ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

CIVIL 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
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>
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<td>IV.</td>
<td>Electronics and Communication Engineering</td>
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<td>V.</td>
<td>Mechanical Engineering</td>
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<tr>
<td>VI.</td>
<td>Metallurgical Engineering</td>
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<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 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>4)</td>
<td></td>
<td>PC – Professional Core</td>
<td>Includes core subjects related to the Parent Discipline/ Department/Branch of Engg.</td>
<td>30% - 40%</td>
</tr>
<tr>
<td>5)</td>
<td>Elective Courses (EℓC)</td>
<td>PE – Professional Electives</td>
<td>Includes Elective subjects related to the Parent Discipline/ Department/Branch of Engg.</td>
<td>10% - 15%</td>
</tr>
<tr>
<td>6)</td>
<td></td>
<td>OE – Open Electives</td>
<td>Elective subjects which include inter-disciplinary subjects or subjects in an area outside the Parent Discipline/Department/Branch of Engg.</td>
<td>5% - 10%</td>
</tr>
<tr>
<td>7)</td>
<td></td>
<td>Project Work</td>
<td>B.Tech. Project or UG Project or UG Major Project</td>
<td></td>
</tr>
<tr>
<td>8)</td>
<td></td>
<td>Industrial Training/Mini-Project</td>
<td>Industrial Training/Internship/UG Mini-Project</td>
<td>10% - 15%</td>
</tr>
<tr>
<td>9)</td>
<td></td>
<td>Seminar</td>
<td>Seminar/ Colloquium based on core contents related to Parent Discipline/Department/Branch of Engg.</td>
<td></td>
</tr>
<tr>
<td>10)</td>
<td></td>
<td>Minor Courses</td>
<td>1 or 2 Credit Courses (subset of HS)</td>
<td>included</td>
</tr>
<tr>
<td>11)</td>
<td></td>
<td>Mandatory Courses (MC)</td>
<td>Mandatory Courses (non-credit)</td>
<td>-</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 SEEs (Semester End Examiantions) 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’ (ie., 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, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

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.

\[
\text{Credit Points (CP)} = \text{Grade Point (GP)} \times \text{Credits}
\] .... For a Course

10.7 The Student passes the Subject/ Course only when he gets \( \text{GP} \geq 5 \) (P Grade or above).

10.8 The Semester Grade Point Average (SGPA) is calculated by dividing the Sum of Credit Points (\( \sum \text{CP} \)) secured from ALL Subjects/ Courses registered in a Semester, by the Total Number of Credits registered during that Semester. SGPA is thus computed as

\[
\text{SGPA} = \frac{\sum \text{CP}}{\sum \text{Credits}}
\]

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), \( j \) is the Subject indicator index (taken into account all Subjects from 1 to \( S \) Semesters) and \( C_i \) and \( G_i \) represent the no. of Credits allotted to the \( i \)th Subject, and the Grade Points (GP) corresponding to the Letter Grade awarded for that \( i \)th Subject.

Illustration of calculation of SGPA

<table>
<thead>
<tr>
<th>Course / Subject</th>
<th>Credits</th>
<th>Letter Grade</th>
<th>Grade Points</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course 1</td>
<td>4</td>
<td>A</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>Course 2</td>
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<td>O</td>
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<td>30</td>
</tr>
<tr>
<td>Course 3</td>
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<td>C</td>
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</tr>
<tr>
<td>Course 4</td>
<td>4</td>
<td>B</td>
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</tr>
<tr>
<td>Course 5</td>
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<td>A+</td>
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<td>Course 6</td>
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<td>Course 7</td>
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<td>B</td>
<td>6</td>
<td>12</td>
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<tr>
<td>Course 8</td>
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<td>C</td>
<td>5</td>
<td>10</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>24</strong></td>
<td></td>
<td></td>
<td><strong>165</strong></td>
</tr>
</tbody>
</table>

\[
\text{SGPA} = \frac{165}{24} = 6.87
\]

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 I Year Second Semester onwards, at the end of each Semester, as per the formula

\[
\text{CGPA} = \frac{\sum_{i=1}^{S} C_i G_i}{\sum_{i=1}^{M} C_i} \quad \text{... for all } S \text{ Semesters registered (i.e., up to and inclusive of } S \text{ Semesters, } S \geq 2),}
\]

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), \( C_j \) is the no. of Credits allotted to the \( j \)th Subject, and \( G_j \) represents the Grade Points (GP) corresponding to the Letter Grade awarded for that \( j \)th Subject. After registration and completion of I 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 \( \geq 5.00 \) (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 \( \geq 5.00 \); subject to the condition that he secures a GP \( \geq 5 \) (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.

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

10.12.3 A Student shall be declared successful or ‘passed’ in any Non-Credit Subject/ Course, if he secures a ‘Satisfactory Participation Certificate’ for that Mandatory Course.

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

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 ...

% of Marks = (final CGPA – 0.5) x 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 I Year I 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.

* * * * *
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<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>
<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 only of all the candidates involved. In case of an outsider, he will be expelled 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>
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<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>
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<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 walkout or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the exam hall.</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 forfeit their seats. In case of outsiders, they will be handed over to the police and a case is registered against him.</td>
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<td>Clause</td>
<td>Offense Description</td>
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<td>6</td>
<td>Examinee assaults the officer-in-charge or any other officer on duty in or outside the examination hall or damages or destroys any property in the examination hall or any part of the College campus or indulges in any act of misconduct or mischiefs 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>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>
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<td>Possess any lethal weapon or firearm in the examination hall.</td>
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<td>9</td>
<td>If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.</td>
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<td>10</td>
<td>Comes in a drunken condition to the examination hall.</td>
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<td>11</td>
<td>Copying detected on the basis of internal evidence, as, during valuation or during special scrutiny.</td>
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<tr>
<td>12</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>
</tr>
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</table>
### I YEAR

#### I SEMESTER

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<th>S.No.</th>
<th>Group</th>
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### II YEAR

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#### II SEMESTER

<table>
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### IV YEAR
#### I SEMESTER

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#### II SEMESTER

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</table>
Professional Elective 1
1. Concrete Technology
2. Air Pollution and Control
3. Ground Water Development & Management
4. Introduction to offshore structures

Professional Elective 2
1. Structural Analysis-II
2. Stochastic Hydrology
3. Geo Environmental Engineering
4. FEM for Civil Engineering

Professional Elective 3
1. Water Resources Engineering – II
2. Traffic Engineering
3. Bridge Engineering
4. Soil Dynamics and Machine Foundations

Professional Elective 4
1. Remote Sensing & GIS
2. Waste Management
3. Pavement Design
4. Construction Technology and Management

Professional Elective 5
1. Elements of Earthquake Engineering
2. Ports and Harbor Engineering
3. Design and Drawing of Irrigation Structures
4. Ground Improvement Techniques

<table>
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<tr>
<th>S.No.</th>
<th>Subject</th>
<th>Offering Department</th>
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<tbody>
<tr>
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<td>Disaster Management</td>
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<tr>
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<td>Non – Conventional Power Generation</td>
<td>Electrical &amp; Electronics Engineering</td>
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OPEN ELECTIVE- II

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<td>Estimation, Quantity Survey &amp; Valuation</td>
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<td>2</td>
<td>Design Estimation and Costing of Electrical Systems</td>
<td>Electrical &amp; Electronics Engineering</td>
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<td>Energy Storage Systems</td>
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<td>Jet propulsion and Rocket Engineering</td>
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OPEN ELECTIVE- III

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<td>2</td>
<td>Entrepreneur Resource Planning</td>
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<td>Management Information Systems</td>
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<td>Aspects of Heat Transfer in</td>
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<td>Electrical/Electronically controlled</td>
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<td>Principles of Computer Communications</td>
<td>Electronics &amp; Engineering</td>
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<td>and Networks</td>
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<td>Engineering</td>
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<td>Surface Engineering</td>
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<tr>
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<td>Industrial Safety &amp; Hazard Management</td>
<td>Chemical Engineering</td>
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JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. Civil Engg. I-Sem

MATHEMATICS – I
(Common to all Branches)

Pre Requisites: NIL

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.

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.
Multiple integrals – double and triple integrals – change of order of integration- change of variables (polar, cylindrical and spherical).
Finding the area of a region using Double integration and volume of a region in space using triple integration.

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 $x^n$, $e^{ax}V(x)$, $x^nV(x)$. 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, WILEY PUBLICATIONS.
3) VECTOR ANALYSIS BY GHOSH & 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.

Prerequisite: Nil
Course Objectives:
The course aims at making students to understand the basic concepts of Principles of Physics in a broader sense with a view to lay foundation for the various engineering courses. Today the need is to stress principles rather than specific procedures, to select areas of contemporary interest rather than of past interest, and to condition the student to the atmosphere of change he will encounter during his carrier. The main purpose of this course is to equip engineering undergraduates with an understanding of the scientific method, so that they may use the training beneficially in their higher pursuits. An earnest attempt is made in framing the course in this direction by blending careful presentation of fundamental concepts and methods of physics. The course begins with a detailed coverage of optics, which includes topics such as interference, diffraction, polarization of Light phenomenon. It then delves into discussion on Characterization of materials in terms of bonding, defects, Structures, X-ray diffraction, dielectric nature, Magnetic behavior, Superconducting nature, Nano size activity etc. The basic principles behind the Acoustics of good structures (Halls) are elucidated for easy understanding of complex concepts.

