINEERING MATERIALS

Pre-requisites: Nil

Objectives: To understand the importance of various materials used in electrical engineering and obtain a qualitative analysis of their behavior and applications.

UNIT – I

DIELECTRIC MATERIALS: Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics, Ferromagnetic materials, properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials, piezoelectric materials, pyroelectric materials.

UNIT – II

MAGNETIC MATERIALS: Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, magnetic Anisotropy, Magnetostriiction, diamagnetism, magnetically soft and hard materials, special purpose materials, feebly magnetic materials, Ferrites, cast and cermet permanent magnets, ageing of magnets. factors effecting permeability and hysteresis

UNIT – III

SEMICONDUCTOR MATERIALS: Properties of semiconductors, Silicon wafers, integration techniques, Large and very large scale integration techniques (VLSI)

UNIT – IV

MATERIALS FOR ELECTRICAL APPLICATIONS: Materials used for Resistors, rheostats, heaters, transmission line structures, stranded conductors, bimetallic fuses, soft and hard solders, electric contact materials, electric carbon materials, thermocouple materials. Solid, Liquid and Gaseous insulating materials, Effect of moisture on insulation.

UNIT – V

SPECIAL PURPOSE MATERIALS: Refractory Materials, Structural Materials, Radioactive Materials, Galvanization and Impregnation of materials, Processing of electronic materials, Insulating varnishes and coolants, Properties and applications of mineral oils, Testing of Transformer oil as per ISI

OUTCOMES: Will be able to
- Understand various types of dielectric materials, their properties in various conditions.
- Evaluate magnetic materials and their behavior.
- Evaluate semiconductor materials and technologies.
- Materials used in electrical engineering and applications.

TEXT BOOKS
3. TTTI Madras: Electrical Engineering Materials
OPEN ELECTIVE-I
NANO-TECHNOLOGY

Pre-requisites: Nil

OBJECTIVES: To enable the student to understand fundamentals of nano materials and technologies for these materials and their manufacturing, applications in various fields.

UNIT - I

Background of Nanotechnology: Scientific Revolutions, Nanotechnology and Nanomachines - The Periodic Table, Atomic Structure, Molecules and Phases, Energy, Molecular and Atomic size, Surfaces and Dimensional Space, Top down and Bottom up approach.

UNIT - II


UNIT - III

Nanopowders and Nanomaterials: Preparation, Plasma arcing, chemical vapor deposition, Sol-gels, Electrodeposition, Ball milling, using natural nanoparticles, Applications of nanomaterials.

UNIT - IV

Nanoelectronics: Approaches to nanoelectronics, Fabrication of integrated circuits, MEMS, NEMS, Nano circuits, Quantum wire, Quantum well, DNA-directed assembly and application in electronics.

UNIT - V


OUTCOMES:

- To evaluate electronic structural studies of nano materials and different synthesis methods to obtain nano structures.
- Understand characterization techniques through various measurements to study electrical, mechanical, thermal properties of nano materials.
- Applications of nano materials for specific purposes like MEMS, NEMS, nano electronics, energy storage.

TEXT BOOKS

1. Introduction to Nanoscience and Nanotechnology Gabor L. Hornyak, NanoThread, Inc., Golden, Colorado, USA; H.F. Tibbals, University of Texas Southwestern Medical Center, Dallas, USA; Joydeep Dutta, Asian Institute of Technology, Pathumthani, Thailand; John J. Moore, Colorado School of Mines, Golden, USA
2. Introduction to Nanotechnology by Charles P. Poole Jr and Frank J.Owens Wiley India Pvt Ltd.
3. Introduction to Nanoscience and Nanotechnology, Chatopadhyaya.K.K, and Banerjee A.N.
4. Introduction to nano tech by phani kumar
5. Introduction to Nano Technology by Charles P. Poole Jr and Frank J. Owens. Wiley India Pvt Ltd.
6. Introduction to Nanoscience and Nanotechnology, Chatopadhyaya.K.K, and Banerjee A.N.

NANOTECHNOLOGY Basic Science and Emerging Technologies by Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse- CHAPMAN & HALL/CRC PRESS 2002.
Prerequisites: None

Objectives:
Understanding the mathematical importance of development of model in a particular optimization model for the issue and solving it.

Outcomes:
Understanding the problem, identifying variables & constants, formulas of optimization model and applying appropriate optimization Techniques

UNIT – I


UNIT – II


UNIT – III
SEQUENCING – Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through ‘m’ machines-graphical model

REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely- Group Replacement.

UNIT – IV

INVENTORY: Introduction – Single item, Deterministic models – Types - Purchase inventory models with one price break and multiple price breaks –Stochastic models – demand discrete variable or continuous variable – Single Period model with no setup cost.

UNIT – V

DYNAMIC PROGRAMMING:

TEXT BOOK :
2. Operations Research/A.C.S.Kumar/Yesdee

REFERENCE BOOKS :
1. Operations Research: Methods and Problems / Maurice Saseini, Arhur Yaspan and Lawrence Friedman
4. Introduction to O.R/Hillier & Libermann (TMH).
5. Introduction to O.R/Taha/PHI
L  T  P  C  
3  0  0  3

BASICS OF THERMODYNAMICS
OPEN ELECTIVE-I

Pre-requisite: Engineering Chemistry and Physics

Course Objective: To understand the treatment of classical Thermodynamics and to apply the First and Second laws of Thermodynamics to engineering applications

Course Outcomes:
At the end of the course, the student should be able to
- Understand and differentiate between different thermodynamic systems and processes
- Understand and apply the laws of Thermodynamics to different types of systems undergoing various processes
- Understand and analyze the Thermodynamic cycles

UNIT – I
Introduction: Basic Concepts:

UNIT II

UNIT – III

Carnot Cycle, Carnot Efficiency, Statement of Clausius Inequality, Property of Entropy, T-S and P-V Diagrams

UNIT IV
Atmospheric air - Psychrometric Properties – Dry bulb Temperature, Wet Bulb Temperature, Dew point Temperature, , Specific Humidity, Relative Humidity, saturated Air, Vapour pressure, Degree of saturation – Adiabatic Saturation, Psychrometric chart.

