# ACADEMIC REGULATIONS (NR-23)

# COURSE STRUCTURE

# AND

# DETAILED SYLLABI

# FOR

## B.Tech Regular Four Year Degree Courses

(For the Batches Admitted From 2023-2024)

## &

## B. Tech (Lateral Entry Scheme)

(For the Batches Admitted From 2024-2025)

# CIVIL ENGINEERING

**NARSIMHA REDDY ENGINEERING COLLEGE**
**UGC AUTONOMOUS INSTITUTION**
Maisammaguda (V), Kompally - 500100, Secunderabad, Telangana state, India

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**UGC AUTONOMOUS INSTITUTION**

Maisammaguda (V), Kompally - 500100, Secunderabad, Telangana state, India

## ACADEMIC REGULATIONS (NR23) FOR B.TECH REGULAR STUDENTS

## WITH EFFECT FROM THE ACADEMIC YEAR 2023-24

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

NarsimhaReddy Engineering College (NRCM) offers a 4-year (8 semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year **2023-24.**

**2.0** **Eligibility for Admission**

**2.1** Admission to the undergraduate(UG) programme shall be made on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (EAMCET), subject to reservations as prescribedby the government from time to time.

**2.2** The medium of instructions for the entire undergraduate programme in Engineering & Technology will be **English** only.

**3.0** **B.Tech. Programme Structure**

**3.1** A student after securing admission shall complete the B.Tech. programme in a minimum period of **four** academic years (8 semesters), and a maximum period of**eight** academic years (16 semesters) starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech course. Each student shall secure 160 credits (with CGPA $\geq$ 5) required for the completion of the undergraduate programme and award of the B.Tech. degree.

**3.2** **UGC/ AICTE** specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms, which are listed below.

**3.2.1** **Semester Scheme**

Each undergraduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters of 22 weeks ($\geq$ 90 instructional days) each and in each semester - 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) indicated by UGC, and curriculum/course structure suggested by AICTE are followed.

### 3.2.2 Credit Courses

All subjects/ courses are to be registered by the student in a semester to earn credits which shall be assigned to each subject/ course in an L: T: P: C (lecture periods: tutorial periods: practical periods: credits) structure based on the following general pattern.

- One credit for one hour/ week/ semester for Theory/ Lecture (L) courses or Tutorials.

- One credit for two hours/ week/ semester for Laboratory/ Practical (P) courses.

Courses like Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization Lab are mandatory courses. These courses will not carry any credits.

### 3.2.3 Subject Course Classification

All subjects/ courses offered for the undergraduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows. The University has followed almost all the guidelines issued by AICTE/UGC.

| S. No. | Broad Course Classification | Course Group/ Category | Course Description |
|--------|------------------------------|------------------------|--------------------|
| 1 | Foundation Courses (FnC) | BS – Basic Sciences | Includes Mathematics, Physics and Chemistry subjects |
| 2 | | ES - Engineering Sciences | Includes Fundamental Engineering Subjects |
| 3 | | HS – Humanities and Social Sciences | Includes subjects related to Humanities, Social Sciences and Management |
| 4 | Core Courses (CoC) | PC – Professional Core | Includes core subjects related to the parent discipline/ department/ branch of Engineering. |
| 5 | Elective Courses (EℓC) | PE – Professional Electives | Includes elective subjects related to the parent discipline/ department/ branch of Engineering. |
| 6 | | OE – Open Electives | Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering. |
| 7 | Core Courses | Project Work | B.Tech. Project or UG Project or UG Major Project or Project Stage I & II |

| 8 | | Industry Training/ Internship/ Industry Oriented Mini-project/ Mini- Project/ Skill Development Courses | Industry Training/ Internship/ Industry Oriented Mini-Project/ Mini-Project/ Skill Development Courses |
|---|---|---|---|
| 9 | | Seminar | Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch of Engineering. |
| 10 | Minor Courses | - | 1 or 2 Credit Courses (subset of HS) |
| 11 | Mandatory Courses (MC) | - | Mandatory Courses (non-credit) |

### 4.0 Course Registration

**4.1** A 'faculty advisor or counselor' shall be assigned to a group of 20 students, who will advise the students about the undergraduate programme, its course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.

**4.2** The academic section of the college invites 'registration forms' from students before the beginning of the semester through 'on-line registration', ensuring 'date and time stamping'. The online registration requests for any 'current semester' shall be **completed before the commencement of SEEs (Semester End Examinations) of the 'preceding semester'**.

**4.3** A student can apply for **on-line** registration, **only after** obtaining the '**written approval**' from faculty advisor/counselor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with the Head of the Department, Faculty Advisor/ Counselor and the student.

**4.4** A student may be permitted to register for all the subjects/ courses in a semester as specified in the course structure with maximum additional subject(s)/course(s) limited to 6 Credits (any 2 elective subjects), based on **progress** and SGPA/ CGPA, and completion of the '**pre-requisites'** as indicated for various subjects/ courses, in the department course structure and syllabus contents.

**4.5** Choice for '**additional subjects/courses**', not more than any 2 elective subjects in any Semester, must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Mentor/HOD.

**4.6** If the student submits ambiguous choices or multiple options or erroneous entriesduring **online** 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.

**4.7** Subject/ course options exercised through **on-line** registration are final and **cannot** be changed or inter-changed; further, alternate choices also will not be considered.

However, if the subject/ course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any inevitable 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). Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within **a week** after the commencement of class-work for that semester.

**4.8** Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor 'within a period of 15 days' from the beginning of the current semester.

**4.9** **Open Electives**: The students have to choose three Open Electives (OE-I, II & III) from the list of Open Electives given by other departments. However, the student can opt for an Open Elective subject offered by his own (parent) department, if the student has not registered and not studied that subject under any category (Professional Core, Professional Electives, Mandatory Courses etc.) offered by parent department in any semester. Open Elective subjects already studied should not repeat/should not match with any category (Professional Core, Professional Electives, Mandatory Courses etc.) of subjects even in the forthcoming semesters.

**4.10** **Professional Electives**: The students have to choose six Professional Electives (PE-I to VI) from the list of professional electives given.

**5.0** **Subjects/ courses to be offered**

**5.1** A subject/ course may be offered to the students, **only if** a minimum of 15 students opt for it.

**5.2** More than **one faculty member** may offer the **same subject** (lab/ practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice for students will be based on - '**first come first serve** basis and CGPA criterion' (i.e. the first focus shall be on early **on-line entry** from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

**5.3** If more entries for registration of a subject come into picture, then the Head of the Department concerned shall decide, whether or not to offer such a subject/ course for **two (or multiple) sections**.

**5.4** In case of options coming from students of other departments/ branches/ disciplines (not considering **open electives**), first **priority** shall be given to the student of the '**parent department**'.

**6.0** **Attendance requirements:**

**6.1** A student shall be eligible to appear for the semester end examinations, if the student acquires a minimum of 75% of attendance in aggregate of all the subjects/ courses

(including attendance in mandatory courses like Environmental Science, Constitutionof India, Intellectual Property Rights, and Gender Sensitization Lab) for that semester. **Two periods** of attendance for each theory subject shall be considered, if the student appears for the mid-term examination of that subject.

**6.2** Shortage of attendance in aggregate upto 10% (65% and above, and below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

**6.3** A stipulated fee shall be payable for condoning of shortage of attendance.

**6.4** Shortage of attendance below 65% in aggregate shall in **NO** case be condoned.

**6.5** **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,** including all academic credentials (internal marks etc.) of that semester. **They will not be promoted to the next semester**. They may seek re-registration for all those subjects registered in that semester in which the student is detained, by seeking re-admission into that semesteras and when offered; 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 offeredin later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category.

**6.6** A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

**7.0** **Academic Requirements**

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in Item No. **6**.

**7.1** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if student secures not less than 35% (14 marks out of 40 marks) in the Continuous Internal Evaluation (CIE), not less than 35% (21 marks out of 60 marks) in the semester end examinations (SEE), and a minimum of 40% (40 marks out of 100 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 **'C'** grade or above in that subject/ course.

**7.2** A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship (or) Seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Industry Oriented Mini Project/Internship, or (ii) not make a presentation of the same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Real-time Research

Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship evaluations.

A student may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one reappearance' evaluation also, the student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

**7.3    Promotion Rules**

| S. No. | Promotion | Conditions to be fulfilled |
|--------|-----------|----------------------------|
| 1 | **First year first semester to first year second semester** | **Regular course of study of first year first semester.** |
| 2 | **First year second semester to Second year first semester** | **(i) Regular course of study of first year second semester.** <br> **(ii) Must have secured at least 20 creditsout of 40 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.** |
| 3. | **Second year first semester to Second year second semester** | **Regular course of study of second year first semester.** |
| 4 | **Second year second semester to Third year first semester** | **(i) Regular course of study of second year second semester.** <br> **(ii) Must have secured at least 48 creditsout of 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.** |
| 5 | **Third year first semester to Third year second semester** | **Regular course of study of third year first semester.** |
| 6 | **Third year second semester to Fourth year first semester** | **(i) Regular course of study of third yearsecond semester.** <br> **(ii) Must have secured at least 72 creditsout of 120 credits i.e., 60% credits up tothird year second semester from all the relevant and supplementary examinations, whether the student takes those examinations or not.** |
| 7 | **Fourth year first semester to Fourth year second semester** | **Regular course of study of fourth year first semester.** |

**7.4** A student (i) shall register for all courses/subjects covering 160 credits as specified and listed in the course structure, (ii) fulfills all the attendance and academic requirements for 160 credits, (iii) earn all 160 credits by securing SGPA $\geq$ 5.0 (in each semester), and CGPA $\geq$ 5 (at the end of 8 semesters), (iv) **passes all the mandatory courses,** to successfully complete the undergraduate programme. The performance of the student in these 160 credits shall be considered for the calculation of the final CGPA **(at the end of undergraduate programme),** and shall be indicated in the grade card / marks memo of IV-year II semester.