Outcomes:
The knowledge of Physics relevant to engineering is critical for converting ideas into technology. An understanding of Physics also helps engineers understand the working and limitations of existing devices and techniques, which eventually leads to new innovations and improvements. In the present course, the students can gain knowledge not only about one of the naturally main source of life on the earth planet i.e. sun rays and their phenomenon, but also of other artificial light source behavior and their phenomenon. Similarly, by studying other chapters, the student can gain the knowledge of the relation between the micro level physical properties of the materials and their macro level behavior thereby acquires the idea of making them use effectively in real time situation or in applications of interest.
UNIT-I
1. **Interference**: Superposition of Waves, Young’s double slit experiment, Coherence, Interference in Thin films by Reflection, Newton’s Rings.
3. **Polarization**: Introduction to polarization, Double Refraction, Nicol Prism, Quarter and Half wave plates

UNIT-II
5. **Crystallography and Crystal Structures**: Space Lattice, Unit Cell, Lattice parameters, Crystal Systems, Bravais Lattices, Miller Indices, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, Diamond Structure(Cubic), Structures of NaCl, ZnS, CsCl, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal Systems

UNIT-III

UNIT-IV

10. **Superconductivity**: Introduction of Superconductivity, Properties of Superconductors, Meissner Effect, BCS theory (Qualitative), Type-I and Type II Superconductors, Magnetic Levitation and Applications of Superconductors.

UNIT-V
12. **Nanomaterials**: 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.

**Text books:**
2. Introduction to Solid State Physics by Charles Kittel, Wiley India Pvt Ltd, 7th Edition
4. Solid State Physics by A J Dekker, MACMILLAN INDIA LTD.

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

Course objectives:
The student is made to understand the basic concepts of chemistry. To explore the economically viable techniques developed for utilizing water resources and to provide the skills for analysis of water and materials. To inculcate the knowledge of corrosion to face thin burning issue of the Globe. The principle of the preparing and utilizing various polymers for varied applications.

Outcomes:
At the end of the course, the student will be able to:
- learn the concepts of electrochemistry, batteries. The principles and procedures for making varied polymers for different applications are well understood. The skills pertaining to water treatment and analysis will be inculcated.

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 thermoset plastic, compounding of plastics. Fibre reinforced plastics. Preparation, properties and applications of PVC, Teflon, Bakelite, Nylon 6:6 and terephylene (Dacron); Rubber – Natural rubber, its processing and vulcanization. Elastomers: Preparation, properties and applications of Styrene butadiene, butyl and thiokol 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 their applications.

Unit-IV: Chemistry of Energy sources


Unit-V: Engineering Materials:
**Refractories** – Characteristics of a good refractory, classification with examples – refractoriness and refactoriness under load - causes for the failure of refractories.

**Abrasives:** Characteristics – Classification and applications of Diamond and Carborandum (SIC)

**Lubricants** – Characteristics of a good lubricant – mechanism of lubrication – thick film, thin film and extreme pressure lubrication. Classification of lubricants with examples. Properties– viscosity, cloud point, pour point, flash point, fire point and mechanical stability (determination and their significance).

**Text Books:**

**Reference Books:**

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**JNTUH COLLEGE OF ENGINEERING HYDERABAD**

I Year B.Tech. Civil Engg. 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.

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

**Outcomes:**
At the end of the course, the student will be able to:
1. 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.
2. 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
JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. Civil Engg. I-Sem

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4 1 0 4

APPLIED MECHANICS

Prerequisites: Nil

Objectives:
- The study of Engineering Mechanics is very vital to the curriculum of Engineering Studies.
- The objective of this course is to build up and enhance the knowledge of mechanics studied in the physics in the application orientation for engineering problems. This course enables the students to take up the further courses in Engineering orientation for respective branches.

Outcomes:
In applied mechanics Program, the student will be given maximum flexibility in pursuing an area of special interest like:
- Dynamics and Vibrations - its interfaces to materials and structures for understanding on applications. Towards characteristics of structures and study on material and structure.
- Applied Mathematics and Numerical Methods.
- Strength of materials & structural analysis.

After completing the course student will have the basic knowledge on material and structures at analysis level. This will also integrate the science, engineering and mathematical concept for student understanding.

UNIT – I
INTRODUCTION OF ENGINEERING MECHANICS – Basic concepts

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

VIRTUAL WORK: Theory of virtual work – Applications.

TEXT BOOKS:

REFERENCES:
1. Engineering Mechanics (Statics and Dynamics) by Hibbler; Pearson Education.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. Civil Engg. I-Sem

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ENGINEERING PHYSICS LAB

LIST OF EXPERIMENTS

1. Dispersive power of the material of a prism –Spectrometer
2. Determination of wavelengths of a source-Diffraction Grating.
4. Time constant of an R-C Circuit.
5. Magnetic field along the axis of current carrying coil-Stewart and Gee's method.
8. Torsional pendulum.
10. Diffraction grating using single slit- Laser source

1) Estimation of ferrous iron by Permanganometry.
2) Estimation of ferric iron by Dichrometry.
3) Estimation of copper by Iodometry.
4) Estimation of Fe²⁺ & Fe³⁺ by dichrometry.
5) Estimation of hardness of water by Complexometry using EDTA.
6) Estimation of copper by Complexometry using EDTA.
7) Estimation of alkalinity of water.
8) Estimation of Permanent hardness by EDTA.
9) Preparation of Thikol rubber.
10) Estimation of iron in cement by Colorimetry; KMnO₄.
11) Estimation of Mn in KMnO₄ by Colorimetry.
12) Estimation of HCl in a given solution by pH - metry.
13) Estimation of HCl in acid mixture by conductometry.
14) Estimation of Fe²⁺ by Potentiometry.

Recommended Books:
I Year B.Tech. Civil Engg. I-Sem

JNTUH COLLEGE OF ENGINEERING HYDERABAD

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

Week 5:
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 6:
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\times x + x^2 + x^3 + \ldots + x^n
For example: if n is 3 and x is 5, then the program computes
1\times 5 + 5^2 + 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 7:
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.

Week 8:
19. Write a C program to convert a Roman numeral to its decimal equivalent.

Week 9:
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 10:
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.
    ii) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third 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

Week 10:
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 11:
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

Week 12:
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

JNTUH COLLEGE OF ENGINEERING HYDERABAD

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MATHEMATICS – II
(Common to all Branches)

Pre Requisites: NIL

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.

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)
Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and non-linear equations (Charpit’s method).
Method of separation of variables for second order equations. Applications of Partial differential equations- one dimensional wave equation., Heat equation.

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

Prerequisites: NIL

Objectives:
- To introduce the concept of electrical circuits and its components.
- To introduce the characteristics of various electronic devices.
- To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

Outcomes:
At the end of the course, the student will be able to:
- To analyze and solve electrical circuits using network laws and theorems.
- To design & analyse various circuits using electronic components viz. diodes, transistors & other special purpose devices.

UNIT-I ELECTRICAL and SINGLE PHASE AC CIRCUITS
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.

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 theorems for DC and AC excitations.
UNIT - III P-N JUNCTION DIODE & DIODE CIRCUITS
P-N Junction Diode - Diode equation, Energy Band diagram, Volt-Ampere characteristic, Temperature dependence, Static and dynamic resistances, Equivalent circuit, Load line analysis, Diffusion and Transition Capacitances.
Rectifiers and Filters - The P-N junction as a rectifier - A Half Wave Rectifier, Ripple Factor, Full Wave Rectifier, Bridge Rectifier, Harmonic components in Rectifier Circuits, Filters – Inductor Filters, Capacitor Filters, L-section Filters, π-section Filters.

UNIT - IV BIPOLAR JUNCTION TRANSISTOR

Transistor Configurations - BJT modeling, Hybrid model, Determination of h-parameters from transistor characteristics, Analysis of CE, CB and CC configurations using h-parameters, Comparison of CE, CB and CC configurations.

UNIT - V JUNCTION FIELD EFFECT TRANSISTOR & SPECIAL PURPOSE DEVICES:
Junction Field Effect Transistor - Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and JFET.

Special Purpose Devices - Breakdown Mechanisms in Semi Conductor Diodes, Zener diode characteristics, Use of Zener diode as simple regulator, Principle of operation and Characteristics of Tunnel Diode (With the help of Energy band diagram) and Varactor Diode, Principle of Operation of SCR.

TEXT BOOKS:

REFERENCES:
1. Introduction to Electronic Devices and Circuits-Rober T. Paynter, Pearson Education.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
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:

a. To improve the language proficiency of the students in English with emphasis on LSRW skills.
b. To equip the students to study academic subjects more effectively using the theoretical and practical components of the English syllabus.
c. To develop the study skills and communication skills in formal and informal situations.

LEARNING OUTCOMES:

1. 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
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills:

Objectives

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

   L - Listening for Sounds, Stress and Intonation
   S - Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)
   R - Reading for Subject/ Theme- The Palm Islands from Epitome of Wisdom is for Reading Comprehension
   W - Writing Paragraphs
   G - Types of Nouns and Pronouns
   V - Homonyms, Homophones & Homographs

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 Sastri 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.
4. Technical Communication, Meenakshi Raman, Oxford University Press
5. Practical English Usage, Michael Swan, Oxford University Press
12. Everyday Dialogues in English, Robert J. Dixon, Prentice Hall India Pvt Ltd.,
14. Basic Vocabulary Edgar Thorpe & Showick Thorpe, Pearson Education
15. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan, Frank Bros & CO

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### 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.

**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
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 conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people; its


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 cosystemspond, 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.