UNIT - V
Power Cycles : Otto, Diesel cycles - Description and representation on P--V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis
Refrigeration Cycles:
Bell-Coleman cycle, Vapour compression cycle-performance Evaluation.

TEXT BOOKS :
1. Engineering Thermodynamics / PK Nag /TMH, III Edition
2. Thermodynamics / C.P.Arora.

REFERENCE BOOKS:
1. Thermodynamics – An Engineering Approach – Yunus Cengel & Boles /TMH
3. Thermodynamics – J.P.Holman / McGrawHill
4. Engineering Thermodynamics – Jones & Dugan
FABRICATION PROCESSES
OPEN ELECTIVE-I

Prerequisites: Nil

Objectives:
Understand the philosophies of various Manufacturing process.

Outcomes:
For given product, one should be able identify the manufacturing process.

UNIT – I
Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands.
Methods of Melting - Crucible melting and cupola operation – Defects in castings;

UNIT – II
Welding: Classification – Types of welds and welded joints; Gas welding - Types, oxy-fuel gas cutting. Arc welding, forge welding, submerged arc welding, Resistance welding, Thermit welding.
Inert Gas Welding _ TIG Welding, MIG welding, explosive welding, Laser Welding; Soldering and Brazing; Heat affected zone in welding. Welding defects – causes and remedies; destructive and non-destructive testing of welds.

UNIT – III
Hot working, cold working, strain hardening, recovery, recrystallisation and grain growth.

UNIT – IV
Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion - Forward extrusion and backward extrusion – Impact extrusion – Extruding equipment – Tube extrusion and pipe making, Hydrostatic extrusion. Forces in extrusion

UNIT – V

TEXT BOOKS:
1. Manufacturing Technology / P.N. Rao/TMH

REFERENCE BOOKS:
1. Production Technology / R.K. Jain
2. Metal Casting / T.V Ramana Rao / New Age
4. Welding Process / Parmar /
5. Production Technology /Sarma P C /
ELECTRONIC MEASURING INSTRUMENTS
( OPEN ELECTIVE – I )

Note: No detailed mathematical treatment is required.

Prerequisite : Nil

Course Objectives:
- It provides an understanding of various measuring systems functioning and metrics for performance analysis.
- Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
- Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.

Course Outcomes:
On completion of this course student can be able to
- Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.
- Measure various physical parameters by appropriately selecting the transducers.
- Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.

Unit-I: Block Schematics of Measuring Systems and Performance Metrics:
Performance Characteristics, Static Characteristics, Accuracy, Precision, Resolution, Types of Errors, Gaussian Error, Root Sum Squares formula, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag.

Unit-II: Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, and Specifications.

Unit-III: Measuring Instruments: DC Voltmeters, D’ Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS

TEXT BOOKS:

REFERENCES:
OPEN ELECTIVE-I
OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Prerequisites
1. A course on “Computer Programming & Data Structures”

Objectives
1. Introduces object oriented programming concepts using the Java language.
2. Introduces the principles of inheritance and polymorphism; and demonstrates how they relate to the design of abstract classes
3. Introduces the implementation of packages and interfaces
4. Introduces exception handling, event handling and multithreading
5. Introduces the design of Graphical User Interface using applets and swings

Outcomes
1. Develop applications for a range of problems using object-oriented programming techniques
2. Design simple Graphical User Interface applications

UNIT I:
Object oriented thinking and Java Basics- Need for OOP paradigm, summary of OOP concepts, coping with complexity, abstraction mechanisms. A way of viewing world – Agents, responsibility, messages, methods, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, method binding, inheritance, overriding and exceptions, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT II:
Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance-specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces, Exploring java.io.

UNIT III:
Exception handling and Multithreading– Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling,Exploring java.util.Differences between multi threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter-thread communication, thread groups, daemon threads, Enumerations, auto boxing, annotations, generics.

UNIT IV:
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scroll pane, dialogs, menu bar, graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V:
Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

TEXT BOOKS:
1. Java the complete reference, 7th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

REFERENCES:
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. An introduction to Java programming and object oriented application development,
   R.A. Johnson- Thomson.
OPEN ELECTIVE-I
COMPUTER GRAPHICS

Prerequisites
1. Familiarity with the theory and use of coordinate geometry and of linear algebra such as matrix multiplication.
2. A course on “Computer Programming and Data Structures”

Objectives
1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
2. Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Outcomes
1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation
3. Be able to design applications that display graphic images to given specifications

UNIT-I:
Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms (Bresenham’s and DDA Algorithm), mid-point circle and ellipse algorithms

Filled area primitives: Scan-line polygon fills algorithm, boundary-fill and flood-fill algorithms

UNIT-II:
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions,

UNIT-III:
3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT-IV:
3-D geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT-V:
Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area subdivision and octree methods

Text Books:
3. Computer Graphics, Steven Harrington, TMH

References:
Pre requisites: Nil

Course Objectives:
1. To gain an knowledge about the uses and application of various ferrous metals and alloys.
2. To gain an knowledge about the uses and application of various non ferrous alloys.
3. To gain an knowledge about the uses and application of various ceramics, polymers and composites for different engineering applications.