**7.5** If a student registers for '**extra subjects**' (in the parent department or other departments/branches of Engg.) other than those listed subjects totaling to 160 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 160 credits) will not be considered while calculating the SGPA and CGPA. For such '**extra subjects'** registered, percentage of marks and letter grade alone will be indicated in the grade card / marks memo as a performance measure, subject to completion of the attendance and academic requirements as stated in regulations Items 6 and 7.1 – 7.4 above.

**7.6** A student eligible to appear in the semester end examination for any subject/ course, but absent from it or failed (thereby failing to secure **'C'** grade or above) may reappear for that subject/ course in the supplementary examination as and when conducted. In such cases, 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 performance in that subject.

**7.7** A student **detained in a semester due to shortage of attendance may be re- admitted in the same semester in the next academic year for fulfillment of academic requirements**. The academic regulations under which a student has been re-admitted shall be applicable. Further, no grade allotments or SGPA/ CGPA calculations will be done for the entire semester in which the student has been detained.

**7.8** A student detained **due to lack of credits, shall be promoted to the next academic year only after acquiring the required number of academic credits.** The academic regulations under which the student has been readmitted shall be applicable to him.

**8.0** **Evaluation - Distribution and Weightage of Marks**

**8.1** The performance of a student in every subject/course (including practicals and Project Stage – I & II) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination).

**8.2** In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each Mid-Term examination consists of two parts i) **Part – A** for 10 marks, ii) **Part – B** for 20 marks with a total duration of 2 hours as follows:

1. Mid Term Examination for 30 marks:
   a. Part - A : Objective/quiz paper for 10 marks.
   b. Part - B : Descriptive paper for 20 marks.

The objective/quiz paper is set with multiple choice and fill-in the blanks type of questions for a total of 10 marks. The descriptive paper shall contain 6 full questions out of which, the student has to answer one question from each unit with either or choice with a weightage of 8M from Unit-1, 8M from Unit-2, 4M from Unit-3 for Mid-1 Examination and 4M from Unit-3, 8M from Unit-4, 8M from Unit-5 for Mid-2 Examination. The **average of the two Mid Term Examinations** shall be taken as the final marks for Mid Term Examination (for 30 marks).

The remaining 10 marks of Continuous Internal Evaluation are distributed as:

2. Assignment for 5 marks. (**Average of 2 Assignments** each for 5 marks)
3. Subject Viva-Voce/PPT/Poster Presentation/Case Study/Tech-Talk on a topic in the concerned subject for 5 marks.

While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus.

Five (5) marks are allocated for assignments (as specified by the subject teacher concerned). The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the subject concerned for 5 marks before II Mid-Term Examination.

- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

*The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.*

*In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.*

There is NO Computer Based Test (CBT) for NR23 regulations.

The details of the end semester question paper pattern are as follows:

**8.2.1** The semester end examinations (SEE), for theory subjects, will be conducted for 60 marks consisting of two parts viz. i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from allunits carrying equal marks.

- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from each unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there willbe two questions from each unit and the student should answer either of the two questions.

- The duration of Semester End Examination is 3 hours.

**8.2.2** For the subject, **Computer Aided Engineering Graphics**, the Continuous Internal Evaluation (CIE) and Semester End Examinations (SEE) evaluation pattern is same as for other theory subjects.

**8.3** For practical subjects there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and 60 marks for semester end examination. Out of the 40 marks for internal evaluation:

1. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks
2. **10 marks for viva-voce** (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
3. Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 10 marks.
4. The remaining 10 marks are for Laboratory Report/Project and Presentation, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination shall be conducted with an external examiner and the laboratory teacher. The external examiner shall be appointed from the other colleges which will be decided by the Principal of the College.

In the Semester End Examination held for 3 hours, total 60 marks are divided and allocated as shown below:

1. 10 marks for write-up
2. 15 for experiment/program
3. 15 for evaluation of results
4. 10 marks for presentation on another experiment/program in the same laboratory course and
5. 10 marks for viva-voce on concerned laboratory course.

- The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and Over all

40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

*The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.*

*In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.*

**8.4** The evaluation of courses having ONLY internal marks in I Year I Semester and IIYear II Semester is as follows:

1. I Year I Semester course (*ex., **Elements of CE/ME/EEE/ECE/CSE** etc*): The internal evaluation is for 100 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The sum of the two Mid-Term examinations is the final for 100 marks. Student shall have to earn 40%, i.e 40 marks out of 100 marks. There shall be NO external evaluation. The student is deemed to have failed, if he (i) is absent as per schedule,or (ii) secures less than 40% marks in this course.

   **For CSE/IT and allied branches and Mining Engineering**, the Continuous Internal Evaluation (CIE) will be for 100 marks (i.e., Each Mid-Term examination 50 marks). Each Mid-Term examination consists of two parts i) **Part–A** for 20 marks, ii) **Part–B** for 20 marks with a total duration of 2 hours.

   **Part A:** Objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 20 marks. **Part B:** Descriptive paper shall contain 6 full questions out of which, the student has to answer one question from each unit with either or choice with a weightage of 8M from Unit-1, 8M from Unit-2, 4M from Unit-3 for Mid-1 Examination and 4M from Unit-3, 8M from Unit-4, 8M from Unit-5 for Mid-2 Examination.

   The remaining 10 marks of Continuous Internal Evaluation are for Assignment (5 marks) and Subject Viva-Voce/PPT/Poster Presentation/ Case Study (5 marks).

   **For all other branches,** the Continuous Internal Evaluation (CIE) will be for 100 marks. Out of the 100 marks for internal evaluation:

   a) A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 20 marks
   b) **20 marks for viva-voce (**or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
   c) Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 30 marks.
   d) The remaining 30 marks are for Laboratory Report/Project and Presentation, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be

evaluated after completion of laboratory course and before semester end practical examination.

2. II Year II Semester *Real-Time (or) Field-based Research Project* course: The internal evaluation is for 100 marks and it shall take place during I Mid-Term examination and II Mid-Term examination. The sum of two Mid-Term examinations is the final for 100 marks. Student shall have to earn 40%, i.e 40 marks out of 100 marks from the sum of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the internal committee as per schedule, or (ii) secures less than 40% marks in this course.

**8.5** There shall be an Industry training (or) Internship (or) Industry oriented Mini-project (or) Skill Development Courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project in collaboration with an industry of their specialization. Students shall register for this immediately after II-Year II Semester Examinations and pursue it during summer vacation/semester break & during III Year without effecting regular course work. Internship at reputed organization (or) Skill development courses (or) Paper presentation in reputed journal (or) Industry Oriented Mini Project shall be submitted in a report form and presented before the committeein III-year II semester before end semester examination. It shall be evaluated for 100 external marks. The committee consists of an External Examiner, Head of the Department, Supervisor of the Industry Oriented Mini Project (or) Internship etc, Internal Supervisor and a Senior Faculty Member of the Department. There shall be **NO internal marks** for Industry Training (or) Internship (or) Mini-Project (or) Skill Development Courses (or) Paper Presentation in reputed journal (or) Industry Oriented Mini Project.

**8.6** The UG project shall be initiated at the end of the IV Year I Semester and the duration of the project work is one semester. The student must present Project Stage – I during IV Year I Semester before II Mid examinations, in consultation with his Supervisor,the title, objective and plan of action of his Project work to the departmental committee for approval before commencement of IV Year II Semester. Only after obtaining the approval of the departmental committee, the student can start his project work.

**8.7** UG project work shall be carried out in two stages: Project Stage – I for approval of project before Mid-II examinations in IV Year I Semester and Project Stage – IIduring IV Year II Semester. Student has to submit project work report at the end of IV Year II Semester. The project shall be evaluated for 100 marks before commencement of SEE Theory examinations.

**8.8** For Project Stage – I, the departmental committee consisting of Head of the Department, project supervisor and a senior faculty member shall approve the project work to begin before II Mid-Term examination of IV Year I Semester. The student is deemed to be not eligible to register for the Project work, if he does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he fails in such 'one reappearance' evaluation also, he has toreappear for the same in the next subsequent semester, as and when it is scheduled.

**8.9** For Project Stage – II, the external examiner shall evaluate the project work for 60 marks and the internal project committee shall evaluate it for 40 marks. Out of 40 internal marks, the departmental committee consisting of Head of the Department,Project Supervisor and a Senior Faculty Member shall evaluate the project work for20 marks and Project Supervisor shall evaluate for 20 marks. The topics for Industry Oriented Mini Project/ Internship/SDC etc. and the main Project shall be different from the topic already taken. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same beforethe External Examiner as per schedule, or (iii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

For conducting viva-voce of project, Principal selects an external examiner from the list of experts in the relevant branch submitted by the Head of the Department.

A student who has failed, may reappear once for the above evaluation, when it is scheduled again; if student 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.

**8.10** A student can re-register for subjects in a semester:

- If the internal marks secured by a student in the Continuous Internal Evaluation marks for 40 (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva- voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject) are less than 35% and failed in those subjects.

They may seek re-registration for all those subjects registered in that semester in which the student is failed. The student has to re-appear for CIE and SEE as and when offered.

A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the classwork in next academic year. His Continuous Internal Evaluation marks for 40 obtained in the previous attempt stand cancelled. The student has to obtain fresh set of marks for 40 allotted for CIE (Sum of average oftwo mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva-voce/PPT/ Poster presentation/ Case Study on a topic in the concerned subject). Head of the Dept. will take care of this.

**8.11** For mandatory courses of Environmental Science, Constitution of India, Intellectual Property Rights, and Gender Sensitization lab, a student has to secure 40 marks out of 100 marks (i.e. 40% of the 100 marks allotted) in the Continuous Internal Evaluation

for passing the subject/course. These marks should also be uploaded along with the internal marks of other subjects.

**8.12** No marks or letter grades shall be allotted for mandatory/non-credit courses. Only Pass/Fail shall be indicated in Grade Card.

**9.0 Grading Procedure**

**9.1** Grades will be awarded to indicate the performance of students in each Theory Subject, Laboratory/Practicals/ Industry-Oriented Mini Project/Internship/SDC and Project Stage. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade shall be given.