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COMPUTATIONAL MATHEMATICS
(Common to all Branches)

Pre Requisites: NIL

Objectives:
- This course aims at providing the student with the concepts of matrices, numerical techniques and curve fitting.

Outcomes:
- At the end of the course, the student will be able to:
- analyze engineering problems using the concepts of Matrices and Numerical Methods.

UNIT-I: Matrices and Linear Transformations

UNIT-II: Interpolation and Curve fitting
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
2) NUMERICAL AND STATISTICAL METHODS WITH PROGRAMMING IN C BY SUJATHA SINHA AND SUBHABRADA DINDA, SCITEC PUBLISHERS.
3) NUMERICAL METHODS, PRINCIPLES, ANALYSIS AND ALGORITHMS BY SRIMANTAPAL & SUBODH C. BHUNIA, OXFORD UNIVERSITY PRESS.

References:
1) ADVANCED ENGINEERING MATHEMATICS BY ALAN JEFFERY
2) APPLIED NUMERICAL METHODS USING MATLAB BY RAO.V.DUKKIPATI, NEW AGE PUBLISHERS
3) NUMERICAL METHODS IN SCIENCE AND ENGINEERING –APRACTICAL APPROACH BY S.RAJASEKARAN, S.CHAND PUBLICATIONS

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.

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

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
   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
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.

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**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’s interpolation)

(Selection criteria of the interpolation formula are important.)

**UNIT- I 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- I I I: 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 falsi).

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 Raphson 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-Seidel 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 Ruge-Kutta method.

PROBABILITY AND STATISTICS

Pre Requisites: Mathematics - I

Objectives:
To make the student to understand the statistics and probability theories such as random variables, sampling distribution, tests of significance etc. so that he can apply them to engineering problems.

Outcomes:
Students will able to perform probability theories & statistics on engineering problems.

UNIT-I: Probability

UNIT-II: Single Random variables and probability distributions

UNIT-III: 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-IV: 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 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 its properties. Test of equality of two population variances Chi-square distribution, its properties, Chi-square test of goodness of fit

UNIT- V: Queuing Theory & Stochastic Processes

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 SCIENCECY BY JAY L.DEVORE.

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) PROBABILITY AND STATISTICS BY T.K.V.IYENGAR & B.KRISHNA GANDHI et al
4) A TEXT BOOK OF PROBABILITY AND STATISTICS, SHAHNAZ BATHUL, CENGAGE LEARNING

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

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STRENGTH OF MATERIALS - I

Pre Requisites: Engineer Mechanics

Objectives:
The subject provide the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.

Outcomes:
Student can able to find out the bending moments, shear force diagram shear stresses and deflection in beams to the engineering problems

UNIT – I
SIMPLE STRESSES AND STRAINS:


UNIT – II
SHEAR FORCE AND BENDING MOMENT:
Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III
FLEXURAL STRESSES:
SHEAR STRESSES:
Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

UNIT – IV
DEFLECTION OF BEAMS:
Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay’s methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load-Mohr’s theorems – Moment area method – application to simple cases including overhanging beams.

CONJUGATE BEAM METHOD: Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

UNIT – V
PRINCIPAL STRESSES AND STRAINS:
Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr’s circle of stresses – Principal stresses and strains – Analytical and graphical solutions.


Text Books:
2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.

References:
7) Strength of Materials by R.Subramanian, Oxford University Press.
PREPARASITES: Engineering Mechanics

OBJECTIVES:
To give the students a basic idea about the construction materials, building components and to introduce component methodologies.

OUTCOMES:
Student able to identify various building materials to perform construction & planning

UNIT – I
Stones and Bricks, Tiles:
Building stones – classifications and quarrying – properties – structural requirements – dressing
Bricks – Composition of Brick earth – manufacture and structural requirements.

Wood, Aluminum, Glass and Paints

UNIT-II
Cement & Admixtures:
Ingredients of cement – manufacture – Chemical composition – Hydration - field & lab tests
Admixtures – mineral & chemical admixtures – uses.

UNIT-III
Building Components:

Building Services:

UNIT –IV
Masonry and Finishing’s
Brick masonry – types – bonds ; Stone masonry – types ; Composite masonry – Brick-stone composite ; Concrete, Reinforced brick.
Finishers : Plastering, Pointing, Painting, Claddings – Types – Tiles - ACP
Form work :
Requirements – Standards – Scaffolding – Design ; Shoring, Underpinning.

UNIT – V
Building Planning : Principles of Building Planning, Classification of buildings and Building by laws.

TEXT BOOKS:

REFERENCES:
2. Building Materials by P.C.Varghese, PHI.
3. Building Construction by PC Varghese PHI.
5. Basics of Civil Engg by Subhash Chander; Jain Brothers
Pre Requisites: Engineering Mechanics

Objectives:
The first step in engineering practice is surveying and the soundness of the any civil engineering work is dependent on the reliability and accuracy of the surveying. There fore, it is imperative that a student of engineering should have good knowledge of surveying. To impart the knowledge of surveying and latest technologies in surveying it is necessary to introduce this subject in the curriculum.

Outcomes:
Able to perform various surveying techniques using latest technologies in surveying

Unit-I:
Introduction and Basic Concepts
Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.

Measurement of Distances and Directions

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and dip

Unit-II
Levelling and Contouring
Levelling- Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.
Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes
Areas- Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter.
Volumes- Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

Unit-III
Theodolite Surveying
Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing
Methods of traversing, traverse computations and adjustments, Gale’s traverse table, Omitted measurements.

Unit-IV
Tacheometric Surveying
Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves
Types of curves and their necessity, elements of simple curve, setting out of simple Curves, Introduction to compound curves.

Unit-V
Modern Surveying Methods
Total Station and Global Positioning System. : Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components of GPS – space segment, control segment and user segment, reference systems, satellite orbits, GPS observations. Applications of GPS.

TEXT BOOKS:
REFERENCES:
2. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
3. Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
5. Surveying by BHAVIKATTI; Vikas publishing house ltd.

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II Year B.Tech. Civil Engg. I-Sem

FLUID MECHANICS

Pre Requisites: Engineering Mechanics

Objectives:
This subject introduces the basic concepts of fluids, their behavioural properties, analyzing the fluid flows using primary equations. This subject further deals with various flow measuring devices and concepts of boundary layer flows.

Outcomes: Engineering Mechanics

UNIT I
INTRODUCTION : Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal’s law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers. Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

UNIT II
FLUID KINEMATICS : Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, nonuniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, flownet analysis.

UNIT III

UNIT IV
CLOSED CONDUIT FLOW: Reynold’s experiment – Characteristics of Laminar & Turbulent flows. Laws of Fluid friction – Darcy’s equation, variation of friction factor with Reynold’s number – Moody’s Chart, Minor

UNIT – V

BOUNDARY LAYER THEORY: Approximate Solutions of Navier Stoke’s Equations – Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers (no derivations) BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

TEXT BOOKS:
3. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer, Oxford University Press, New Delhi

REFERENCES:
4. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi
STRENGTH OF MATERIALS LAB

Pre Requisites: Strength of Materials – Theory

Objectives:
The object of the course to make the student to understand the behaviour of materials under different types of loading for different types structures

Outcomes:
Able to identify the various properties of engineering material.

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell’s Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges

List of Major Equipment:
1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell’s / Rock well’s hardness testing machine
6. Spring testing machine
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell’s theorem verification.
11. Continuous beam setup

SURVEYING LAB –I

Pre Requisites: Surveying Theory

Objectives:
To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

Outcomes:
Practically able to give drawing of plans & maps & determining the area before taking up any civil engineering works.

1. Surveying of an area by chain survey (closed traverse) & plotting.
2. Chaining across obstacles
3. Determine of distance between two inaccessible points with compass
4. Survey of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane table survey.
6. Two point and three point problems in plane table survey.
7. Levelling – Longitudinal and cross-section and plotting
8. Trigonometric leveling using theodolite
9. Height and distances using principles of tacheometric surveying
    b) Distance between inaccessible point by theodolite
HUMAN VALUES AND PROFESSIONAL ETHICS

Pre Requisites: NIL

Objectives:
The object of subject is to develop personality development, professional responsibility in Engineering, have a knowledge about rights, global issues

Outcomes:
Student will be perfect with human values up professional ethics which is essential in any kind of work in engineering field


Unit II Professional Ethics: Profession- and professionalism - Two models of professionalism –Professional etiquette -Three types of Ethics or morality Responsibility in Engineering – Engineering standards – Engineering Ethics – Positive and Negative Faces. Professional Codes and Code of conduct (as given by ASME, ASCE, IEEE, IETE, Institute of Engineers as Guidelines for ethical conduct). Mini-cases


Unit IV Professional Rights: professional rights and employee rights communicating risk and public policy – Whistle blowing - collective bargaining. Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Regulatory compliances, Monitoring and control- 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.
STRENGTH OF MATERIALS – II

Pre Requisites: Strength of Materials -I

Objectives:
Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.

Outcomes: Students will be able to know the principles for practical design of columns, curved beams, springs, thick & thin cylinders, circular shafts etc.

UNIT – I
TORSION OF CIRCULAR SHAFTS:
Theory of pure torsion – Derivation of Torsion equations : \( T/J = q/r = N\theta/L \)

SPRINGS
Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT – II
COLUMNS AND STRUTS:

BEAM COLUMNS: Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

UNIT - III
DIRECT AND BENDING STRESSES:
Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both axis.

BEAMS CURVED IN PLAN:
Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semi-circular beam simply-supported on three equally spaced supports.

UNIT – IV
THIN CYLINDERS:

THICK CYLINDERS:

UNIT – V
UNSYMETRICAL BENDING:
Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Deflection of beams under unsymmetrical bending.