Course Outcomes:
At the end of the course, student would be able to recommend
1. Ferrous metals and alloys for a given engineering applications and service condition.
2. Non ferrous alloys for a given engineering applications and service condition.
3. Ceramics, Polymers and composites for a given engineering applications and service condition.

UNIT-I

UNIT-II
NONFERROUS ALLOYS: Introduction, properties and applications, Aluminum Alloys, Magnesium Alloys, Copper Alloys and Titanium Alloys.

UNIT-III
CERAMIC MATERIALS: Introduction, Properties and Applications of Ceramics, Glasses and Refractories.

UNIT-IV
POLYMERS: Introduction, Classification of Polymers, Polymerization, Degree of Polymerization, Typical Thermoplastics and Thermosets.

UNIT-V
COMPOSITES: Introduction, Classification, Properties and Applications of Polymer matrix, Metal Matrix Ceramic Matrix and Laminar composites.

TEXT / REFERENCE BOOKS:
Pre requisites: Nil

Course Objectives:
1. To describe the basic principles of metallurgy and the importance of metallurgy in various discipline of engineering.
2. Gain a thorough knowledge about heat treatment of steels.
3. Gain a knowledge about properties and uses of cast irons and non ferrous metals.
4. Gain a working knowledge of basic testing methods for metals.

Course Outcomes:
At the end of the course Student would be able
1. To use and apply metallurgy in his own branch of engineering.
2. The student will be able to justify the various testing methods adopted for metals.

UNIT-I
Introduction: Crystal structure and defects, Crystal structure of metals, Classification of steels, Carbon steels

UNIT-II
Heat Treatment of Steels: The Iron carbon systems, Common phases in steels, Annealing, Normalizing, Hardening and tempering

UNIT-III
Cast irons: Properties and applications of Ductile irons, Malleable irons, Compacted graphite iron.

UNIT-IV
Non Ferrous Metals: Properties and applications of Light Metals (Al, Be, Mg, Ti), Super alloys

UNIT-V

TEXT BOOKS
2. Introduction to Physical Metallurgy – SH Avner, TATA Mc GRAW HILL, 1997
3. Metallurgy for Engineers- Clark and Varney
4. Mechanical Metallurgy – G. E. Dieter

REFERENCE BOOKS
1. Engineering Physical Metallurgy and Heat treatment – Y Lakhtin
   Foundations of Materials Science and Engineering – WF Smith
OPEN ELECTIVE-I
INDUSTRIAL POLLUTION CONTROL ENGINEERING

Objective:
To expose the students to various types of industrial pollutions and controlling techniques.

UNIT-I
Introduction to industrial pollution and types of pollution from chemical industries, Effects of pollution as environment and ecosystems-global warming-green house effect; Environmental legislatures-standards and guidelines.

UNIT-II
Air pollution- Meteorological aspects of pollution dispersion-adiabatic lapse rate-Environmental lapse rate-Turbulence and stability of atmosphere, Richardson number-Plume raise-plume behavior and characteristics, effective stack height. Major air pollutants and their sources, measurement of air pollutants.

UNIT-III

UNIT-IV


UNIT-V

Text books:
1. Pollution control in process industries by S.P. Mahajan TMH.,1985

References:

OUTCOME: The student will be able learn the sources of air, water pollution and also their treatment methods.
OPEN ELECTIVE - II

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg. L T P C
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OPEN ELECTIVE -II
ESTIMATION, QUANTITY SURVEY & VALUATION

Pre Requisites:
Concrete Technology, RC Design, Design of Steel Structure

Course Objectives:
The subject provide process of estimations required for various work in construction. To have knowledge of using SOR & SSR for analysis of rates on various works.

Course Outcomes:
Able to provide control steps for disaster mitigation steps

UNIT – I

UNIT – II
Detailed Estimates of Buildings - Reinforcement bar bending and bar requirement schedules

UNIT – III
Earthwork for roads and canals.

UNIT – IV
Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT-V

NOTE: NUMBER OF EXERCISES PROPOSED:
1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.
Text Books:
2. Estimating and Costing by G.S. Birdie

Reference books:
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborti; Laxmi publications.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. EEE

OPEN ELECTIVE-II
DESIGN ESTIMATION AND COSTING OF ELECTRICAL SYSTEMS

Pre-requisite: Power systems-I and Power Systems-II

Objectives: Objectives of this course are
- To emphasize the estimating and costing aspects of all electrical equipment, installation and designs to analyze the cost viability.
- To design and estimation of wiring,
- To design overhead and underground distribution lines, substations and illumination design.

UNIT - I
DESIGN CONSIDERATIONS OF ELECTRICAL INSTALLATIONS: Electric Supply System, Three phase four wire distribution system, Protection of Electric Installation against over load, short circuit and Earth fault, Earthing, General requirements of electrical installations, testing of installations, Indian Electricity rules, Neutral and Earth wire, Types of loads, Systems of wiring, Service connections, Service Mains, Sub-Circuits, Location of Outlets, Location of Control Switches, Location of Main Board and Distribution board, Guide lines for Installation of Fittings, Load Assessment, Permissible voltage drops and sizes of wires, estimating and costing of Electric installations.