**9.2** As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed:

| % of Marks Secured in a Subject/Course (Class Intervals) | Letter Grade (UGC Guidelines) | Grade Points |
|---|---|---|
| Greater than or equal to 90% | O (Outstanding) | 10 |
| 80 and less than 90% | $A^+$ (Excellent) | 9 |
| 70 and less than 80% | A (Very Good) | 8 |
| 60 and less than 70% | $B^+$ (Good) | 7 |
| 50 and less than 60% | B (Average) | 6 |
| 40 and less than 50% | C (Pass) | 5 |
| Below 40% | F (FAIL) | 0 |
| Absent | Ab | 0 |

**9.3** A student who has obtained an '**F'** grade in any subject shall be deemed to have '**failed'** and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier.

**9.4** To a student who has not appeared for an examination in any subject, '**Ab'** grade will be allocated in that subject, and he is deemed to have '**Failed'**. A student will be required to reappear as a 'supplementary student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.

**9.5** A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

**9.6** A student earns Grade Point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'Credit Points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

**Credit Points (CP) = Grade Point (GP) x Credits …. For a course**

**9.7** A student passes the subject/ course only when $GP \geq 5$ (**'C' grade or above**)

**9.8** The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points ($\Sigma CP$) secured from all subjects/ courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to **two** decimal places. SGPA is thus computed as

$$SGPA = \{ \sum_{i=1}^{N} C_i \, G_i \} / \{ \sum_{i=1}^{N} C_i \} \text{ …. For each semester},$$

where 'i' is the subject indicator index (considering 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), $C_i$ is the no. of credits allotted to the $i^{th}$ subject, and $G_i$ represents the grade points (GP) corresponding to the letter grade awarded for that $i^{th}$ subject.

**9.9** The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in **all** registered courses (of 160) in **all** semesters, and the total number of credits registered in **all** the semesters. CGPA is rounded off to **two** decimal places. CGPA is thus computed from the I year II semester onwards at the end of each semester as per the formula

$$CGPA = \{ \sum_{j=1}^{M} C_j \, G_j \} / \{ \sum_{j=1}^{M} C_j \} \text{ … for all S semesters registered}$$

**(i.e., up to and inclusive of S 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'** i.e., from the $1^{st}$ semester onwards up to and inclusive of the $8^{th}$ semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 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, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

**Illustration of calculation of SGPA:**

| Course/Subject | Credits | Letter Grade | Grade Points | Credit Points |
|---|---|---|---|---|
| Course 1 | 4 | A | 8 | 4 x 8 = 32 |
| Course 2 | 4 | O | 10 | 4 x 10 = 40 |

| | | | | |
|---|---|---|---|---|
| Course 3 | 4 | C | 5 | 4 x 5 = 20 |
| Course 4 | 3 | B | 6 | 3 x 6 = 18 |
| Course 5 | 3 | A+ | 9 | 3 x 9 = 27 |
| Course 6 | 3 | C | 5 | 3 x 5 = 15 |
| | 21 | | | 152 |

$$SGPA = 152/21 = 7.24$$

**Illustration of Calculation of CGPA up to 3rd Semester:**

| Semester | Course/ Subject Title | Credits Allotted | Letter Grade Secured | Corresponding Grade Point (GP) | Credit Points (CP) |
|---|---|---|---|---|---|
| I | Course 1 | 3 | A | 8 | 24 |
| I | Course 2 | 3 | O | 10 | 30 |
| I | Course 3 | 3 | B | 6 | 18 |
| I | Course 4 | 4 | A | 8 | 32 |
| I | Course 5 | 3 | A+ | 9 | 27 |
| I | Course 6 | 4 | C | 5 | 20 |
| II | Course 7 | 4 | B | 6 | 24 |
| II | Course 8 | 4 | A | 8 | 32 |
| II | Course 9 | 3 | C | 5 | 15 |
| II | Course 10 | 3 | O | 10 | 30 |
| II | Course 11 | 3 | B+ | 7 | 21 |
| II | Course 12 | 4 | B | 6 | 24 |
| II | Course 13 | 4 | A | 8 | 32 |
| II | Course 14 | 3 | O | 10 | 30 |
| III | Course 15 | 2 | A | 8 | 16 |
| III | Course 16 | 1 | C | 5 | 5 |
| III | Course 17 | 4 | O | 10 | 40 |
| III | Course 18 | 3 | B+ | 7 | 21 |
| III | Course 19 | 4 | B | 6 | 24 |
| III | Course 20 | 4 | A | 8 | 32 |
| III | Course 21 | 3 | B+ | 7 | 21 |
| | **Total Credits** | **69** | | **Total Credit Points** | **518** |

**CGPA = 518/69 = 7.51**

The calculation process of CGPA illustrated above will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech programme.

**9.10** For merit ranking or comparison purposes or any other listing, **only** the '**rounded off**' values of the CGPAs will be used.

**9.11** SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA shall be mentioned only on the Memorandum of Grades in which sittinghe passed his last exam in that semester. However, mandatory courses will not be taken into consideration.

**10.0 Passing Standards**

**10.1** A student shall be declared successful or 'passed' in a semester, if he secures a GP $\geq 5$ ('**C**' grade or above) in every subject/course in that semester (i.e. when the student gets an SGPA $\geq 5.0$ at the end of that particular semester); and he shall be declared successful or 'passed' in the entire undergraduate programme, only when gets a CGPA $\geq 5.00$ ('**C**' grade or above) for the award of the degree as required.

**10.2** After the completion of each semester, a grade card or grade sheet 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. ofcredits, grade earned, etc.) and credits earned. **There is NO exemption of credits in any case.**

**11.0 Declaration of results**

**11.1** Computation of SGPA and CGPA are done using the procedure listed in 9.6 to 9.9.

**11.2** For final percentage of marks equivalent to the computed final CGPA, the following formula may be used.

$$\% \text{ of Marks} = (\text{final CGPA} - 0.5) \times 10$$

**12.0 Award of Degree**

**12.1** A student who registers for all the specified subjects/ courses as listed in the course structure and secures the required number of 160 credits (with CGPA $\geq 5.0$), within 8 academic years from the date of commencement of the first academic year, shall be declared to have '**qualified**' for the award of B.Tech. degree in the branch of Engineering 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 beplaced in the following classes.

**12.3** A student with final CGPA (at the end of the undergraduate programme) > 8.00, and fulfilling the following conditions - shall be placed in '**First Class with Distinction**'. However, he

(i) Should have passed all the subjects/courses in '**First Appearance**' within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.

(ii)     Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason.

A student not fulfilling any of the above conditions with final CGPA > 8 shall be

placed in **'First Class'.**

**12.4**    Students with final CGPA (at the end of the undergraduate programme) $\geq$ 7.0 but <

8.00 shall be placed in **'First Class'.**

**12.5**    Students with final CGPA (at the end of the undergraduate programme) $\geq$ 6.00 but < 7.00, 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 undergraduate programme) $\geq$ 5.00 but <  6,  shall be placed in '**pass class**'.

**12.7**    A student with final CGPA (at the end of the undergraduate programme) < 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 for award of '**Gold Medal**'.

**12.9    Award of 2-Year B.Tech. Diploma Certificate**

*1.* A student is awarded 2-Year UG Diploma Certificate in the concerned engineering branch on completion of all the academic requirements and earned all the 80 credits (within 4 years from the date of admission) upto B.Tech. II Year II Semester, if the student want to exit the 4-Year B.Tech. program and *requests for the 2 -Year* B. Tech. (*UG) Diploma Certificate.*

*2.* The student **once opted and awarded 2-Year UG Diploma Certificate, the student will be permitted to join** in B. Tech. III Year I Semester and continue for completion of remaining years of study for 4-Year B.  Tech. Degree ONLY in the next academic year along with next batch students. *However, if any student wishesto continue the study after opting for exit, he/she should register for the subjects/courses in III Year I Semester before commencement of classwork for that semester.*

*3. The students, who exit the 4-Year B. Tech. program after II Year of study and wish to re-join the B.Tech. program, must submit the 2 -Year* B. Tech. (*UG) Diploma Certificate awarded to him, subject to the eligibility for completion of Course/Degree.*

4. A student may be permitted to take one year break after completion of II Year II Semester or B. Tech. III Year II Semester (with the permission of college Academic Committee well in advance) and can re-enter the course in **next Academic Year in the same college** and complete the course on fulfilling all the academic credentials within a stipulated duration i.e. double the duration of the course (Ex. within 8 Years for 4-Year program).

**13.0    Withholding of results**

**13.1**    If the student has not paid the fees to the College at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result ofthe student may be withheld, and the student 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**

A.  For students detained due to shortage of attendance:

1.  A student who has been detained in any semester of I, II, III and IV years of NR21 regulations for want of attendance, shall be permitted to join the corresponding semester of NR23 Regulations and is  required  to  complete  the study of B.Tech. within the stipulated period of eight academic years from  the date of first admission in I Year. The NR23 Academic Regulations under which a student has been readmitted shall be applicable to that  student  from  that semester. See rule (C) for further Transitory Regulations.

B.  For students detained due to shortage of credits:

1.  A student of NR21 Regulations who has been detained due to lack of credits, shall be promoted to the next semester of NR23 Regulations only after acquiring the required number of credits as per the corresponding regulations of his/her first admission. The total credits required are 160 including both NR21 & NR23 regulations. The student is required to complete the study of B.Tech. within the stipulated period of eight academic years from the year of first admission. The NR23 Academic Regulations are applicable to a student from the year of readmission. See rule (C) for further Transitory Regulations.

C.  For readmitted students in NR23 Regulations:

1.  A student who has failed in any subject under any regulation has to pass those subjects in the same regulations.

2.  The maximum credits that a student acquires  for the  award  of  degree, shall  be the sum of the total number of credits secured in all  the regulations of his/her study including NR23 Regulations. **There is  NO exemption of  credits in any case**.

3.  If a student is readmitted to NR23 Regulations and has any subject with 80% of syllabus common with his/her previous regulations,  that  particular  subject  in NR23 Regulations will be substituted by another subject to be suggested by the College.