SHEAR CENTRE: Introduction - Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections

Text Books:
2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.

References:
1) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd
2) Introduction to Strength of Materials by U.C.Jindal, Galgotia Publications Pvt. Ltd.
3) Mechanics of Materials by R.C.Hibbeler, Pearson Education
HYDRAULICS & HYDRAULIC MACHINERY

Pre Requisites: Fluid Mechanics

Objectives:
The main objective of this course to deal with the concepts of flow through open channels and their applications and the principles of hydraulic machines and hydraulic models

Outcomes:
Students will be able to know about the flow through open channels & also practical applications of hydraulic mechanics importants of hydraulic models.

UNIT – I

UNIT - II
HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh’s method and Buckingham’s pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations. Distorted and non-distorted models.

UNIT – III
BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

UNIT - IV
HYDRAULIC TURBINES: Layout of a typical Hydropower installation – Heads and efficiencies-classification of turbines-pelton wheel-Francis
turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency. Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed perormance characteristics-geometric similarity-cavitation.

UNIT – V

TEXT BOOKS:
2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi

REFERENCES :
3. Fluid mechanics and fluid machines by Rajput, S.Chand &Co.
UNIT – IV
CONTINUOUS BEAMS: Introduction-Continuous beams. Clapeyron’s theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang. Effects of sinking of supports.


UNIT – V
MOVING LOADS and INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length. Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section -Point loads, UDL longer than the span, UDL shorter than the span- Influence lines for forces in members of Pratt and Warren trusses. Equivalent uniformly distributed load. Focal length.

Text Books:

References:
1) Structural Analysis by R.C.Hibbeler, Pearson Education
3) Structural Analysis by Devdas Menon, Narosa Publishing House.
5) Fundamentals of Structural Analysis by M.L.Gamhir, PHI Learning Pvt. Ltd

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. Civil Engg. II-Sem L T P C 4 0 0 3

ENGINEERING GEOLOGY

Pre Requisites: Building Materials

Objectives:
The objectives was course is to give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures in the syllabus include the basic Geology, Geological Hazardous and Environmental Geology which gives a complete picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects

Outcomes:
Student will acquire basic knowledge of geology.

UNIT - I
INTRODUCTION: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like “Granite”

UNIT - II
MINERALOGY : Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.ROLE of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite.

PETROLOGY : Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic and
microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT - III
Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults, unconformities, and joints - their important types and case studies. Their importance in situ and drift soils, common types of soils, their origin and occurrence in India. Stabilisation of soils. Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

UNIT - IV
Earthquakes: Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.


UNIT - V

Text Books:
1) Engineering Geology by N.Chennakesavulu, Mc-Millan, India Ltd. 2005
2) Engineering Geology for Civil Engineers – P.C. Varghese PHI

References:
II Year B.Tech. Civil Engg. II-Sem  

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**Pre Requisites:** Fluid Mechanics

**Objectives:**
This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.

**Outcomes:**
Student will able to provide fundamental for water treatment, design of distribution system waste water

**UNIT – I**

**UNIT II**

**UNIT-III**
Distribution systems requirement –method and layouts -Design procedures- Hardy Cross and equivalent pipe methods pipe – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house - Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow

**UNIT - IV**

**UNIT – V**

**TEXT BOOKS** :

**REFERENCE BOOK** :
1. Water and Waste Water Technology by Steel
2. Water and Waste Water Engineering by Fair Geyer and Okun
5. Unit operations in Environmental Engineering by R. Elangovan and M.K. Sasutharam (Newage)
Objectives of the Course:

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

Learning Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.
Just Relationships: Being Together as Equals (Towards a World of Equals: Unit -12)
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters, Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

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:
ENGINEERING GEOLOGY LAB

Pre Requisites: Engineering Geology Theory

Objectives:
The object of this lab is that to provide practical knowledge about physical properties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.

Outcomes:
Identify the various rocks, minerals depending on geological classifications

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Microscopic study of rocks.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
5. Simple Structural Geology problems.
6. Electrical resistivity meter.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.
5. Microscopic identification of rocks.

ENVIRONMENTAL ENGINEERING LAB

Pre Requisites: Chemistry Laboratory

Objectives:
The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates, Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand are also included. The estimation status of industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

Outcomes:
Students can provide various properties of water

LIST OF EXPERIMENTS

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination of iron.
7. Determination of Nitrates.
8. Determination of Optimum dose of coagulant
9. Determination of Chlorine demand
10. Determination of total Phosphorous.
11. Determination of B.O.D
12. Determination of C.O.D
13. Presumptive coliform test.

NOTE: At least 8 of the above experiments are to be conducted.
FLUID MECHANICS & HYDRAULIC MACHINERY LAB

Pre Requisites: FM & HHM Theory

Objectives:
To give the student an exposure to various hydraulic devices and hydraulic machines.

Outcomes: Fluid Mechanics & Hydraulics Machinery

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice / mouthpiece by constant head method.
3. Calibration of contracted Rectangular Notch and / Triangular Notch
5. Determination of Coefficient for minor losses.
6. Verification of Bernoulli’s equation.
7. Impact of jet on vanes
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Performance characteristics of a single stage/ multi-stage centrifugal pump.
12. Performance characteristics of a reciprocating pump.
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Pre-Requisites: Mathematics

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

Course Outcomes:
Student will able to solve various business problem up make various business decision


TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

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DESIGN OF REINFORCED CONCRETE STRUCTURES

Pre-Requisites: Structural Analysis I & II

Course Objectives:
Structural elements are subjected to different loading to withstand the structures, for external loading we need to design the structures for its safety and serviceability.

Course Outcomes:
Able to design RC structural elements

UNIT –I
Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections

UNIT –II
Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing ; Design of canopy.

UNIT – III

UNIT – IV
Footings: Different types of footings – Design of isolated, square, rectangular, circular footings and combined footings.

UNIT - V
Design of Two-way slabs, one way slab, and continuous slab Using I S Coefficients
Limit state design for serviceability for deflection, cracking and codal provision.
Design of dog-legged staircase.

TEXT BOOKS:

REFERENCES :

NOTE :
Alternate weeks two periods of drawing class should be conducted. The end examination paper should consist of Part – A and Part – B. Part – A should consist of two questions in design and drawing out of which one question to be answered. Part –B should consist of five questions in design out of which three to be answered. Weightage for Part – A is 40 % and Part – B is 60 %.
SOIL MECHANICS

Pre-Requisites: Engineering Geology, Applied Mechanics, Fluid Mechanics

Course Objectives:
To enable the student to study the properties of soil and to determine the behaviour soil under various conditions and loads.

Course Outcomes:
Can understand the mechanism and Behaviour of Soil for Different loads and Soil Condition able to determine properties of soil

UNIT – I

UNIT – II

UNIT – III
STRESS DISTRIBUTION IN SOILS: Boussinesq’s and Westergaard’s theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and Newmark’s influence chart for irregular areas.

UNIT – IV
CONSOLIDATION: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log(p) curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi’s 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

UNIT - V
SHEAR STRENGTH OF SOILS: Importance of shear strength – Mohr’s–Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio.

Text books:
3. Foundation Engineering by P.C. Varghese, PHI

References:
WATER RESOURCES ENGINEERING-I

Pre-Requisites: Fluid Mechanics & HHM

Course Objectives:
To study the concepts of
i. Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.

Course Outcomes:
Estimate runoff, design discharge up flood waiting, Irrigation engineering

UNIT I

UNIT-II
Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow- Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT-III
Ground water Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, Darcy’s law, radial flow to wells in confined and unconfined aquifers. Types of wells,- Well Construction – Well Development.

UNIT-IV
Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of irrigation water, Indian agricultural soils, methods of improving soil fertility—Crop Rotation, preparation of land for Irrigation, standards of quality for Irrigation water. Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and delta, factors affecting duty- Design discharge for a water course. Depth and frequency of Irrigation, irrigation efficiencies-Water Logging.

UNIT-V
Classification of canals, Design of Irrigation canals by Kennedy’s and Lacey’s theories, balancing depth of cutting, IS standards for a canal design canal lining. Design Discharge over a catchment, Computation of design discharge- rational formulae etc.

Text books:
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

References:
1. Elementary hydrology by V.P.Singh, PHI publications.
3. Irrigation Water Management by D.K. Majundar, Printice Hall of India.
4. Irrigation and Hydraulic structures by S.K.Grag - Khanna publishers
5. Applied hydrology by Ven Te Chow, David R. Maidment larry W. Mays Tata MC. Graw Hill.
ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

Pre-Requisites: English

Course Objectives:
The purpose of this course is to develop the students' competence in communication at an advanced level. Assuming that the students are fairly proficient in the basic communication skills of listening, speaking, reading and writing in English, this course aims to train them in communicating efficiently in the workplace and professional contexts.

Course Outcomes:
Communicate efficiently in the workplace and professional context

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.

3. Activities on Writing Skills
   - Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing – planning for writing – improving one’s writing.

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
- P-IV Processor, Hard Disk – 80 GB, RAM – 512 MB Minimum, Speed – 2.8 GHZ
- 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:

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.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. I-Sem

SURVEYING LAB –II

Pre-Requisites: Surveying Theory

Course Objectives:
To impart the practical knowledge in the field to set out any Civil Engineering work

Course Outcomes:
Perform surveying on any civil engineering work

1. Determine of area using total station
2. Traversing using total station
3. Contouring using total station
4. Determination of remote height using total station
5. Stake out using total station
6. Distance, gradient, differential height between two inaccessible points using total station.
7. Curve settling using total station
8. Resection using total station
9. Setting out works for buildings and pipe lines
10. Finding position of stations using G.P.S
Pre-Requisites: Soil Mechanics (Co-requisite)

Course Objectives:
To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.