UNIT - II
ELECTRICAL INSTALLATION FOR DIFFERENT TYPES OF BUILDINGS AND SMALL INDUSTRIES: Electrical installations for residential buildings – estimating and costing of material, Electrical installations for commercial buildings, Electrical installations for small industries.

UNIT - III
OVERHEAD AND UNDERGROUND TRANSMISSION AND DISTRIBUTION LINES: Introduction, Supports for transmission lines, Distribution lines – Materials used, Underground cables, Mechanical Design of overhead lines, Design of underground cables.
UNIT - IV

**SUBSTATIONS:** Introduction, Types of substations, Outdoor substation – Pole mounted type, Indoor substations – Floor mounted type.

UNIT – V

**DESIGN OF ILLUMINATION SCHEMES:** Introduction, Terminology in illumination, laws of illumination, various types of light sources, Practical lighting schemes LED, CFL and OCFL differences.

**OUTCOMES:** Students are in a position to Understand the design considerations of electrical installations.
- To design electrical installation for buildings and small industries.
- To identify and design the various types of light sources for different applications.

**TEXT BOOKS**
2. Design of Electrical Installations, Er. V. K. Jain, Er. Amitabh Bajaj, University Science Press.

**REFERENCE BOOKS**

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. EEE

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**OPEN ELECTIVE-II**

**ENERGY STORAGE SYSTEMS**

Pre-requisite: None

**Objectives:** Objectives of this course are
- To enable the student to understand the need for energy storage, devices and technologies available and their applications.

UNIT - I

**Electrical Energy Storage Technologies:** Characteristics of electricity, Electricity and the roles of EES, High generation cost during peak-demand periods, Need for continuous and flexible supply, Long distance between generation and consumption, Congestion in power grids, Transmission by cable.

UNIT - II

**Needs for Electrical Energy Storage:** Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, The roles of electrical energy storage technologies, The roles from the viewpoint of a utility, The roles from the viewpoint of consumers, The roles from the viewpoint of generators of renewable energy.

UNIT - III

**Features of Energy Storage Systems:** Classification of EES systems, Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES), Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H2), Synthetic natural gas (SNG).

UNIT - IV

**Types of Electrical Energy Storage systems:** Electrical storage systems, Double-layer capacitors (DLC), Superconducting magnetic energy storage (SMES), Thermal storage systems, Standards for EES, Technical comparison of EES technologies.

UNIT - V

**Applications:** Present status of applications, Utility use (conventional power generation, grid operation & service), Consumer use (uninterruptable power supply for large consumers), New trends in applications, Renewable energy generation, Smart Grid, Smart Micro
grid, Smart House, Electric vehicles, Management and control hierarchy of storage systems, Internal configuration of battery storage systems, External connection of EES systems, Aggregating EES systems and distributed generation (Virtual Power Plant), Battery SCADA–aggregation of many dispersed batteries.

OUTCOMES: After this course, the student

- Can analyze the characteristics of energy from various sources and need for storage
- Can classify various types of energy storage and various devices used for the purpose
- Can apply the same concepts to real time problems.

TEXT BOOKS


REFERENCE BOOKS:

UNIT – IV

UNIT – V

TEXT BOOKS
2. Mechatronics by M.D.Singh, J.G.Joshi PHI.
3. Mechatronics HMT

REFERENCE BOOKS
2. Michel B. Histand and David G. Alciatore,

UNIT – IV

UNIT – V

TEXT BOOKS
2. Mechatronics by M.D.Singh, J.G.Joshi PHI.
3. Mechatronics HMT

REFERENCE BOOKS
2. Michel B. Histand and David G. Alciatore,

**Solid Propulsion System:**

**Unit - IV:**
Solid propellant rocket engine – internal ballistics, equilibrium motor operation and equilibrium pressure to various parameters. Transient and pseudo equilibrium operation, end burning and burning grains, grain design. Rocket motor hard ware design. Heat transfer considerations in solid rocket motor design. Ignition system, simple pyro devices.

**Liquid Rocket Propulsion System:**
Liquid propellants – classification, Mono and Bi propellants, Cryogenic and storage propellants, ignition delay of hypergolic propellants, physical and chemical characteristics of liquid propellant. Liquid propellant rocket engine – system layout, pump and pressure feed systems, feed system components. Design of combustion chamber, characteristic length, constructional features, and chamber wall stresses. Heat transfer and cooling aspects. Uncooled engines, injectors – various types, injection patterns, injector characteristics, and atomization and drop size distribution, propellant tank design.

**Unit - V: Ramjet and Integral Rocket Ramjet Propulsion System:**
Fuel rich solid propellants, gross thrust, gross thrust coefficient, combustion efficiency of ramjet engine, air intakes and their classification – critical, super critical and sub-critical operation of air intakes, engine intake matching, classification and comparison of IIRR propulsion systems.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
1. Rocket propulsion –Sutton
2. Gas Turbines /Cohen, Rogers & Sarvana Muttoo/Addision Wesley & Longman.
3. Gas Turbines-V.Ganesan /TMH.
UNIT III
User, Centred Workspace Design Anthropometric Data, Statistical Essentials, Types of Anthropometric Data, Applications Of Anthropometry in Design, Multiple Workspace Configurations, Status of Anthropometry in Ergonomics.

UNIT IV

UNIT V

Text books
1. Introduction to Ergonomics(Third Edition)/ R.S.Bridger/CRC Press , Taylor & Francis Group

References
1. Human factors in Engineering and Design/E.J.McCormick/ TMH Edison

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MECHATRONICS
OPEN ELECTIVE-II

Pre-requisites: None.