Note: If a student readmitted to NR23 Regulations and has not studied any subjects/topics in his/her earlier regulations of study which is prerequisite for further subjects in N R23

Regulations, the Head of the department concerned shall conduct remedial classes to cover those subjects/topics for the benefit of the students.

**15.0    Student Transfers**

**15.1**    There shall be no branch transfers after the completion of admission process.

**15.2**    The students seeking transfer to NRCM from various other Universities/institutions have to pass the failed subjects which are equivalent to the subjects of NRCM of NR23 regulation, and also pass the subjects of NRCM which the students have not studied at the earlier institution. Further, though the students have passed some of the subjects at the earlier institutions, if the same subjects are prescribed in different semesters of NRCM, the students have to study those subjects in NRCM in spite ofthe fact that those subjects are repeated.

**15.3**    The colleges will provide one chance to write the internal examinations in the **equivalent subject(s)** to the students transferred from other universities/institutions to NRCM who are on rolls, as per the clearance (equivalence) letter issued by the Academic Committee.

**16.0     Scope**

**16.1**    The academic regulations should be read as a whole, for the purpose of any interpretation.

**16.2**    In case of any doubt or ambiguity in  the interpretation of the above  rules, the decision of the Principal is final.

**16.3**    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.

**16.4**    Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

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# NARSIMHAREDDY ENGINEERING COLLEGE
## UGC AUTONOMOUS INSTITUTION
Maisammaguda (V), Kompally - 500100, Secunderabad, Telangana state, India

## ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME) FROM THE AY 2024-25

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

   The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.

2. The student shall register for 120 credits and secure 120 credits with CGPA ≥ 5 from II year to IV-year B.Tech. programme (LES) for the award of B.Tech. degree.

3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.

4. The attendance requirements of B. Tech. (Regular) shall be applicable to B.Tech.(LES).

5. **Promotion rule**

| S. No | Promotion | Conditions to be fulfilled |
|---|---|---|
| 1 | Second year first semester to second year second semester | Regular course of study of second year first semester. |
| 2 | Second year second semester to third year first semester | (i) Regular course of study of second year second semester.<br><br>(ii) Must have secured at least 24 credits out of 40 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not. |
| 3 | Third year first semester to third year second semester | Regular course of study of third year first semester. |
| 4 | Third year second semester to fourth year first semester | (i) Regular course of study of third year second semester.<br><br>(ii) Must have secured at least 48 credits out of 80 credits i.e., 60% credits up to |

| | | **third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.** |
|---|---|---|
| **5** | **Fourth year first semester to fourth year second semester** | **Regular course of study of fourth year first semester.** |

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

7. **LES students are not eligible for 2-Year B. Tech. Diploma Certificate.**

**✷✷✷✷**

# Malpractices Rules

# Disciplinary Action For / Improper Conduct in Examinations

| | Nature of Malpractices/Improper conduct | Punishment |
|---|---|---|
| | If the student: | |
| 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 student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination) | Expulsion from the examination hall and cancellation of the performance in that subject only. |
| (b) | Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter. | Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him. |
| 2. | Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The hall ticket of the student is to be cancelled. |
| 3. | Impersonates any other student in connection with the examination. | The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student 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 student is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is anoutsider, he will be handed over to the policeand a case is registered against him. |
| 4. | Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book oradditional sheet, during or after theexamination. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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 student is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. |
| 5. | Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks. | Cancellation of the performance in that subject. |
| 6. | Refuses to obey the orders of the chief superintendent/assistant – superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of | In case of students of the college, they shall be expelled from examination halls andcancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them. |

| | | |
|---|---|---|
| | 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. | |
| 7. | Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall. | Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student 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 student is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. |
| 8. | Possesses any lethal weapon or firearm in the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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 student is also debarred and forfeits the seat. |
| 9. | If student of the college, who is not a student 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. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student 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 student is also debarred and forfeits the seat.<br><br>Person(s) who do not belong to the college will be handed over to the police and, a police case will be registered against them. |
| 10. | Comes in a drunken condition to the examination hall. | Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared for including practical examinations |

| | | |
|---|---|---|
| | | and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. |
| 11. | Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny. | Cancellation of the performance in that subject and all other subjects the student has appeared for including practical examinations and project work of that semester/year examinations. |
| 12. | If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College Malpractice committee for further action to award a suitable punishment. | |

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NARSIMHA REDDY ENGINEERING COLLEGE
UGC AUTONOMOUS INSTITUTION
Maisammaguda (V), Kompally - 500100, Secunderabad, Telangana state, India

Accredited by NBA & NAAC with 'A' Grade
Approved by AICTE
Permanently affiliated to JNTUH

# INSTITUTION VISION

To produce competent professionals who can contribute to the industry, research and societal benefits with environment consciousness and ethical Values.

# INSTITUTION MISSION

- Adapt continuous improvements in innovative teaching-learning practices and state-of-the- art infrastructure to transform students as competent professionals and entrepreneurs in multi-disciplinary fields.
- Develop an innovative ecosystem with strong involvement and participation of students and faculty members.
- Impart National development spirit among the students to utilize their knowledge and skills for societal benefits with ethical values.

# DEPARTMENT VISION

To impart knowledge and excellence in Civil Engineering and technology with global perspectives to our students and to make them ethically strong engineers to build our nation.

# DEPARTMENT MISSION

- To make the department a center of excellence in the field of civil engineering and allied research.
- To provide knowledge base and consultancy services to the society in all areas of civil engineering.
- To promote innovative and original thinking in the budding engineers to face the challenges of the future.

# PROGRAM OUTCOMES (POs)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

**PEO 1**: To produce students who can excel in civil engineering profession or higher education by acquiring thorough knowledge in mathematical, computing and engineering concepts.

**PEO 2**: To produce students who can apply their knowledge and skills to real life problems thereby not only rendering safe and economical structures against natural calamities but also environmentally sustainable and useful to the society.

**PEO 3**: Mould and groom students to exhibit professional attitude, ethical behavior, ability to communicate effectively with everyone and adapt to the latest developments and trends by engaging themselves in life-long learning.

**PEO 4**: Graduates will have awareness of contemporary professional issues and support the engineering profession through participation in professional societies and/or educational institutions

## PROGRAM SPECIFIC OBJECTIVES (PSOs)

**PSO1**: Graduates of this program will be able to demonstrate that they can meet the needs of society in the design and execution of quality construction work that is in accordance with standards and takes into account health and safety considerations as well as cultural, societal, and environmental considerations.

**PSO2:** After gaining knowledge of building analysis through the use of various software packages, the graduates will be able to analyses and design both simple and complex engineering structures.

**PSO3**: Graduates will be able to work effectively as individuals or as part of teams, having acquired skills in leadership, research-based thinking, and the ability to manage projects in environments requiring knowledge from multiple disciplines.

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Maisammaguda (V), Kompally - 500100, Secunderabad, Telangana state, India

Accredited by NBA & NAAC with 'A' Grade
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## B Tech in CIVIL ENGINEERING
### COURSE STRUCTURE & SYLLABUS (NR23 Regulations)
### Applicable from AY 2023-24 Batch

### I YEAR I SEMESTER

| S.No. | Course Code | Course Title | C | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---|---------|
| 1 | 23MA101 | Matrices and Calculus | BS | 3 | 1 | 0 | 4 |
| 2 | 23CH102 | Engineering Chemistry | BS | 3 | 1 | 0 | 4 |
| 3 | 23EN103 | English for Skill Enhancement | HS | 2 | 0 | 0 | 2 |
| 4 | 23ME104 | Engineering Mechanics | ES | 3 | 0 | 0 | 3 |
| 5 | 23CS105 | Programming for Problem Solving | ES | 3 | 0 | 0 | 3 |
| 6 | 23EN106 | English Language And Communication Skills Laboratory | BS | 0 | 0 | 2 | 1 |
| 7 | 23CS107 | Programming for Problem Solving Laboratory | ES | 0 | 0 | 2 | 1 |
| 8 | 23CH108 | Engineering Chemistry Laboratory | BS | 0 | 0 | 2 | 1 |
| 9 | 23CE109 | Elements of Civil Engineering | ES | 0 | 0 | 2 | 1 |
| | | Induction Program | - | - | - | - | - |
| | | **Total** | | **15** | **1** | **08** | **20** |

### I YEAR II SEMESTER

| S.No. | Course Code | Course Title | C | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---|---------|
| 1 | 23MA201 | Ordinary Differential Equations and Vector Calculus | BS | 3 | 1 | 0 | 4 |
| 2 | 23PH202 | Applied Physics | BS | 3 | 1 | 0 | 4 |
| 3 | 23ME203 | Computer Aided Engineering Graphics | ES | 1 | 0 | 4 | 3 |
| 4 | 23CE204 | Surveying | ES | 2 | 0 | 0 | 2 |
| 5 | 23PH205 | Applied Physics Laboratory | BS | 0 | 0 | 3 | 1.5 |
| 6 | 23CS206 | Python Programming Laboratory | ES | 1 | 0 | 2 | 2 |
| 7 | 23CE207 | Surveying Laboratory – I | ES | 0 | 0 | 2 | 1 |
| 8 | 23ME208 | Engineering Work shop | ES | 1 | 0 | 3 | 2.5 |
| | | **Total** | | **31** | **2** | **10** | **20** |

### II YEAR I SEMESTER

| S.No. | Course Code | Course Title | C | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---|---------|
| 1 | 23MA302 | Probability and Statistics | BS | 3 | 1 | 0 | 4 |
| 2 | 23CE302 | Building Materials, Construction and Planning | PC | 3 | 0 | 0 | 3 |
| 3 | 23CE303 | Engineering Geology | PC | 3 | 0 | 0 | 3 |
| 4 | 23CE304 | Strength of Materials–I | PC | 3 | 0 | 0 | 3 |
| 5 | 23CE305 | Fluid Mechanics | PC | 3 | 0 | 0 | 3 |
| 6 | 23CE306 | Surveying Laboratory-II | PC | 0 | 1 | 2 | 2 |
| 7 | 23CE307 | Strength of Materials Laboratory | PC | 0 | 0 | 2 | 1 |
| 8 | 23CE308 | Computer Aided Drafting Laboratory | PC | 0 | 0 | 2 | 1 |
| 9 | *MC3002 | Constitution of India | MC | 3 | 0 | 0 | 0 |
| | | **Total** | | **18** | **02** | **06** | **20** |