Course Outcomes:
Able to determine index and engg properties of soils

LIST OF EXPERIMENTS
1. Atterberg Limits (Liquid Limit, Plastic Limit)
2. a) Field density by core cutter method and
   b) Determination of Specific gravity of soil.
3. Field density by sand replacement method
4. Grain size distribution by sieve analysis
5. Permeability of soil by constant and variable head test methods
6. Standard Proctor’s Compaction Test
7. California Bearing Ratio Test (CBR Test)
8. Determination of Coefficient of consolidation (square root time fitting method)
9. Unconfined compression test
10. Direct shear test
11. Vane shear test
12. Differential free swell index (DFSI) test

Note: Any Ten experiments may be completed.

REFERENCE BOOK
### JNTUH COLLEGE OF ENGINEERING HYDERABAD

#### III Year B.Tech. Civil Engg. II-Sem

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### DESIGN OF STEEL STRUCTURES

#### Pre-Requisites:
Structural Analysis I & II

#### Course Objectives:
To make the student conversant with the design principles of steel structural elements as per IS Codal provisions

#### Course Outcomes:
Able to design different types of steel structures

#### UNIT – I

#### UNIT – II

#### UNIT – III

#### UNIT – IV

#### UNIT – V
Design of roof trusses – Types of roof trusses, loads on trusses – purlin design – truss design, Design of joints and end bearings.
Text books :

Reference books :
1. Design of Steel structures by K.S. Sai Ram, Person Education.
5. Structural Design and Drawing by N.Krishna Raju, Universities Press.

NOTE:
Alternate weeks two periods of drawing class should be conducted. The end examination paper should consist of Part – A and Part – B. Part – A should consist of two questions in design and drawing out of which one question to be answered. Part – B should consist of five questions in design out of which three to be answered. Weightage for Part – A is 40 % and Part – B is 60 %.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem

TRANSPORTATION ENGINEERING

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4 1 0 4

Pre-Requisites: Surveying

Course Objectives:
It deals with different components of Transportation Engineering like highway, Railway & Airport Engineering Emphasis is a Geometric Design of different elements in Transportation Engineering.

Course Outcomes:
Student is knowledgeable of basic concepts of transportation engineering like highway, railway & airport engineering

UNIT I
HIGHWAY DEVELOPMENT AND PLANNING:
Highway Development in India – Necessity for Highway Planning-Different Road Development Plans; Classification of Roads - Road Network Patterns – Highway Alignment- Factors affecting Alignment-Engineering Surveys – Drawings and Reports – Highway Project.

UNIT – II
HIGHWAY GEOMETRIC DESIGN:
Importance of Geometric Design - Design controls and Criteria - Highway Cross Section Elements - Sight Distance Elements- Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance - Design of Horizontal Alignment - Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III
TRAFFIC ENGINEERING & REGULATIONS:
UNIT – IV
INTERSECTION DESIGN :
Types of Intersections – Conflicts at Intersections – Requirements of At-Grade Intersections - Types of At-Grade Intersections: Channelized and Unchannelized Intersections - Traffic Islands - Types of Grade Separated Intersections - Rotary Intersection – Concept of Rotary – Design Factors of Rotary – Advantages and Limitations of Rotary Intersections.

UNIT - V
PAVEMENT DESIGN

Text books:

References:
4. IRC 37-2012 : Tentative guidelines for design of flexible pavement
5. IRC 58-2011: Guidelines for design of plain jointed rigid pavements.
6. IRC 81-1997 : Guidelines for design of overlay using Benkalman Beam Deflection Technique

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg. II-Sem
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TRANSPORTATION ENGINEERING LAB

Pre-Requisites: Transportation Engineering Theory

Course Objectives:
To gain the practical knowledge of properties of Highway materials and surveys

Course Outcomes:
Practically student can provide or identify properties of highway materials

I. ROAD AGGREGATES:
1. Aggregate Crushing value
2. Aggregate Impact Test.
4. Abrasion Test
5. Flakiness and elongation Indices of coarse Aggregates.

II. BITUMINOUS MATERIALS:
1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Marshal stability Test

III. TRAFFIC STUDIES
1. Traffic volume counts-Mid Blocks
2. Traffic volume counts-Junctions
4. Parking Studies

TEXT BOOK:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg.  II-Sem       L   T    P   C
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COMPUTER AIDED DRAFTING LAB - II

Pre-Requisites: CAD Lab – I & Excel, C - Programming

Course Objectives:
To make student understand detailing of all kinds of structures might be of reinforced concrete, plain concrete, steel structures.

Course Outcomes: Student can draft various structures
1. Detailing of reinforcement in Cantilever, Simply supported and Continuous Beams (Both Singly & Doubly Reinforced Beams)
2. Detailing of reinforcement in canopy & columns (both uniaxial & biaxial)
3. Detailing of reinforcement in RC isolated footings square, rectangular, circular and combined footings.
4. Detailing of reinforcement in RC one-way, two-way slabs and dog-legged staircases.
5. Drawing of Steel bolted and welded connections.
6. Drawing of steel compression and tension members.
7. Drafting of steel beams-built-up sections.
8. Drafting of steel plate girder
9. Drafting of steel roof truss.

Note: Drafting of all the exercises is to be carried out using commercially available drafting softwares.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. Civil Engg.  II-Sem       L   T    P   C
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CONCRETE TECHNOLOGY LAB

Pre-Requisites: Concrete Technology Theory

Course Objectives:
To gain the practical knowledge of properties of concrete materials, behaviour of concrete and properties of fresh and hardened concrete

Course Outcomes:
Provide properties of concrete material, behavior of concrete & properties of fresh & hardened concrete

I. Test on Cement
1. Normal Consistency and fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement.
4. Soundness of cement.
5. Compressive strength of cement.
6. Workability test on concrete by compaction factor, slump and Vee-bee.

II. Test on Aggregate
1. Sieve Analysis and gradation chairs
2. Bulking of sand.
3. Bulk and compact densities of fine and coarse aggregates

III. Test on Fresh Concrete
1. Slump test
2. CF (compact factor stress)
3. Vee-bee Test
4. Flow Table Test

Self Compacting Concrete
1. Slump cone
2. V funnel
3. L Box
4. U – box

IV. Test on hardened concrete
1. compression test on cubes & Cylinders
2. flexure test
3. Splitting Tensile Test
4. Modulus of Elasticity

V. Non Destructive test of concrete
1. Rebound hammer
2. Ultrasound pulse Velocity (UPV)
3. Rebar data scanner

TEXT BOOK:
1. Concrete Technology by M.S. Shetty – S.Chand & Co.
2. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
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FOUNDATION ENGINEERING

Pre-Requisites: Soil Mechanics

Course Objectives:
To impart the knowledge on design substructures for various civil engg structural principle of soil mechanics checking the stability of slope, to design of earth retaining structures.

Course Outcomes:
Able to check the stability of slope & design of earth retaining structures

UNIT – I

UNIT – II

UNIT – III
EARTH PRESSURE THEORIES: Rankine’s theory of earth pressure – earth pressures in layered soils – Coulomb’s earth pressure theory – Culmann’s graphical method.

RETAINING WALLS: Types of retaining walls – stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity. Drainage from backfill, introduction to reinforced earth walls.

UNIT – IV
SHALLOW FOUNDATIONS - Types - choice of foundation – location and depth - safe bearing capacity – shear criteria – Terzaghi’s, and IS code methods - settlement criteria – allowable bearing pressure based on SPT N value and plate load test – allowable settlements of structures.

UNIT – V
PILE FOUNDATION: Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pile formulae – Pile Capacity through SPT and CPT results - pile load tests - load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin friction


Text books:
PRESTRESSED CONCRETE

Pre-Requisites: Reinforced Concrete Design

Course Objectives:
Prestressing is the techniques often used in bridges and other structural elements for longer span and heavier loads. This subject covers various aspects of prestressing and design techniques to give the student an overall exposure in the analysis and design of Prestressed concrete structures.

Course Outcomes: Able to design prestressed concrete structures

UNIT I:
Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

UNIT II:
Methods and Systems of prestressing: Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system. Losses of Prestress: Loss of prestress in pretensioned and posttensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses IS 1343-2012 code provisions

UNIT III:
Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I sections- Kern line – Cable profile and cable layout.
Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions.

UNIT IV:

UNIT V
Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.
Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- IS code requirements.

References:
4. Prestressed Concrete by N. Rajagopalan Narosa Publishing House
COMPUTER AIDED DESIGN & DRAFTING LAB

Pre-Requisites: Structural Analysis I & II RCC Design Steel Design

Course Objectives:
To impart the knowledge on analysing the structures

Course Outcomes:
Able to analysis various structural members

1. Analysis of Beams (Simply Supported and Continuous)
2. Analysis of Plane Frames for D.L & L.L
3. Analysis of Space Frames for D.L & L.L
4. Analysis of Space Frames subjected to wind & Earthquake Loads.
5. Analysis & Design of Residential Building (G + 2 Floors)
6. Analysis & Design of Roof Truss

Structural Frame
Model Generation in any 2 softwares like STAAD PRO ETABS etc.