Course objectives:
• They should be able to link up mechanical and electronics.

Outcomes:
• Develop a relationship between mechanical elements and electronics elements for proper functioning of mechanical systems.

UNIT – I
INTRODUCTION: Definition – Trends - Control Methods: Standalone , PC Based ( Real Time Operating Systems, Graphical User Interface , Simulation ) - Applications: identification of sensors and actuators in Washing machine, Automatic Camera, Engine Management, SPM, Robot, CNC, FMS, CIM.

UNIT – II
PRECISION MECHANICAL SYSTEMS :
Modern CNC Machines – Design aspects in machine structures, guideways, feed drives, spindle and spindle bearings, measuring systems, control software and operator interface, gauging and tool monitoring.

Note: (text book: Mechatronics HMT – chapter 5)

ELECTRONIC INTERFACE SUBSYSTEMS :
TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isolation schemes- opto coupling, buffer IC’s - Protection schemes – circuit breakers , over current sensing , resetable fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets

UNIT – III
ELECTROMECHANICAL DRIVES :
Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors -
w.e.f. 2017-2018 academic year

4-quadrant servo drives, PWM’s - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.


**UNIT – IV**

**UNIT – V**

**TEXT BOOKS**:
2. Mechatronics/M.D.Singh/J.G.Joshi PHI.

**REFERENCE**:

Unit 5:

Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA, WCDMA.

Wireless Technologies: Wireless LAN, PANs and Bluetooth, ZigBee and Mesh Wireless networks, Wimax and MANs, Infrared wireless, RFID communication, UWB.

Text Books:
2. Kennady, Davis, Electronic Communications systems, 4e, TMH, 1999

Reference Books:

Prerequisites
1. A course on “Advanced Data Structures”

Objectives
1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

Outcomes
1. Gain knowledge of fundamentals of DBMS, database design and normal forms
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques.

UNIT I:
Database System Applications: database system Vs. file system, view of data, data abstraction, instances and schemas, data models, the ER model, relational model, other models, database languages, DDL, DML, database access for application programs, database users and administrator, transaction management, database system structure, storage manager, the query processor, history of data base systems, data base design and ER diagrams, beyond ER design entities, attributes and entity sets, relationships and relationship sets, additional features of ER model, concept design with the ER Model, conceptual design for large enterprises.

UNIT II:
Introduction to the Relational Model: integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base
design, introduction to views, destroying/altering tables and views, form of basic SQL query, examples of basic SQL queries, introduction to nested queries, correlated nested queries, set comparison operators, aggregation operators, NULL values, comparison using null values, logical connectivity’s, AND, OR and NOT, impact on SQL constructs, outer joins, disallowing NULL values, complex integrity constraints in SQL, triggers and active data bases, Oracle, SQL Server, DB2.

UNIT III:

Schema refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, dependency preserving decomposition, schema refinement in database design, multi valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT IV:

UNIT V:

Text Books:
OPEN ELECTIVE -II
CYBER SECURITY

Prerequisites
1. A Course on "Network Security and Cryptography"

Objectives
1. The purpose of the course is to educate on cyber security and the legal perspectives of cyber crimes and cyber offenses.
2. Introduce tools and methods for enhancing cyber security.
3. Topics include cyber crimes, cyber offenses, cyber crimes on mobile and wireless devices, tools and methods to prevent cyber crimes, legal perspectives of cyber crimes and cyber security, computer forensics, Intellectual Property Rights and cyber terrorism

Outcomes
1. Demonstrate the knowledge of cyber security and understand the Indian and Global Act concerning cyber crimes
2. Employ security and privacy methods in the development of modern applications such that personal data is protected; and provide safe Internet usage.

UNIT-I
Introduction to Cybercrime:
Introduction, Cybercrime and Information security, who are cyber criminals, Classification of Cyber crimes, Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cyber crimes.

Cyber offenses: How criminals Plan Them

UNIT-II
Cybercrime: Mobile and Wireless Devices

Tools and Methods Used in Cyber Crime:
Introduction, Proxy services and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.

UNIT III
Cyber crimes and Cyber Security: the Legal Perspectives
Introduction
Cyber Crime and Legal Landscape around the world, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario In India, Digital signatures and the Indian IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment Cyber law, Technology and Students: Indian Scenario.

Understanding Computer Forensics
Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Chain of Custody concept, Network Forensics, Approaching a computer, Forensics Investigation, Challenges in Computer Forensics, Special Tools and Techniques Forensics Auditing

UNIT IV
Cyber Security: Organizational Implications
Introduction, cost of cyber crimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Cybercrime and Cyber terrorism:
Introduction, intellectual property in the cyberspace, the ethical dimension of cyber crimes the psychology, mindset and skills of hackers and other cyber criminals

UNIT V
Cybercrime: Illustrations, Examples and Mini-Cases
Examples:
Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.
Mini-Cases:
The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Illustrations of Financial Frauds in Cyber Domain, Digital Signature-Related Crime Scenarios.

Text book:

Reference book:
UNIT - IV
Corrosion prevention methods: Alteration of Environment (Inhibitors),
Design, Coatings, cathodic and anodic protection. Material selection,
Metallurgical aspects, Hydrogen damage (hydrogen blistering, Hydrogen
embrittlement, Prevention).

UNIT - V
Modern theory and applications of corrosion: Introduction, free energy,
cell potentials, emf series, applications of thermodynamics to corrosion,
Corrosion rate expressions and measurements, corrosion testing.