**II YEAR II SEMESTER**

| S.No. | Course Code | Course Title | C | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---|---------|
| 1 | 23EE401 | Basic Electrical and Electronics Engineering | ES | 3 | 0 | 0 | 3 |
| 2 | 23CE402 | Concrete Technology | PC | 3 | 0 | 0 | 3 |
| 3 | 23CE403 | Strength of Materials–II | PC | 3 | 0 | 0 | 3 |
| 4 | 23CE404 | Hydraulics and Hydraulics Machinery | PC | 3 | 0 | 0 | 3 |
| 5 | 23CE405 | Structural Analysis-I | PC | 3 | 0 | 0 | 3 |
| 6 | 23EE406 | Basic Electrical and Electronics Engineering Laboratory | ES | 0 | 0 | 2 | 1 |
| 7 | 23CE407 | Fluid Mechanics and Hydraulics Machinery Laboratory | PC | 0 | 0 | 2 | 1 |
| 8 | 23CE408 | Concrete Technology Laboratory | PC | 0 | 0 | 2 | 1 |
| 9 | 23CE409 | Real-time Research Project/Field-Based Project | PS | 0 | 0 | 4 | 2 |
| 10 | *MC4002 | Gender Sensitization Laboratory | MC | 0 | 0 | 2 | 0 |
| | | **Total** | | **15** | **0** | **12** | **20** |

**III YEAR I SEMESTER**

| S.No. | Course Code | Course Title | C | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---|---------|
| 1 | 23CE501 | Structural Analysis- II | PC | 3 | 0 | 0 | 3 |
| 2 | 23CE502 | Geotechnical Engineering | PC | 3 | 0 | 0 | 3 |
| 3 | 23CE503 | Structural Engineering-I(RCC) | PC | 3 | 0 | 0 | 3 |
| 4 | 23MB504 | Business Economics & Financial Analysis | HS | 3 | 0 | 0 | 3 |
| 5 | 23CE505 | Transportation Engineering | PC | 3 | 0 | 0 | 3 |
| 6 | 23CE506 | Water Resources Engineering-I | PC | 3 | 0 | 0 | 3 |
| 7 | 23CE507 | Transportation Engineering Laboratory | PC | 0 | 0 | 2 | 1 |
| 8 | 23CE508 | Geotechnical Engineering Laboratory | PC | 0 | 0 | 2 | 1 |
| 9 | *MC5001 | Intellectual Property Rights | MC | 3 | 0 | 0 | 0 |
| | | **Total** | | **21** | **0** | **4** | **20** |

**III YEAR II SEMESTER**

| S.No. | Course Code | Course Title | C | L | T | P | Credits |
|-------|-------------|--------------|---|---|---|---|---------|
| 1 | 23CE601 | Environmental Engineering | PC | 3 | 0 | 0 | 3 |
| 2 | 23CE602 | Foundation Engineering | PC | 3 | 0 | 0 | 3 |
| 3 | 23CE603 | Structural Engineering-II (Steel Structures) | PC | 3 | 0 | 0 | 3 |
| 4 | | Professional Elective–I | PE | 3 | 0 | 0 | 3 |
| 5 | | Open Elective -I | OE | 3 | 0 | 0 | 3 |
| 6 | 23CE607 | Environmental Engineering Laboratory | PC | 0 | 0 | 2 | 1 |
| 7 | 23CE608 | Computer Aided Design Laboratory | PC | 0 | 0 | 2 | 1 |
| 8 | 23EN609 | Advanced English Communication Skills Laboratory | HS | 0 | 0 | 2 | 1 |
| 9 | 23CE610 | Industry Oriented Mini Project/Internship | PS | 0 | 0 | 4 | 2 |
| 10 | *MC6001 | Environmental Science | MC | 3 | 0 | 0 | 0 |
| | | **Total** | | **18** | **0** | **10** | **20** |

| Professional Elective-I | |
|---|---|
| **Code** | **Course Title** |
| 23CE604 | Green Building Technologies |
| 23CE605 | Geomantic Applications in Civil Engineering |
| 23CE606 | Smart Cities Planning and Management |

| Open Elective-I | | |
|---|---|---|
| **BRANCHES** | **Course Code** | **Course Title** |
| CIVIL | 23CE611 | Disaster Preparedness & Planning Management |
| | 23CE612 | Building Management Systems |
| | 23CE614 | Hydrogeology |
| EEE | 23EE606 | Renewable Energy Sources |
| | 23EE607 | Fundamental of Electric Vehicles |
| MECH | 23ME608 | Operation Research |
| | 23ME609 | Fundamentals of Mechanical Engineering |
| | 23ME610 | Metallurgy of Non-Metallurgists |
| ECE | 23EC614 | Fundamentals of Internet of Things |
| | 23EC615 | Principles of Signal Processing |
| | 23EC616 | Digital Electronics for Engineering |
| CSE | 23CS613 | Data Structures |
| | 23CS614 | Database Management Systems |
| IT | 23IT612 | Java Programming |
| | 23IT613 | Object Oriented Programming using C++ |
| CSE(CS) | 23CY614 | Cyber Laws |
| | 23CY615 | Ethical Hacking |
| CSE(AIML) | 23AM612 | Fundamentals of AI |
| | 23AM613 | Machine Learning Basics |

**IV YEAR I SEMESTER**

| S.No. | Course Code | Course Title | C | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | 23CE701 | Quantity Survey &Valuation | PC | 2 | 0 | 0 | 2 |
| 2 | 23CE702 | Project Management | PC | 2 | 0 | 0 | 2 |
| 3 | | Professional Elective–II | PE | 3 | 0 | 0 | 3 |
| 4 | | Professional Elective–III | PE | 3 | 0 | 0 | 3 |
| 5 | | Professional Elective-IV | PE | 3 | 0 | 0 | 3 |
| 6 | | Open Elective-II | OE | 3 | 0 | 0 | 3 |
| 7 | 23CE712 | Civil Engineering Software Laboratory | PC | 0 | 0 | 2 | 1 |
| 8 | 23CE713 | Project Stage-I | PS | 0 | 0 | 6 | 3 |
| | | **Total** | | **16** | **0** | **08** | **20** |

| Professional Elective-II | |
|---|---|
| **Code** | **Course Title** |
| 23CE703 | Prestressed Concrete |
| 23CE704 | Elements of Earthquake Engineering |
| 23CE705 | Advanced Structural Analysis |

| Professional Elective-III | |
|---|---|
| **Code** | **Course Title** |
| 23CE706 | Earth Retaining Structures |
| 23CE707 | Ground Improvement Techniques |
| 23CE708 | Stability Analysis of Slopes |

| Professional Elective-IV | |
|---|---|
| **Code** | **Course Title** |
| 23CE709 | Design of  Hydraulic Structures |
| 23CE710 | Advanced Water Resources Engineering |
| 23CE711 | Ground Water Hydrology |

| Open Elective - II | | |
|---|---|---|
| **DEPARMENT** | **Course Code** | **Course Title** |
| CIVIL | 23CE714 | Remote Sensing & Geographical Information Systems |
| | 23CE715 | Sustainable Infrastructure Development |
| EEE | 23EE708 | Utilization of Electric Energy |
| | 23EE709 | Energy Storage Systems |
| MECH | 23ME715 | Fabrication Processes |
| | 23ME716 | Total Quality Management |
| | 23ME717 | Energy Management and Conservation |
| ECE | 23EC710 | Electronic Sensors |
| | 23EC711 | Electronics for Health Care |
| | 23EC712 | Telecommunications for Society |
| CSE | 23CS716 | Operating Systems |
| | 23CS717 | Software Engineering |
| IT | 23IT716 | Full Stack development |
| | 23IT717 | Scripting Languages |
| CSE(CS) | 23CY716 | Computer Security & Audit Assurance |
| | 23CY717 | Social Media Security |
| CSE(AIML) | 23AM716 | Introduction to Natural Language Processing |
| | 23AM717 | AI applications |

## IV YEAR II SEMESTER

| S.No. | Course Code | Course Title | C | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | | Professional Elective– V | PE | 3 | 0 | 0 | 3 |
| 2 | | Professional Elective- VI | PE | 3 | 0 | 0 | 3 |
| 3 | | Open Elective -III | OE | 3 | 0 | 0 | 3 |
| 4 | 23CE807 | Project Stage–II | PS | 0 | 0 | 22 | 11 |
| | | Total | | 9 | 0 | 22 | 20 |

| Professional Elective-V | |
|---|---|
| **Code** | **Course Title** |
| 23CE801 | Solid Waste Management |
| 23CE802 | Environmental Impact Assessment for Civil Engineers |
| 23CE803 | Air pollution |

| Professional Elective-VI | |
|---|---|
| **Code** | **Course Title** |
| 23CE804 | Airports, Railways and Water ways |
| 23CE805 | Pavement Asset Management |
| 23CE806 | Pavement Analysis & Design |

| Open Elective - III | | |
|---|---|---|
| **DEPARTMENT** | **Course Code** | **Course Title** |
| CIVIL | 23CE808 | Energy Efficient Buildings |
| | 23CE809 | Multi Criterion Decision Making |
| | 23CE810 | Environmental Pollution |
| EEE | 23EE807 | Charging Infrastructure for Electric Vehicles |
| | 23EE808 | Electrical Safety Engineering |
| MECH | 23ME809 | Reliability Engineering |
| | 23ME810 | Industrial Management |
| ECE | 23EC808 | Measuring Instruments |
| | 23EC809 | Communication Technologies |
| | 23EC810 | Fundamentals of Social Networks |
| CSE | 23CS808 | Algorithms Design and Analysis |
| | 23CS809 | Introduction to Computer Networks |
| IT | 23IT808 | Big Data Technologies |
| | 23IT809 | Dev Ops |
| CSE(CS) | 23CY808 | Data Privacy |
| | 23CY809 | 5G Technologies |
| CSE(AIML) | 23AM812 | Chatbots |
| | 23AM813 | Genetic Algorithms & Fuzzy logic |