MANAGEMENT SCIENCE

Pre-Requisites: Managerial Economics & Financial Analysis

Course Objectives:
To obtain knowledge about managing of open business by analysing it theoretically

Course Outcomes:
Able to management & make planning of any engineering project

Unit I Introduction to Management & Organisation:

Unit II Operations & Marketing Management:

Unit III Human Resources Management (HRM):
Concepts of HRM, HRD and Personnel Management and Industrial Relations (PMIR), HRM vs PMIR, 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 – Capability Maturity Model (CMM) Levels – Performance Management System.

**Unit IV Project Management (PERT/CPM):** Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing (simple problems).


**TEXT BOOKS:**

**REFERENCES :**

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**JNTUH COLLEGE OF ENGINEERING HYDERABAD**

**IV Year B.Tech. Civil Engg. II-Sem**

**GEOGRAPHICAL INFORMATION SYSTEMS LAB**

**Prerequisites :** Surveying

**Course Objectives:**
Development of GIS interface to field problems through geofencing.

**Course Outcomes:**
Exposed to spatial technologies, mapping the field problems and solution convergence through GIS.

**UNIT 1:**
Development of georeferencing of map either from cadastral or Autocad based map.

**UNIT 2:**
Identification of best locations of ground control points and mosaicing the different sources of maps of information like topo sheets & satellite data and other drawings.

**UNIT 3:**
Digitization and GIS coordination.

**UNIT 4:**
GIS interface and features in Arc info/ map info.

**UNIT 5:**
Case example on mapping like water distinguish, Road alignment road network etc.,

**Text Books :**
Pre Requisites: Building Materials

Course Objectives:
Lot of advantages are taking place in the concrete technology as par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology

Course Outcomes:
Able to identify different properties of cement, aggregate properties, and design concrete mix of various exposures.

UNIT I

UNIT - II

UNIT – III

UNIT - IV

TESTING OF HARDENED CONCRETE: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.


UNIT – V


Text books:
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

References:
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
Professional Elective - I
AIR POLLUTION AND CONTROL

Pre Requisites: Environmental Engineering

Course Objectives:
The subject provides the knowledge of various effects of Air pollution on human beings and Vegetation and Materials. The topics of control methods, details of control equipment, the methods of controlling gaseous are also included. The objective of the course is to study the moment, occurrence of ground water and its development and management.

Course Outcomes:
Able to control the air pollution by properties various techniques to control

UNIT – I
Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution-stationary and mobile sources.

UNIT – II
Effects of Airpollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT-III
Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO$_2$; NO$_x$; CO; HC etc., air-fuel ratio. Computation and Control of products of combustion. Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT-IV
Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion. Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.

Text books:

Reference:
ARTIFICIAL RECHARGE OF GROUND WATER: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT – V
Well Construction – Drilling Equipment used for Well Construction – Bore log – Interpretation of Log Data.


Text books:
2. Groundwater by H.M.Raghunath, Wiley Eastern Ltd.

References:
INTRODUCTION TO OFFSHORE STRUCTURES

Pre Requisites: FM & Hydraulics, Structural Analysis, RC Design

Course Objectives:
The subject provides knowledge on offshore structures, analysis and design of offshore structures.

Course Outcomes:
Able to understand and design offshore structures.

UNIT I

UNIT II
WAVE THEORIES
Wave generation process, small and finite amplitude wave theories.

UNIT III
FORCES OF OFFSHORE STRUCTURES
Wind forces, wave forces on vertical, inclined cylinders, structures - current forces and use of Morison equation.

UNIT IV
OFFSHORE SOIL AND STRUCTURE MODELING
Different types of offshore structures, foundation modeling, structural modeling.

UNIT V
ANALYSIS AND DESIGN OF OFFSHORE STRUCTURES
Static method of analysis, foundation analysis and dynamics of offshore structures. Design of platforms, helipads, Jacket tower and mooring cables and pipe lines.

Text Books

References
7. Codes of Practice (latest versions) such as API RP-2A, Bureau Veritas etc.
8. Proceedings of Offshore Technology Conference (O.T.C.), Behaviour of Offshore Structures (BOSS) and other Conferences on Offshore Engineering.
Professional Elective - II

STRUCTURAL ANALYSIS – II

Pre Requisites: SA- I

Course Objectives:
Indeterminate structures are subjected to different loading with different supported conditions, hence it is necessary to study the behaviour of the structures.

Course Outcomes: Able to study behaviour of the structure

UNIT – I

TWO HINGED ARCHES: Introduction – Classification of Two hinged Arches – Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

CABLES and SUSPENSION BRIDGES: Equilibrium of a Suspension Cable subjected to concentrated loads and uniformly distributed loads. Length of a cable. Cable with different support levels. Suspension cable supports. Suspension Bridges. Analysis of Three Hinged Stiffening Girder Suspension Bridges.

UNIT – II


UNIT – III


UNIT – IV


UNIT – V

INFLUENCE LINES FOR INDETERMINATE BEAMS: Introduction – ILD for shear force and bending moment for two span continuous beam with constant and different moments of inertia. ILD for shear force and bending moment for propped cantilever beams.

INDETERMINATE TRUSSES: Determination of static and kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies – Castigliano’s second theorem.

Text Books:

References:
4) Structural Analysis by Devdas Menon, Narosa Publishing House.
5) Advanced Structural Analysis by A.K.Jain, Nem Chand & Bros.
STOCHASTIC HYDROLOGY

Pre Requisites: WRE

Course Objectives:
Understanding probabilities interventions of dynamics characteristic of water

Course Outcomes: Water Resources – I & Probability statistics


Reading:

GEOENVIRONMENTAL ENGINEERING

Pre Requisites: Soil Mechanics & Environmental Engineering

Course Objectives:
1. To study the sources of contamination and characterization of contaminated ground.
2. To study and model the contaminable Transport.
3. To identify appropriate remediation technique for the contaminated.

Course Outcomes:
Able to identify appropriate remediation techniques for contamination & provide models

Unit. I
Sources and Site Characterization: Scope of Geoenvironmental Engineering, Various Sources of Contaminations, Need for contaminated site characterization; and Characterisation methods.

Unit. II
Solid and Hazardous Waste Management: Classification of waste, Characterisation solid wastes, Environmental Concerns with waste, waste management strategies.

Unit. III

Unit. IV
Remediation Techniques: Objectives of site remediation, various active and passive methods, remediation NAPL sites, Emerging Remediation Technologies.

Unit. V
Landfills: Types of landfills, Site Selection, Waste Containment Liners, Leachate collection system, Cover system, Gas collection system.

Text Books
1. Bedient, Refai & Newell - Ground Water Contamination
2. Sharma, H. D. and Reddy, K. R. - Geoenvironmental Engineering
References:
1. Rowe, R. K. - Geotechnical & Geoenvironmental Engineering Handbook
2. Reddi, L. N. and Inyang, H. I. - Geoenvironmental Engineering
3. LaGrega, M. D., Buckingham, P. L. and Evans, J. C. - Hazardous Waste Management

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg. \[ L \ T \ P \ C \]
Professional Elective - II
FEM for CIVIL ENGINEERING

Pre Requisites: SA – I & SA – II

Course Objectives:
The subject provides finite element methods and analysis

Course Outcomes: Analysis Finite Element in engineering

UNIT – I

UNIT – II
Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions stiffness matrix – stress – strain relation

UNIT – III
FEA Beam elements – stiffness matrix - shape function– Analysis of continuous beams.

UNIT – IV
Isoparametric formulation – Concepts of, isoparametric elements for 2D analysis -formulation of CST element.

UNIT-V
Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:
2.  Introduction to finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D. Belegundu, Prentice Hall of India

REFERENCES:
1.  Finite Element Analysis by P.Seshu, PHI Learning Private Limited
2.  Concepts and applications of Finite Element Analysis by Robert D. Cook et al., Wiley India Pvt. Ltd.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg.

Professional Elective - III
WATER RESOURCES ENGINEERING-II

Pre Requisites: WRE - II

Course Objectives:
To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, design etc.,

Course Outcomes: Water Resources Engineer

UNIT-I
Storage Works-Reservoirs - Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve- Reservoir Sedimentation – Life of Reservoir. Types of dams, factors affecting selection of type of dam, factors governing selection of site for a dam.

UNIT-II
Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, Factors of Safety - Stability Analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

UNIT-III
Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.Spillways: types of spillways, Design principles of Ogee spillways - Spillway gates. Energy Dissipaters and Stilling Basins Significance of Jump Height Curve and Tail Water Rating Curve - USBR and Indian types of Stilling Basins.

UNIT-IV
Diversion Head works: Types of Diversion head works- weirs and barrages, layout of diversion head work - components. Causes and failure of Weirs and Barrages on permeable foundations,-Silt Ejectors and Silt Excluders Weirs on Permeable Foundations – Creep Theories - Bligh’s, Lane’s and Khosla’s theories, Determination of uplift pressure- Various Correction Factors – Design principles of weirs on permeable foundations using
Creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron.

UNIT-V
Canal Falls - types of falls and their location, Design principles of Notch Fall and Sarada type Fall. Canal regulation works, principles of design of distributory and head regulators. Canal Cross Regulators -canal outlets, types of canal modules, proportionality, sensitivity and flexibility. Cross Drainage works: types, selection of site,

Text books:
1. Irrigation engineering and hydraulic structures by S.K Garg, Khanna publishers.
2. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi

References:
1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
3. Irrigation engineering by K.R.Arora
5. Introduction to Hydrology by Warren Viessvann, Jr, Garyl. Lewis, PHI

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg. Professional Elective - III
L T P C
TRAFFIC ENGINEERING

4 1 0 4

Pre Requisites: Transportation Engineering

Course Objectives:
To provide engineering techniques to achieve the safe and efficient movement of people and goods on roadways.