Text / Reference Books:
1. Theory of Corrosion and Protection of Metals, N. D. Tomashov,
   1985.

UNIT – I
Introduction, Importance of testing
Hardness Test: Methods of hardness testing – Brinell, Vickers, Rockwell
hardness tests.
The Impact Test: Notched bar impact test and its significance, Charpy and
Izod Tests, fracture toughness testing - COD and CTOD tests, significance
of transition temperature curve.

UNIT - II
The Tension Test: Engineering stress-strain and True stress-strain curves.
Tensile properties, conditions for necking, Stress-Strain diagrams for steel,
Aluminum and cast iron.
UNIT - III

UNIT – IV
Creep and Stress Rupture: Introduction, The creep curve, Stress-rupture test, Structural changes during creep, Mechanism of creep deformation, theories of creep. Fracture at elevated temperature.

UNIT – V
NDT: Principle, Operation, Advantages and Limitations of Liquid Penetrant, Magnetic Particle, Radio graphy and Ultrasonic tests.

TEXT / REFERENCE BOOKS:
1. Mechanical Metallurgy – G. E. Dieter
2. Mechanical behavior - Ed. Wulf.

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OPEN ELECTIVE-II
SOLID WASTE MANAGEMENT

Objectives:
- To know the Classification of solid waste and characterization of the same
- Understand the sense of onsite handling storage and collection systems including transportation
- Understand the different processing technologies of solid waste

Unit I


Unit II

Unit III

Unit IV

Unit V

Case studies: Major industries and management methods used in typical industries – Coal fired power stations, textile industry, oil refinery, distillery, sugar industry, and radioactive waste generation units.

Text Books:

Reference Books:

Outcomes:
The student will be able to
- Apply the knowledge of characterization of waste and develop a suitable management plan
- Assess the cost of transportation and laboratory processing of solid waste
- Identify hazardous nature of waste if any and can suggest suitable dumping methods.
- Suggest processing waste for material for energy recovery.

OPEN ELECTIVE- III
OPEN ELECTIVE -III
ENVIRONMENTAL IMPACT ASSESSMENT

Pre Requisites: Environmental Engineering

Course Objectives:
This subject will cover various aspects of Environment Impact Assessment methodologies, impact of development activities. Impact on surface water, Air and Biological Environment, Environment legislation Environment.

Course Outcomes: Environmental Science

UNIT – I

UNIT-II
Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT-III
Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures.

UNIT – IV
Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities.

UNIT - V

Text Books:

References:
3. Bhatia, H. S. - Environmental Pollution and Control, Galgotia Publication(P) Ltd, Delhi.
OPEN ELECTIVE-III
ENTERPRISE RESOURCE PLANNING

(Students must read text book. Faculty are free to choose any other cases)

Course Aim:
It enables the student to understand the foundations of Enterprise planning and ERP System Options.

Learning Outcome: The student understands the challenges in implementation of ERP system, ERP System Implementation options, and functional modules of ERP.

1. Introduction to ERP- Foundation for Understanding ERP systems-Business benefits of ERP-The challenges of implementing ERP system-ERP modules and Historical Development.
   Case: Response to RFP for ban ERP system (Mary Sumner).
   Case: Atlantic Manufacturing (Mary Sumner).
3. ERP system Installation Options- IS/IT Management results-Risk Identification analysis-System Projects- Demonstration of the system- Failure method-system Architecture & ERP (David L. Olson).
   Case: DataSolutions & Technology Knowledge (Mary Sumner).
   Case: atlantic manufacturing (Mary Sumner).
5. ERP – Production and Material Management-Control process on production and manufacturing-Production module in ERP- supply chain Management & e-market place-business & ERP-e supply chain & ERP- Future directions for ERP.
   Case: HR in atlantic manufacturing. (Mary Sumner).

Text Book:

References:
The objective of the course is to provide the basic concepts of Enterprise Resource Planning and Management of Information System.


Unit – 2: IS Security, Control and Audit– System Vulnerability and Abuse, business value of security and control, Need for Security, Methods of minimizing risks IS Audit, ensuring system quality.


References
- C.S.V.Murthy: Management Information System, Himalaya,2009
- Vaman, ERP in Practice, TMH, 2009
- Dharminder and Sangeetha: Management Information Systems, Excel, 2009
- Olson: Managerial Issues of ERO, TMH, 2009
- Miller:MIS—Cases, Pearson, 2009
The objective of the course is to provide the students with the conceptual framework and the theories underlying Organisational Behaviour.


Unit-3: Dynamics of OB-I: Communication – types - interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision making techniques – creativity and group decision making . Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individual conflict - strategies to cope with stress and conflict.


References
- Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
- McShane: Organizational Behaviour, 3e, TMH, 2008
- Aswathappa: Organisational Behaviour,7/e,Himalaya, 2009
Pre-Requisites: None

Course outcomes:
After this completion of this course, the student should be able to understand the basic components of robots, differentiate types of robots and robot grippers, model forward and inverse kinematics of robot manipulators, analyse forces in links and joints of a robot, programme a robot to perform tasks in industrial applications, design intelligent robots using sensors.

Unit 1

Unit 2

Unit 3

Unit 4
Trajectory planning: Joint space scheme- Cubic polynomial fit-Obstacle avoidance in operation space-cubic polynomial fit with via point, blending scheme. Introduction Cartesian space scheme.