## MATRICES AND CALCULUS

**B Tech I Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23MA101** | **Basic Sciences** | **L** | **T** | **P** | **4** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **1** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: 16** | **Practical Classes: Nil** | | | **Total Classes:64** | | | |

**Pre-requisites:** Mathematical Knowledge at pre-university level

**Course Objectives: To learn**

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of Eigen values and Eigen vectors and to reduce the quadratic form to canonical form
3. Geometrical approach to the mean value theorems and their application to the mathematical problems and evaluation of improper integrals using Beta and Gamma functions.
4. Partial differentiation and finding maxima and minima of function of two or more variables.
5. Evaluation of multiple integrals and their applications

**Course outcomes: The student will be able to**

1. Solve the system of Linear equations in various engineering problems
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Solve the applications on the mean value theorems and evaluate the improper integrals using Beta and Gamma functions
4. Find the extreme values of functions of two variables with/without constraints.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes

**UNIT - I: Matrices**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method, System of linear equations: linearly dependent and linearly independent solutions, Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Gauss Seidel Iteration Method, L-U decomposition method

**UNIT - II: Eigen values and Eigen vectors** Linear Transformation and Orthogonal Transformation: Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

**UNIT - III: Calculus** :Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem, Taylor's Series, Maclaurin's series. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

**UNIT - IV: Multivariable Calculus (Partial Differentiation and applications)** Definitions of Limit and continuity. Partial Differentiation: Euler's Theorem, Total derivative, Jacobian, Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

**UNIT-V: Multivariable Calculus (Integration)** Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas and volumes (by double integrals).

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5 th Editon, 2016.

**REFERENCE BOOKS:**

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delh

**ENGINEERING CHEMISTRY**

**B Tech I Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CIA | SEE | TOTAL |
| **23CH102** | **Basic Sciences** | 3 | 1 | 0 | **4** | 40 | 60 | 100 |
| **Contact Classes: 48** | **Tutorial Classes: 16** | **Practical Classes: Nil** | | | **Total Classes:64** | | | |

**BCourse Objectives:**

1. To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
2. To include the importance of water in industrial usage, fundamental aspects of battery chemistry, significance of corrosion and its control to protect the structures.
3. To provide fundamental knowledge on properties and applications of polymers & to learn about polymers in a particular application area.
4. To impart knowledge about various types of fuels and their combustion.
5. To acquire required knowledge about engineering materials like cement, smart materials and Lubricants.

**Course Outcomes:**

1. The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
2. Students will acquire the basic knowledge of electrochemical procedures related to corrosion and its control.
3. Classify and characterize different polymer engineering materials and apply its knowledge to select suitable materials for specific applications.
4. To be able to understand various types of fuels and the advantages of alternate fuels over conventional sources.
5. They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

**UNIT - I: Water and its treatment: [8]**

Introduction to Water and its types – related numerical's.Estimation of hardness of water by complexometric method- related numerical. Potable water and its specifications – Steps involved in the treatment of potable water – Disinfection of potable water by chlorination and break - point chlorination –. Defluoridation - Determination of Fluoride ion by ion- selective electrode method.

Boiler troubles: Sludges, Scales and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning, External treatment methods - Softening of water by ion- exchange processes. Desalination of water – Reverse osmosis.

**UNIT – II: Battery Chemistry & Corrosion [8]**
Introduction - Classification of batteries- primary, secondary and reserve batteries with examples. Basic requirements for commercial batteries. Construction, working and applications of: Zn-air and Lithium ion battery, Applications of Li-ion battery to electrical vehicles. Fuel Cells- Differences between battery and a fuel cell, Construction and applications of Hydrogen oxygen fuel cell and Solid oxide fuel cell. Microbial fuel cell. Solar cells - Introduction and applications of Solar cells.

**Corrosion:** Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.

**UNIT - III: Polymeric materials: [8]**

Definition – Classification of polymers with examples – Types of polymerization – addition (free radical addition) and condensation polymerization with examples – Nylon 6:6, Terylene

**Fibers**: Properties and engineering applications of - Nylon 6:6, Terylene.

**Plastics:** Definition and characteristics- thermoplastic and thermosetting plastics, Properties and engineering applications of PVC and Bakelite, Teflon, Fiber reinforced plastics (FRP)

**Rubbers:** Natural rubber and its vulcanization.

**Elastomers:** Characteristics –preparation – properties and applications of Buna-S, Butyl and Thiokol rubber.

**Conducting polymers:** Characteristics and Classification with examples-mechanism of conduction in trans-poly acetylene and applications of conducting polymers.

**Biodegradable polymers:** Concept and advantages - Polylactic acid and poly vinyl alcohol and their applications.

**UNIT - IV: Energy Sources: [8]**

Introduction,Calorific value of fuel – HCV, LCV- Dulongs formula. Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer-Tropsch's process; Gaseous fuels – composition and uses of natural gas, LPG and CNG, Biodiesel – Transesterification, advantages. Alternate fuels.

## UNIT - V: Engineering Materials: [8]

**Cement:** Portland cement, its composition, Setting and hardening of cement

**Smart materials and their engineering applications** Shape memory materials- Poly urethane, Thermo responsive materials- Polyacryl amides, Poly vinyl amides

**Lubricants:** Classification of lubricants with examples-characteristics of a good lubricant - mechanism of lubrication (thick film, thin film and extreme pressure)- properties of lubricants: viscosity, cloud point, pour point, flash point and fire point.

**TEXT BOOKS**:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengage   learning, 2016
3. A text book of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana and K. Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

**REFERENCE BOOKS**:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

**ENGLISH FOR SKILL ENHANCEMENT**

**B Tech I Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CIA | SEE | TOTAL |
| **23EN103** | **Basic Sciences** | **2** | **0** | **0** | **2** | **40** | **60** | **100** |
| **Contact Classes: 32** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:32** | | | |

## B. INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of "English for Skill Enhancement" has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students. In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing.

**Course Objectives: This course will help to enable the students to:**

1. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
2. Develop study skills and communication skills in various professional situations.
3. Equip students to study engineering subjects more effectively and critically using the theoretical and practical components of the syllabus.
4. Understand the importance of defining, classifying and Practice the unique qualities of Professional writing style.
5. Employ the acquired knowledge in Classroom with reference to various social and Professional spheres, thus leading to a lifelong learning process.

**Course Outcomes:**

1. Develop proficiency in reading and writing comprehensive skills from the known and unknown passages.
2. Use and interpret vocabulary and sentence structures in new situations.
3. Develop skills needed to participate in conversation that builds Proficiency in English.
4. Demonstrate, question and test their understanding of functional grammar.
5. To differentiate, organise, relate to develop English skills such as drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.

**UNIT- I**

Chapter entitled **'*Toasted English*'** by R.K.Narayan from **"*English: Language, Context and Culture*"** published by Orient Black Swan, Hyderabad.

**Vocabulary:** The Concept of Word Formation -The Use of Prefixes and Suffixes - Synonyms and Antonyms

**Grammar:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

**Reading:** Reading and Its Importance- Techniques for Effective Reading.

**Writing:** Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

**UNIT - II**

Chapter entitled **'Appro JRD'** by Sudha Murthy from **"*English: Language, Context and Culture*"** *published* by Orient Black Swan, Hyderabad.

**Vocabulary:** Homophones, Homonyms and Homographs

**Grammar:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

**Reading:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice

**Writing:** Nature and Style of Writing- Defining /Describing People, Objects, Places and Events.

**UNIT - III**

Chapter entitled '**Lessons from Online Learning'** by F.Haider Alvi, Deborah Hurst et al from **"*English: Language, Context and Culture*"** published by Orient Black Swan, Hyderabad. **Vocabulary:** Words Often Confused - Words Often Misspelt - Words from Foreign Languages and their Use in English.

**Grammar:** Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

**Reading:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.

**Writing:** Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with Resume and CV .

**UNIT - IV**

Chapter entitled **''Art and Literature'** by Abdul Kalam

**Vocabulary:** Standard Abbreviations in English-

**Grammar:** Redundancies and Clichés in Oral and Written Communication.

**Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

**Writing:** Writing Practices- Essay Writing-Writing Introduction and Conclusion –Précis Writing.

**UNIT - V**

Chapter entitled '**Go, Kiss the World'** by Subroto Bagchi **from "English: Language, Context and Culture"** published by Orient Black Swan, Hyderabad.

**Vocabulary:** Technical Vocabulary and their Usage

**Grammar:** Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

**Reading:** Reading Comprehension-Exercises for Practice

**Writing:** Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

**TEXT BOOK:**

 "English: Language, Context and Culture" by Orient Black Swan Pvt. Ltd,

   Hyderabad. 2022. Print.7

**REFERENCE BOOKS:**

1.  Effective Academic Writing by Liss and Davis (OUP)
2.  Richards, Jack C. (2022) Interchange Series. Introduction, 1,2,3. Cambridge UniversityPress
3.  Wood, F.T. (2007). Remedial English Grammar. Macmillan
4.  Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of
5.  Functional Language, Grammar and Vocabulary. (2 nd ed.,). Sage Publications India Pvt. Ltd.
6.  (2019). Technical Communication. Wiley India Pvt. Ltd.
7.  Vishwamohan, Aysha. (2013). English for Technical Communication for.
8.  Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.

# Engineering Mechanics

**B.Tech. I Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23ME104** | **Engineering Sciences** | **L** | **T** | **P** | **3** | CIA | SEE | TOTAL |
| | | **3** | **0** | **0** | | 40 | 60 | 100 |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | | **Total Classes:48** | | |

**Course Objectives:**

The objectives of this course is to

1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium.
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections.
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, centroidal motion and plane motion of rigid bodies
5. Explain the concepts of work-energy method.

**Course Outcomes:** Upon graduation he student will be able to

1. Determine resultant of forces acting on a body and analyze equilibrium of a body subjected to a system of forces.
2. Analyze the body subjected to friction and establish the centroid of a given section.
3. Evaluate the area and mass moment of inertia.
4. Comprehend the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
5. Apply work energy equations for translation, fixed axis rotation and plane motion.