Course Outcomes:
To provide engineering techniques to achieve the safe and efficient movement of people and goods on roadways.

Unit 1:
Traffic Studies (Part- I) : Basic principles of Traffic, Volume, Speed and Density; Definitions and their interrelationships; Traffic Volume studies - Objectives, Methods of Volume counts, Presentation of Volume Data; Speed studies- Types of Speeds, Objectives, Methods of speed studies, Statistical Methods for speed data Analysis, Presentation of speed data. Delay Studies; Headways and Gap Studies - Headway and Gap acceptance, Origin and Destination Studies.

Unit 2:
Traffic Studies (Part-II) : Parking Studies: parameters of parking, definitions, Parking inventory study, Parking survey by Patrolling method; Analysis of Parking Survey data; Accident studies- Causative factors of Road accidents, Accident data collection: Accident analysis and modeling;, Road Safety Auditing, Measures to increase Road safety.

Unit3:
Capacity and LOS Analysis: Introduction to Traffic capacity, Analysis concepts, Level of Service, Basic definitions, Factors affecting Capacity and LOS, Capacity of Urban/Rural Highway, With or without access control, Basic freeway segments - Service flow rate of LOS, Lane width or Lateral clearance adjustment; Heavy vehicle adjustment; Driver population adjustment.

Unit4:
Signal Designing – Fixed Time signals, Determination of Optimum Cycle length and Signal setting for Fixed Time signals, Warrants for Signals,
Time Plan Design for Pre-Timed Control- Lane group analysis, Saturation flow rate, and Adjustment factors, Uniform and Incremental Delay, Vehicle Actuated Signals, Signal Coordination.

Unit5:

References:
4. IRC Codes

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg. L T P C
Professional Elective - III
BRIDGE ENGINEERING

Pre Requisites:
Structural Engineering, Soil Mechanics & Foundation Engineering and Water Resources Engineering

Course Objectives:
To study different types of bridges, forces that act on bridges, Design of bridge

Course Outcomes:
To study different types of bridges, forces that act on bridges, Design of bridge.

UNIT-I
Introduction:
Definition, components of bridge, classification of bridges, selection of site, economical span, aesthetics consideration, necessary investigations and essential design data.

Standard Specifications for Roads and Railways Bridges:
General, Indian Road Congress Bridge Code, width of carriage way, clearance, various loads to be considered for the design of roads and railway bridges, detailed explanation of IRC standard live loads.

UNIT-II
Design Consideration for R. C. C. Bridges:
Various types of R.C.C. bridges (brief description of each type), design of R.C.C. culvert and T-beam bridges.

UNIT-III
Design Consideration for Steel Bridges:
Various types of steel bridges (brief description of each), design of truss and plate girder bridges.

UNIT-IV
Hydraulic & Structural Design:
Piers, abutments, wing-wall and approaches.
Brief Description: Bearings, joints, articulation and other details.
UNIT -V
Bridge Foundation:
Various types, necessary investigations and design criteria of well foundation.

Note for Paper-setter: EIGHT questions are to set selecting at least TWO questions from each unit, covering entire syllabus. Students will be required to attempt FIVE questions selecting at least ONE question from each unit.

Books:
Unit IV

Unit V

Text Books
1. Das, B. M. - Principles of Soil Dynamics, PWS KENT publishing Company, Boston.

References:
UNIT – IV
VECTOR DATA MODEL: Representation of simple features- Topology and its importance; coverage and its data structure; Shape file; Data models for composite features Object Based Vector Data Model; Classes and their Relationship; The geobase data model; Geometric representation of Spatial Feature and data structure, Topology rules

UNIT – V
RASTER DATA MODEL: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

DATA INPUT: Metadata, Conversion of Existing data, Creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing

TEXT BOOKS:
2 Introduction to Geographic Information System – Kang-Tsung Chang, Tata McGraw-Hill Education Private Limited

REFERENCES:
Text book:

References:
1. Liquid waste of Industry by Newmerow.

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg.

Professional Elective - IV

PAVEMENT DESIGN

Pre Requisites: Transportation Engineering

Course Objectives:
The study factors affecting pavement design, material characteristics , design of flexible, rigid pavements and low volume roads.

Course Outcomes: Able to design pavement

UNIT – I

UNIT – II

UNIT – III
UNIT - IV
Design Of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute’s Methods with HMA and other Base Combinations, AASHTO, IRC Methods

UNIT – V

Text Books:
2. Pavement Analysis & Design, Yang H. Huang, Prentice Hall Inc

References:
4. IRC Codes for Flexible and Rigid Pavements design
UNIT-V

TEXT BOOKS

REFERENCES:
1. Construction Management And Planning by: sengupta, b. /guha, h. tata mcgraw-hill publications
UNIT III

UNIT IV

UNIT V

TEXT BOOKS:
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

REFERENCES:
2. Earthquake Resistant Design of Building structures by Vinod Hosur, Wiley India Pvt. Ltd.
4. Masory and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros

Reference Codes:
UNIT V

TEXT BOOKS
2. Oza and Oza, “A course in Docks & Harbour Engineering”.

REFERENCES
5. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part . II) Earth Pressure.
7. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part . IV) General Design Consideration.

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg.  L T P C
3 1 0 4

Professional Elective - V
DESIGN AND DRAWING OF IRRIGATION STRUCTURES

Pre Requisites: WRE – I & II

Course Objectives:
Learn designing and drawing of hydraulic structure like surplus weir, siphon well drop, trapezoidal notch fall, tank sluice with tower head.

Course Outcomes:
Able to provide design & drawing of irrigation structures

Design and drawing of the following hydraulic structures.
Group A
1. Surplus weir.
2. Syphon Well Drop
3. Trapezoidal notch fall.
4. Tank sluice with tower head

Group B
1. Sloping glacis weir.
2. Canal regulator
4. Type III Syphon aqueduct

Final Examination pattern:
The Question paper is divided into two parts with two questions in each part. The student has to answer ONE question from each part. Part I should cover the designs and drawings from Group A for 45 marks and Part II should cover only designs from group B carrying 30 marks.

The duration of examination will be FOUR hours.

However, the students are supposed to practise the drawings for Group B structures also for internal evaluation.

Text books:

JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg.  L T P C
4 0 0 4

Professional Elective - V
GROUND IMPROVEMENT TECHNIQUES

Pre Requisites: Soil Mechanics & Foundation Engineering

Course Objectives:
If the ground is not suitable for construction at civil engg. Structures, that ground can be improved to make it suitable hence, to study the various ground improvement techniques and to suggest most effective technique for particular ground and structure.

Course Outcomes: Provide ground improvement techniques

Unit. I
Introduction to Engineering Ground Modification: Need and objectives, Identification of soil types, In situ and laboratory tests to characterise problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, etc. and their applications.

Unit. II

Unit. III

Unit. IV
Physical and Chemical Modification – Modification by admixtures, Shotcreting and Guniting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting, Jet grouting, Thermal Modification, Ground freezing.

Unit. V
Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, bar, mesh, sheet and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.
Text Books:
2. Mosley – Ground Improvemen

References:
3. Xanthakos, Abreimson and Bruce - Ground Control and Improvement

OPEN ELECTIVE- I
JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. Civil Engg

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OPEN ELECTIVE-I
DISASTER MANAGEMENT

Pre Requisites: NIL

Course Objectives:
The subject provides 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
Legislative Support at the state and national levels

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
JNTUH COLLEGE OF ENGINEERING HYDERABAD

B.Tech. EEE

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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
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B.Tech. EEE                        L   T   P   C
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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, bimetals 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.
OPERATIONS RESEARCH
OPEN ELECTIVE-I

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


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
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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

UNIT IV

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
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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

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

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 /
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

Unit-IV:
Recorders: X-Y Plotter, Curve tracer, Galvanometric Recorders, Servo transducers, pen driving mechanisms, Magnetic Recording, Magnetic recording techniques.

Unit-V:
Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Digital Temperature sensing system, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto Stritive Transducers.

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:

TEXT BOOKS:
1. Java the complete reference, 7th editon, 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:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

3 0 0 3

ENGINEERING MATERIALS
OPEN ELECTIVE-I

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:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

3 0 0 3

METALLURGY FOR NON METALLURGIST OPEN ELECTIVE-I

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
Introduction to water pollution – water pollutants classification – characteristics of liquid effluents from fertilizer, pulp & paper and petroleum industries, estimation of oxygen demands – DO, BOD, COD, TOC – BOD curves, oxygen sag curve – modeling of BOD curves


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
OPEN ELECTIVE-II
ESTIMATION, QUANTITY SURVEY & VALUATION

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

Course Objectives:
The subject provides the process of estimations required for various works 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
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

JNTUH COLLEGE OF ENGINEERING HYDERABAD

JET PROPULSION & ROCKET ENGINEERING  3 0 0 3
OPEN ELECTIVE-II

Prerequisites: None

Course outcomes:
After doing this course, student should be in position to
1. Understand Turbo Jet Propulsion System
2. Analyze the flight performance
4. Learn the Aero thermo chemistry of the combustion products
5. Understand the physics of Solid propellant rocket engine, Liquid Rocket Propulsion System & Ramjet and Integral Rocket Ramjet Propulsion System:

Unit - I:
Turbo Jet Propulsion System:
Gas turbine cycle analysis – layout of turbo jet engine. Turbo machinery-compressors and turbines, combustor, blade aerodynamics, engine off design performance analysis.