Textbooks:
2. Industrial Robotics/Grover/ McGraw Hill
3. Robotics/ Mittal and Nagarath/ TMH

REFERENCE BOOKS:
1. Robot Dynamics and Controls / Spony and Vidyasagar / John Wiley
2. Robot Analysis and control Asada and Slotine / Wiley Inter-Science
3. Introduction to Robotics / John J Craig / Pearson Education
NON-CONVENTIONAL SOURCES OF ENERGY
OPEN ELECTIVE-III

Pre-requisites: None

Course Outcomes:
At the end of the course, the student will be able to identify renewable energy sources and their utilization. Understand the basic concepts of solar radiation and analyze the working of solar and thermal systems. Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, biogas and hydrogen. Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator. Identify methods of energy storage for specific applications.

UNIT – I
PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power - Physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT - II
SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds. Solar applications - solar heating/cooling techniques, solar distillation and drying, photovoltaic energy conversion.

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT - III

UNIT – IV
GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

UNIT – V
DIRECT ENERGY CONVERSION: Need for DEC, Carnot cycle, limitations, Principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principle, faraday's laws, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:
1. Renewable Energy Resources / Tiwari and Ghosal / Narosa
2. Non- conventional Energy Sources / G.D. Rai

REFERENCE BOOKS:
1. Renewable Energy Sources / Twidell & Weir
2. Solar Energy / Sukhame
5. Non-Conventional Energy / Ashok V Desai / Wiley Eastern
7. Renewable Energy Technologies / Ramesh & Kumar / Narosa
UNIT - IV
Refrigeration and Air conditioning: Introduction to refrigeration, necessity and applications, unit of refrigeration and cop, Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

UNIT-V

Text books:
3. A course in Refrigeration and Air conditioning – SC Arora and & Domkundwar / Dhanpatrai

Reference books:

UNIT - IV
Refrigeration and Air conditioning: Introduction to refrigeration, necessity and applications, unit of refrigeration and cop, Principle of vapour compression and absorption system – Layout of typical domestic refrigerator – Window and Split type room Air conditioner.

UNIT-V

Text books:
3. A course in Refrigeration and Air conditioning – SC Arora and & Domkundwar / Dhanpatrai

Reference books:
PRINCIPLES OF COMPUTER COMMUNICATIONS AND NETWORKS
OPEN ELECTIVE-III

Prerequisite : Nil

Course Objectives:
- To understand the concept of computer communication.
- To learn about the networking concept, layered protocols.
- To understand various communications concepts.
- To get the knowledge of various networking equipment.

Course Outcomes:
- The student can get the knowledge of networking of computers, data transmission between computers.
- Will have the exposure about the various communication concepts.
- Will get awareness about the structure and equipment of computer network structures.

UNIT-I
Overview of Computer Communications and Networking:

UNIT-II
Essential Terms and Concepts:
Computer Applications and application protocols, Computer Communications and Networking models, Communication Service Methods and data transmission modes, analog and Digital Communications, Speed and capacity of a Communication Channel, Multiplexing and switching, Network architecture and the OSI reference model.

UNIT-III
Analog and Digital Communication Concepts:
Representing data as analog signals, representing data as digital signals, data rate and bandwidth reduction, Digital Carrier Systems.

UNIT-IV
Physical and data link layer Concepts:
The Physical and Electrical Characteristics of wire, Copper media, fiber optic media, wireless Communications. Introduction to data link Layer, the logical link control and medium access control sub-layers.

UNIT-V
Network Hardware Components:
Introduction to Connectors, Transreceivers and media convertors, repeaters, network interference cards and PC cards, bridges, switches, switches Vs Routers.

Text Books:

Reference Books:
OPEN ELECTIVE -III
WEB TECHNOLOGIES

Prerequisites
1. A Course on “Computer Programming and Data Structures”

Objectives
1. To learn the basic web concepts and Internet protocols
2. To introduce XML and processing of XML data
3. To introduce client side scripting with Javascript and DHTML
4. To introduce server side programming with Java servlets and JSP

Outcomes
1. Ability to create dynamic and interactive web sites
2. Gain knowledge of client side scripting using javascript and DHTML.
3. Demonstrate understanding of what is XML and how to parse and use XML data
4. Able to do server side programming with Java Servelets and JSP

UNIT I: Introduction
Web Essentials - Clients, Servers and Communication:

Markup Languages – HTML: Basic Tags, Forms, Style sheets

UNIT II: Client-Side Programming
Introduction to JavaScript, JavaScript in Perspective, Basic Syntax, Variables and Data Types, Statements, Operators, Literals, Functions, Objects, Arrays, Built-in Objects, JavaScript Debuggers.


UNIT III: Server-Side Programming
Java Servlets: Servlet Architecture, Servlets Generating Dynamic Content, Servlet Life Cycle, Parameter Data, Sessions, Cookies, URL Rewriting, Case Study.

UNIT IV: Representing Web Data

UNIT V: Separating Programming and Presentation
JSP Technology: Introduction to JavaServer Pages, Running JSP Applications, Basic JSP, JavaBeans Classes and JSP, Tag Libraries and Files, Support for the Model-View-Controller Paradigm, Case Study.

TEXT BOOKS:
1. Web Technologies: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCES:
4. Paul Dietel and Harvey Deitel, "Java How to Program", Prentice Hall of India, 8th Edition
OPEN ELECTIVE -III
SIMULATION AND MODELING

Prerequisites
1. A course on “Computer Oriented Statistical Methods”

Objectives
1. The overall aim of the course is to provide an understanding of methods, techniques and tools for modeling, simulation and performance analysis of complex systems
2. The topics include system models and studies; random number generation; simulation of continuous and discrete systems; simulation of queuing systems and pert networks
3. The course also provides practical knowledge of simulation experimentation and introduces simulation languages.