**UNIT - I**

**Introduction to Engineering Mechanics** - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

## UNIT - II

**Friction:** Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, ladder friction.
Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity and its implications. – Theorem of Pappus.

## UNIT - III

**Area moment of inertia**- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem.
**Mass Moment of Inertia:** Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

## UNIT - IV

**Kinematics of Particles:** Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles.
Kinetics of Particles: Kinetics of particles – Newton's Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D. Alembert's Principle applied for rectilinear and curvilinear motion.

## UNIT - V

Work - Energy Principle: Equation of translation, principle of conservation of energy, work – energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse – Momentum.
Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elastic impact and types of impact, loss of kinetic energy, co efficient of restitution.

## TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010), Singer's Engineering Mechanics – Statics & Dynamics

**REFERENCE BOOKS:**

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.
2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P& Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Hibbeler R. C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.
5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.
6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.
7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John

**PROGRAMMING FOR PROBLEM SOLVING**

**B Tech I Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CS105** | **Basic Sciences** | **L** | **T** | **P** | **3** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **0** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:48** | | | |

**Course Objectives:**
1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.

**Course Outcomes:** The student will learn
1. To write algorithms, draw flowcharts for solving problems and to covert to problems to Cprograms
2. To use arrays, pointers, strings and structures to write C programs.
3. To decompose a problem into functions and to develop modular reuseable code.
4. To implement searching and sorting problems.
5. To learn about preprocessor directive and files concepts.

**UNIT - I: Introduction to Programming** Compilers, compiling and executing a program.Representation of Algorithm - Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number Flowchart/Pseudocode with examples, Program design and structured programming

**Introduction to C Programming Language:** variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators
**Conditional Branching and Loops**: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

**UNIT - II: Arrays, Strings, Structures and Pointers:**

**Arrays:** one and two dimensional arrays, creating, accessing and manipulating elements of arrays Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

**Structures**: Defining structures, initializing structures, unions, Array of structures

**Pointers:** Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self referential structures in linked list (no implementation) Enumeration data type

## UNIT - III: Function and Dynamic Memory Allocation:

**Functions**: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

## UNIT - IV: Searching and Sorting:

Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

## UNIT - V: Preprocessor and File handling in C:

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

**TEXT BOOKS:**
1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

**REFERENCE BOOKS:**
1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

**ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB**

**B Tech I Year I Sem**

| Course Code | Category | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | **L** | **T** | **P** | | **CIA** | **SEE** | **TOTAL** |
| **23EN106** | **Basic Sciences** | **0** | **0** | **2** | **1** | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:32** | | | |

The English Language and Communication Skills (ELCS) Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

**Course Objectives:**

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

**Course Outcomes:** Students will be able to:

1. Understand the nuances of English language through audio- visual experience and group activities
2. Use English with proper pronunciation and intonation
3. Neutralize their accent for intelligibility
4. Develop speaking skills with clarity and confidence which in turn enhances their employability skills
5. Communicate confidently in Various situations and apply them in Professional communication

**English Language and Communication Skills Lab (ELCS) shall have two parts:**

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

**Listening Skills**

Objectives

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

*Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.*

      a. Listening for general content
      b. Listening to fill up information
      c. Intensive listening
      d. Listening for specific information

**Speaking Skills**

Objectives
1. To involve students in speaking activities in various contexts
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
      ▪ Just A Minute (JAM) Sessions

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

**Exercise – I**

**CALL Lab**:

*Understand:* Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

*Practice:* Introduction to Phonetics – Speech Sounds – Vowels and Consonants – Minimal Pairs Consonant Clusters- Past Tense Marker and Plural Marker- Testing Exercises

**ICS Lab**:

*Understand:* Spoken vs. Written language- Formal and Informal English.

*Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

**Exercise – II**

**CALL Lab**:

*Understand:* Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences – Intonation.

*Practice:* Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms-Stress pattern in sentences – Intonation - Testing Exercises

**ICS Lab**:

*Understand:* Features of Good Conversation – Strategies for Effective Communication*.*

*Practice:* Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

**Exercise - III**

**CALL Lab:**

*Understand:* Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

*Practice:* Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing Exercises

**ICS Lab**:

*Understand:* Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing

*Practice:* Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions.

**Exercise – IV**

**CALL Lab**:

*Understand:* Listening for General Details.

*Practice:* Listening Comprehension Tests - Testing Exercises

**ICS Lab**:

*Understand:* Public Speaking – Exposure to Structured Talks - Non-verbal Communication Presentation Skills.

*Practice:* Making a Short Speech – Extempore- Making a Presentation.

**Exercise – V**

**CALL Lab:**

*Understand:* Listening for Specific Details.

*Practice:* Listening Comprehension Tests -Testing Exercises.

**ICS Lab**:

*Understand:* Group Discussion

*Practice:* Group Discussion

**************

**Source of Material (Master Copy):**

- Exercises in Spoken English. Part 1,2,3. CIEFL and Oxford University Press

**Suggested Software:**

- Cambridge Advanced Learners' English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- Digital All
- Orell Digital Language Lab (Licensed Version)

**REFERENCE BOOKS:**

1. (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.

2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
4. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press.

**PROGRAMMING FOR PROBLEM SOLVING LABORATORY**

**B Tech I Year I Sem**

| Course Code | Category | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CIA | SEE | TOTAL |
| **23CS107** | **Basic Sciences** | 0 | 0 | 2 | 1 | 40 | 60 | 100 |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:32** | | | |

*[Note:The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:*
*Code Lite:https://codelite.org/*

*Code: Blocks: http://www.codeblocks.org/*

*DevCpp: http://www.bloodshed.net/devcpp.html*

*Eclipse: http://www.eclipse.org*

*This list is not exhaustive and is NOT in any order of preference]*

**Course Objectives:** The students will learn the following:
1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept.
6. To create, read from and write to text and binary files

**Course Outcomes:** The candidate is expected to be able to:
1. formulate the algorithms for simple problems
2. translate given algorithms to a working and correct program
3. correct syntax errors as reported by the compilers
4. identify and correct logical errors encountered during execution
5. represent and manipulate data with arrays, strings and structures
6. use pointers of different types
7. create, read and write to and from simple text and binary files
8. modularize the code with functions so that they can be reused

**Practice sessions:**
a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment , bitwise and/or/not , etc.). Read required operand values from standard input.

b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values from standard input.

**Simple numeric problems:**
a. Write a program for finding the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write a program that declares Class awarded for a given percentage of marks, where mark

<40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.

d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
e. e. 5 x 1 = 5
f. f. 5 x 2 = 10

g. g. 5 x 3 = 15

h. h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

**Expression Evaluation:**
a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. 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)
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
e. A 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.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is
a fractional value. i. 1-x/2 +x^2/4-x^3/6

j. Write a C program to read in two numbers, x and n, and then compute     the sum of this geometric progression: 1+x+x^2+x^3+ +x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

**Arrays, Pointers and Functions:**

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a function to compute mean, variance, Standard Deviation, sorting of n elements in a single dimension array.
c. Write a C program that uses functions to perform the following:
d. Addition of Two Matrices
e. Multiplication of Two Matrices
f. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be the same.
g. Write C programs that use both recursive and non-recursive functions
h. To find the factorial of a given integer.
i. To find the GCD (greatest common divisor) of two given integers.
j. To find x^n
k. Write a program for reading elements using a pointer into an array and display the values using the array.
l. Write a program for display values reverse order from an array using a pointer.
m. Write a program through a pointer variable to sum of n elements from an array.

**Files:**

a. Write a C program to display the contents of a file to standard output device.
b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
d. Write a C program that does the following:

   It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function)

   Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function)

   The program should then read all 10 values and print them back.

e. 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).

**Strings:**
a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string into a given main string from a given position.
e. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
h. Write a C program to count the lines, words and characters in a given text.

**Miscellaneous:**
a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

```
1              *           1          1              *
1 2            * *         2 3        2 2            * *
1 2 3          * * *       4 5 6      3 3 3          * * *
                                      4 4 4 4        * * **
```

**Sorting and Searching:**
a. Write a C program that uses non recursive function to search for a Key value in a given
b. list of integers using linear search method.
c. Write a C program that uses non recursive function to search for a Key value in a given
d. sorted list of integers using binary search method.
e. Write a C program that implements the Bubble sort method to sort a given list of
f. integers in ascending order.
g. Write a C program that sorts the given array of integers using selection sort in descending order
h. Write a C program that sorts the given array of integers using insertion sort in ascending order
i. Write a C program that sorts a given array of names

**TEXT BOOKS:**

1. Jeri R. Hanly and Elliot B.Koffman, Problem solving and Program Design in C 7th Edition, Pearson
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

**REFERENCE BOOKS:**

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PHI
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

**ENGINEERING CHEMISTRY LABORATORY**

**B Tech I Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|:---:|
| **23CH108** | **Basic Sciences** | **L** | **T** | **P** | **1** | **CIA** | **SEE** | **TOTAL** |
| | | **0** | **0** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:32** | | | |

**Course Objectives:** The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

1. Estimation of hardness of water to check its suitability for drinking purpose.
2. To perform estimations of acids and bases using conductometry, potentiometry and pH metry methods.
3. To prepare polymers such as Bakelite and nylon-6 in the laboratory.
4. Skills related to the lubricant properties such as saponification value, surface tension and viscosity of oils
5. How to analyze the rate of corrosion of steel.

**Course outcomes:**

The students will be able to:

1. Determination of parameters like hardness of water and rate of corrosion of mild steel in various conditions.
2. Perform methods such as conductometry, potentiometry and pH metry in order to find out the concentrations or equivalence points of acids and bases.
3. Prepare polymers like bakelite and nylon-6.
4. Estimate surface tension and viscosity of lubricant oils.
5. Determine the rate of corrosion of steel in presence and absence of inhibitor

**LIST OF EXPERIMENTS:**

1. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
2. Conductometry: Estimation of the concentration of an acid by Conductometry.
3. Potentiometry: Estimation of the amount of Fe+2 by Potentiomentry.
4. pH Metry: Determination of an acid concentration using pH meter.
5. Preparations:

    1. Preparation of Bakelite.

    2. Preparation Thiokol Rubber.

6. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of Viscosity of lubricant oil using Ostwald's Viscometer.
3. Estimation of Surface Tension of lubricant oil using

Stalagmometer.