Flight Performance:
Forces acting on vehicle – Basic relations of motion – multi stage vehicles.

Unit - II:
Principles of Jet Propulsion and Rocketry:
Fundamentals of jet propulsion, Rockets and air breathing jet engines – Classification – turbo jet , turbo fan, turbo prop, rocket (Solid and Liquid propellant rockets) and Ramjet engines.

Nozzle Theory and Characteristics Parameters:
Theory of one dimensional convergent – divergent nozzles – aerodynamic choking of nozzles and mass flow through a nozzle – nozzle exhaust velocity – thrust, thrust coefficient, \( A_c / A_t \) of a nozzle, Supersonic nozzle shape, non-adapted nozzles, summer field criteria, departure from simple analysis – characteristic parameters – 1) characteristic velocity, 2) specific impulse 3) total impulse 4) relationship between the characteristic parameters 5) nozzle efficiency, combustion efficiency and overall efficiency.
Unit - III: Aero Thermo Chemistry of The Combustion Products:

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.

JNTUH COLLEGE OF ENGINEERING HYDERABAD


ERGONOMICS
OPEN ELECTIVE-II

Prerequisites: None

Objectives:
Provide a broad based introduction to ergonomic principles and their application in the design of work, equipment and the workplace. Consideration is given to musculo-skeletal disorders, manual handling, ergonomic aspects of the environment as well as to the social and legal aspects.

Course Outcomes:
On completing this course successfully the student will be able to:
• understand and apply ergonomic principles to the creation of safer, healthier and more efficient and effective activities in the workplace;
• understand ergonomic risk assessments and appropriate control measures;
• understand the causes of upper limb disorders and how to reduce them;
• appreciate workplace layout and equipment design;
• appreciate environmental aspects of good ergonomic design.

UNIT I

UNIT II
UNIT III
User, Centered 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

JNTUH COLLEGE OF ENGINEERING HYDERABAD

MECHATRONICS
OPEN ELECTIVE-II
3 0 0 3

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 -
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**:  
1. "Designing Intelligent Machines", open University, London.  
2. Michel B. Hirstand and David G. Alciatore,"  

**JNTUH COLLEGE OF ENGINEERING HYDERABAD**

**B.Tech. ECE.**  
**L T P C**  
3 0 0 3

**PRINCIPLES OF ELECTRONIC COMMUNICATIONS**  
OPEN ELECTIVE-II

**Prerequisite**: Nil

**Course Objectives**:  
The objective of this subject is to:
- Introduce the students to modulation and various analog and digital modulation schemes.
- They can have a broad understanding of satellite, optical, cellular, mobile, wireless and telecom concepts.

**Course Outcomes**:  
By completing this subject, the student can
- Work on various types of modulations.
- Should be able to use these communication modules in implementation.
- Will have a basic understanding of various wireless and cellular, mobile and telephone communication systems.

**Unit 1**:  
**Introduction**: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels.

**Unit 2**:  
**Simple description on Modulation**: Analog Modulation-AM, FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

**Unit 3**:  
**Telecommunication Systems**: Telephones Telephone system, Paging systems, Internet Telephony.

**Networking and Local Area Networks**: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

**Unit 4**:  
**Satellite Communication**: Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems.

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:
Relational Algebra: Selection and projection, set operations,
renaming, Joins, Division, Examples of Algebra overviews, Relational
calculus, Tuple relational Calculus, Domain relational calculus,
Expressive Power of Algebra and calculus.
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:
Transaction Concept, Transaction State, Implementation of Atomicity
and Durability, Concurrent Executions, Serializability, Recoverability,
Implementation of Isolation, Testing for serializability, Lock Based
Protocols, Timestamp Based Protocols, Validation- Based Protocols,
Multiple Granularity. Recovery and Atomicity, Log–Based Recovery,
Recovery with Concurrent Transactions, Buffer Management, Failure
with loss of nonvolatile storage, Advance Recovery systems, Remote
Backup systems.

UNIT V:
Data on External Storage, File Organization and Indexing, Cluster
Indexes, Primary and Secondary Indexes, Index data Structures,
Hash Based Indexing, Tree base Indexing, Comparison of File
Organizations, Indexes and Performance Tuning, Intuitions for tree
Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A
Dynamic Index Structure.

Text Books:
1. Database Management Systems, Raghurama Krishnan, Johannes
   Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V
   edition.

References:
1. Database Systems design, Implementation, and Management, Peter
   Education
3. Introduction to Database Systems, C.J. Date Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and
   PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson,
   Wiley Student Edition.
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

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:
1. **Cyber Security**: *Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Nina Godbole and Sunil Belapure, Wiley INDIA.

Reference book:

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**JNTUH COLLEGE OF ENGINEERING HYDERABAD**

**B.Tech. Met. Engg.**

**CORROSION ENGINEERING**

**OPEN ELECTIVE-II**

**Pre-requisites:** NIL

**Course Objectives:**
1. To demonstrate electrometallurgy principles in deposition winning and the efficiency of the bath.
2. To determine corrosion rate/ resistance of metals and alloys.
3. To explain corrosion protection methods and tests.

**Course Outcomes:**
At the end of the course the student will be able:
1. To gain knowledge in various types of electrolytic cells and the processes taking place in them.
2. To obtain knowledge about the importance of controlling corrosion and its prevention measures.
3. The course is useful for higher studies, R&D, and also for getting into jobs in industries.

**UNIT - I**
Introduction, Electro Chemistry principles, electrochemical reactions, Polarization, passivity, environmental effects (oxygen, oxidizers, velocity, temperature, corrosive concentration, Galvanic coupling).

**UNIT - II**

**UNIT - III**
Intergranular corrosion: Sensitization, weld decay, Knife-Line attack, Stress corrosion cracking; crack morphology, stress effects, environmental factors, metallurgical factors, Erosion corrosion: cavitation damage, fretting corrosion, Corrosion fatigue.
UNIT - IV

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:

JNTUH COLLEGE OF ENGINEERING HYDERABAD
TESTING OF MATERIALS
OPEN ELECTIVE-II

L T P C
3 0 0 3

Pre-requisites: NIL

Course Objectives:
1. To gain and understanding of the response of various metals under the application of stress and/or temperature.
2. To build necessary theoretical background of the role of lattice defects in governing both elastic and plastic properties of metals will be discussed.
3. Obtain a working knowledge of various hardness testing machines BHN, VHN, RHN
4. Obtain a working knowledge of creep and fatigue and analysis of data.

Course Outcomes:
At the end of the course the student will be able to:
1. Classify mechanical testing of ferrous and non-ferrous metals and alloys.
2. Recognize the importance of crystal defects including dislocations in plastic deformation.
3. Identify the testing methods for obtaining strength and hardness.
4. Examine the mechanisms of materials failure through fatigue and creep

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.

JNTUH COLLEGE OF ENGINEERING HYDERABAD
B.Tech. Chemical. Engg. OPEN ELECTIVE-II
L T P C 3 0 0 3
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.
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
Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

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-Buisiness benefits of ERP-The challenges of implementing ERP system-ERP modules and Historical Developement.
   Case: Response top 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- Demonstation of the system-Failure method-system Architecture & ERP (David L.Olson)
   Case: DataSolutions & Technology Knowledge (Mary Sumner).
4 ERP - sales and Marketing- Management control process in sales and marking-ERP custoemr relationship managment-ERP systems-
   Accounting & Fiance control processes. Fiancial modules in ERP systems.
   Case: atalantic manufacturing (Mary Sumner).
5 ERP – Producton and Material Managment-Control process on producion and manufacturing-Production module in ERP- supply chain Managmeent & e-market place-e-businesss & ERP-e supply chian & ERP- Future directions for ERP.
   Case: HR in atalntic manufacturing. (Mary Sumner).

Text Book:

References:
OPEN ELECTIVE-III
MANAGEMENT INFORMATION SYSTEM (MIS)

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
FUNDAMENTALS OF ROBOTICS
OPENELECTIVE -III

Pre-Requiests: 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
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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 converter 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  
**Heat pipes:** structure – operation - construction - thermal resistance - performance characteristics - effects of working fluid and operating temperature, wick - selection of material - pore size, applications.

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

**Reference books:**

**Pre-requisites:** None

**Outcomes:**
After the course student should be able to analyse conduction, convection and radiation heat transfer modes, heat generation, conduction and dissipation in electronically controlled units.

**UNIT -I**  
**Conduction Heat transfer:** Modes of heat transfer, Fourier’s law of steady state heat conduction (one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through composite walls and hollow cylinders and spheres with multi-layers, Convective heat transfer, Newton’s law of cooling, electrical analogy and overall heat transfer coefficient, numerical problems.

**UNIT - II**  
**Convective and radiation Heat transfer:** Dimensional analysis as a tool for experimental investigation, Buckingham pi theorem and method, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann’s law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff’s law, Wien’s displacement law, numerical problems.

**UNIT - III**  
**Cooling of Electronic equipment:** Introduction and history, manufacturing of electronic equipment, cooling load of electronic equipment, thermal environment, electronics cooling in different applications, conduction cooling, air cooling: natural convection and radiation, air cooling: forced convection, liquid cooling, immersion cooling, heat pipes, cooling of chips, PCBs, computers, logic chips etc.
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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 Servlets 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.
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.

Text books/ References:
3. Advanced techniques for surface engineering, W.Gissler, Herman A.Jehn, Kluwar Academy Publishers
4. Laser material processing, W.Steen, Springer
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

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.

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.
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