Outcomes
1. Ability to construct a model for a given system/set of data.
2. Ability to generate and test random number variates and apply them to develop simulation models.
3. Ability to interpret the model and apply the results to resolve issues in a real world environment

Unit-I: System Models and Studies

Unit-II: Random Numbers
Random Number Generation: Properties, Generation of Pseudo-Random Numbers, Techniques of generating random numbers, tests for random numbers

Unit-III: Simulation of Continuous and Discrete Systems
Simulation of Continuous Systems: A chemical reactor, Numerical integration vs. continuous system simulation, Selection of an integration formula, Runge-Kutta integration formulas, Simulation of a servo system, Simulation of a water reservoir system, Analog vs. digital simulation.
Discrete System Simulation: Fixed time-step vs. event-to-event model, On simulating randomness, Generation of random numbers, Generation of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation.

Unit-IV: System Simulation
Simulation of Queuing Systems: Rudiments of queuing theory, Simulation of a single-server queue, Simulation of a two-server queue, Simulation of more general queues.

Unit-V: Simulation Experimentation
Design and Evaluation of Simulation Experiments: Length of simulation runs, Variance reduction techniques, Experimental layout, Validation.
Simulation Languages: Continuous and discrete simulation languages, Continuous simulation languages, Block-structured continuous simulation languages, Expression-based languages, Discrete-system simulation languages, GPSS.

Text Books

Reference Books
1. System Modeling and Simulation: An Introduction, Frank L. Severance, Wiley Publisher, 2005
SURFACE ENGINEERING
OPEN ELECTIVE-III

Pre-requisites: Thermodynamics, Physical Metallurgy.

Course Objectives:
1. To provide a state-of-the-art knowledge to the students and various surface engineering techniques.

Unit-I
Introduction to surface modification, need for surface modification, surface properties, surface property modification, history of surface modification.

Unit-II
Plating and coating process: concept of coating, types of coatings, properties of coatings, hard facing, anodizing, PVD, CVD, Electro deposition, Electro less deposition, hot deposition, hot dipping.

Unit-III
Thermo-chemical Processes: carburizing, nitriding, carbonitriding, nitro carburizing, Boronising, Plasma nitriding, thermal spraying, Plasma spraying.

Unit-IV

Unit-V
General design principles related to surface engineering, design guidelines for surface preparation, surface engineering solution to specific problems.

Course Outcomes:
1. This course provides an opportunity to the students to engineer the microstructure for an enhanced performance based on the need in actual practice.

Textbooks/References:
3 0 0 3
NANOMATERIALS
OPEN ELECTIVE-III

Pre-requisites: Physics, chemistry

Course Objective:
1. This course is primarily intended to expose the students to a highly interdisciplinary subject.
2. This would emphasize on the classification, synthesis and applications of Nano materials.

Course Outcomes:
The student will be able to design a component/material that would provide us a 'better tomorrow' via nanotechnology.

UNIT-I
Introduction

UNIT-II
Materials of Nano Technology
Introduction- Si based materials —Ge- based materials- Ferro electric materials —Polymer Materials GaAs and InP (III-V) Group materials.

UNIT-III
Nano Particles:  Introduction Synthesis procedures -- wet chemical approach & physical vapor synthesis approach, size effect and shape change and their properties —examples of systems involved characterization techniques properties & their applications

UNIT- IV
Nano Wires:  Introduction --- Various synthesis procedures (template assisted method and VLS methods) Principles, characterization procedures, properties and applications of Nano wires  
Carbon Nano Tubes: Synthesis procedures properties and applications of carbon Nano tubes.

UNIT-V
Thin films deposition and Doping. Applications of Thin films.

TEXT / REFERENCE BOOKS
2. Nano Essentials: T. Pradeep, TMH
3. Springer Handbook of Nanotechnology
4. The Guest for new materials Author S. T. Lakshmi Kumar, Published by Vigyan Prasar.
5. Nano – The Essentials: C – Pradeep (IICue Professor), McGraw Hill
Objective: The student will be exposed to various industrial hazards and prevention and control methods

UNIT I

UNIT II
Toxicology: How toxicants enter biological organisms, How toxicants are eliminated from biological organisms. Industrial Hygiene: Government regulations, Identification, Evaluation, Control.

UNIT III
Fires and Explosions: The fire triangle, Distinction between fire and explosions; Definitions, Flammability characteristics of liquids and vapors, MOC and inerting, ignition energy, Auto ignition, Auto oxidation, Adiabatic compression, Explosions.

UNIT IV
Designs to prevent fires and explosions: Inerting, Explosion proof equipment and instruments, Ventilations, Sprinkler systems. Introduction to Reliefs: Relief concepts, Definitions, Location of reliefs, Relief types, Data for sizing reliefs, Relief systems.

UNIT V
Relief Sizing: Conventional spring operated reliefs in liquids, Conventional spring operated relief’s in vapor or gas service, Rupture disc relief’s in liquid, vapour or gas service. Hazards Identification: Process hazards checklists, Hazard surveys, Hazop safety reviews.

TEXT BOOK:

REFERENCES:

OUTCOME: The student will be equipped with the knowledge by which thorough safety is ensured in the organization.

Prerequisite: Nil