7. Virtual lab experiments

1. Construction of Fuel cell and it's working.

2. Smart materials for biomedical applications

3. Batteries for electrical vehicles.

4. Functioning of solar cell and its applications.

5. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

6. Preparation of nylon-6.

**REFERENCE BOOKS:**

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007)

## ELEMENTS OF CIVIL ENGINEERING

**B Tech I Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE109** | **Basic Sciences** | **L** | **T** | **P** | **1** | **CIA** | **SEE** | **TOTAL** |
| | | **0** | **0** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 32** | | | **Total Classes:32** | | | |

**Pre-requisites: Nil**

**Course objectives:**

1. To provide practical knowledge about physical properties of minerals and rocks.
2. To determine the characteristics of cement**,** Coarse & Fine aggregates.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Understands the method and ways of investigations required for Civil Engineering projects
2. Identify the various rocks, minerals depending on geological classifications
3. Evaluate the properties of cement, fine and coarse aggregates and determine its suitability for construction.

**List of Experiments:**

1. **Identification of Minerals** – Silica Group, Feldspar Group, Crystalline Group, Carbonate Group, Pyroxene Group, Mica Group, Amphibole Group.
2. **Identification of Rocks –** Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
3. 1. Study of topographical features from Geological maps. Identification of symbols in maps.
   2. Simple structural Geology Problems (Folds, Faults & Unconformities)
4. Tests on Cement
   a. Fineness test & Normal Consistency test.
   b. Specific gravity test, Initial and Final setting time of cement.
5. Tests on Fine Aggregates
   a. Specific Gravity test.
   b. Bulking of sand & Fineness modulus of Fine aggregate.
6. Tests on Coarse Aggregate
   a. Specific Gravity test.
   b. Fineness modulus of Coarse aggregate.

**TEXT BOOK:**

1. IS 383 :1993 "Specification for Coarse and Fine Aggregates from Natural Sources for Concrete".

**ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**

**B Tech I Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23MA201** | **Basic Sciences** | **L** | **T** | **P** | **4** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **1** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: 16** | **Practical Classes: Nil** | | | **Total Classes:64** | | | |

**Pre-requisites: Mathematical Knowledge at pre-university level**

**Course Objectives: To learn**

1. Various analytical Methods to solve first order first degree ordinary differential equations.
2. Methods to solve higher order ordinary differential equations.
3. Concept, properties of Laplace transforms and solving ordinary differential equations using Laplace transforms techniques.
4. The physical quantities involved in engineering field related to vector valued functions
5. Line, Surface and Volume integrals and their applications

**Course outcomes: the student will be able to**

1. Find the solutions of first order first degree differential equations and their applications.
2. Solve higher differential equation and apply the concept of differential equation to real world problems.
3. Use the Laplace transforms techniques for solving ordinary differential equations.
4. Calculate gradient of scalar point function and divergence, curl of vector point function.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

**UNIT-I: First Order ODE:** Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (Cartesian & Polar Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay, First order but not of first degree: solvable for 'p' and clairauts equations.

**UNIT-II: Ordinary Differential Equations of Higher Order**

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}$, sin ,cos$ax$,polynomials in $x$, $e^{ax}V(x)$ and $x^m$ $V(x)$,,(method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Cauchy-Euler equation.

**UNIT-III: Laplace transforms**

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

**UNIT-IV: Vector Differentiation**

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

**UNIT-V: Vector Integration** Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

**TEXT BOOKS:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5 th Edition, 2016.

**REFERENCE BOOKS:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

**APPLIED PHYSICS**

**B Tech I Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23PH202** | **Basic Sciences** | **L** | **T** | **P** | **4** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **1** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: 16** | **Practical Classes: Nil** | | | **Total Classes:64** | | | |

**Course Objectives:**

The objectives of this course for the student are to:

1. Understand the basic principles of quantum physics and band theory of solids.
2. Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
3. Study the fundamental concepts related to the dielectric, magnetic and energy materials.
4. Identify the importance of nanoscale, quantum confinement and various fabrications techniques.
5. Study the characteristics of lasers and optical fibers

**Course Outcomes: Upon graduation he student will be able to:**

1. Analyze the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
2. Identify the role of semiconductor devices in science and engineering Applications.
3. Explore the fundamental properties of dielectric and magnetic materials.
4. Appreciate the features and applications of Nanomaterials.
5. Analyze various aspects of Lasers and Optical fiber and their applications in diverse fields.

**UNIT - I: QUANTUM PHYSICS AND SOLIDS**

**Quantum Physics**: Introduction to quantum physics, Blackbody radiation – Stefan-Boltzmann's law, Planck's radiation law - Wein's and Rayleigh-Jean's law, Photoelectric effect, Matter Waves, de - Broglie Hypothesis, Davisson and Germer experiment, Heisenberg uncertainty principle, Time independent Schrodinger wave equation, Born interpretation of the wave function, Particle in one dimensional potential box.

**Solids:** Classical & Quantum free electron theory (Qualitative), Bloch's theorem, Kronig-Penney model, E-K diagram, Effective mass of electron, Origin of energy bands - classification of solids.

## UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors(Qualitative) – Hall effect - direct and indirect band gap semiconductors - construction, principle of operation and I-V characteristics of P-N Junction diode, Zener diode, bipolar junction Transistor(BJT) - LED, PIN diode, avalanche photo diode (APD) and solar cells, their structure, materials, working principle and I-V characteristics.

## UNIT - III: DIELECTRIC AND MAGNETIC MATERIALS

**Dielectric Materials:** Basic definitions, Types of polarizations (qualitative) -Langevin-Debye equation, Internal fields in a solid, Clausius - Mossotti equation ferroelectric, piezoelectric, and pyroelectric materials – applications, liquid crystal displays (LCD) and crystal oscillators.

**Magnetic Materials:** Basic definitions, Classification of magnetic materials, Domain theory, Hysteresis - soft and hard magnetic materials, magnetostriction, magneto resistance - applications - magnetic field sensors and multiferroics.

## UNIT-IV : NANOTECHNOLOGY

Nanoscale, Quantum Confinement, Surface to volume ratio, Bottom-Up Fabrication: Sol-Gel – Precipitation- Combustion methods, Top-Down Fabrication: Ball Milling - Physical Vapor Deposition (PVD) - Chemical Vapor Deposition (CVD), Characterization Techniques: XRD, SEM & TEM, Applications of Nano materials.

## UNIT - V: LASER AND FIBER OPTICS

**Lasers:** Laser beam characteristics, Three quantum processes, Einstein coefficients and their relations, Population Inversion,Lasing action, Pumping methods, Ruby laser, He-Ne Laser , CO2 Laser, Nd-Yag Laser, semiconductor laser-applications of laser.

**Fiber Optics:** Introduction to optical fiber- advantages of optical Fibers - total internal reflection, construction of optical fiber - acceptance angle - numerical aperture-classification of optical fibers -losses in optical fiber - optical fiber for communication system - applications.

**TEXT BOOKS:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" A Text book of Engineering Physics"- S. Chand Publications, 11th Edition 2019.

2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019

3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4 thEdition,2021.

4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2ndEdition,2022.

5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

6. Modern Engineering Physics by Dr. K. Vijay Kumar, Dr. Chandralingam, S.Chand Publications,

**REFERENCE BOOKS:**

1. Quantum Physics, H.C. Verma, TBS Publication, 2nd Edition 2012.

2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons,11th Edition, 2018.

3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.

4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019. 5. A.K. Bhandhopadhya - Nano Materials, New Age International, 1stEdition, 2007.

# COMPUTER AIDED ENGINEERING GRAPHICS

**B Tech I Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23ME203** | **Basic Sciences** | **L** | **T** | **P** | **4** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **1** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: 16** | **Practical Classes: Nil** | | | **Total Classes:64** | | | |

**Course Objectives:**

1. To develop the ability of visualization of different objects through technical drawings
2. To acquire computer drafting skill for communication of concepts, ideas in the design of engineering products

**Course Outcomes:** At the end of the course, the student will be able to:

1. Apply computer aided drafting tools to create 2D and 3D objects
2. Sketch conics and different types of solids
3. Appreciate the need of Sectional views of solids and Development of surfaces of solids Read and interpret engineering drawings
4. Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting

**UNIT – I:**

**Introduction to Engineering Graphics:** Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Introduction to Computer aided drafting – views, commands and conics

**UNIT- II:**

**Orthographic Projections:** Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections – points, lines and planes

**UNIT – III:**

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views, Computer aided projections of solids – sectional views

**UNIT – IV:**

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Development of surfaces using computer aided drafting

**UNIT – V:**

**Isometric Projections:** Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa –Conventions. Conversion of orthographic projection into isometric view using computer aided drafting.

**TEXT BOOKS:**

1. Engineering Drawing N.D. Bhatt / Charotar

2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.

**REFERENCE BOOKS:**

1. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill

2. Engineering Graphics and Design, WILEY, Edition 2020

3. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.

4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford

5. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

**Note:** - External examination is conducted in conventional mode and internal evaluation to be done by the conventional as well as using computer aided drafting.

**SURVEYING**

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

| Course Code | Category | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE204** | **Engineering Sciences** | **L** | **T** | **P** | **2** | **CIA** | **SEE** | **TOTAL** |
| | | **2** | **0** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 32** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | | **Total Classes:32** | | |

**Course Objectives:** The first step in engineering practice is surveying and the soundness of any civil engineering work is dependent on the reliability and accuracy of surveying. Therefore, 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.

**Course Outcomes:** At the end of the course, the student will be able to:

1. Calculate angles, distances and levels
2. Identify data collection methods and prepare field notes
3. Understand the working principles of survey instruments
4. Estimate measurement errors and apply corrections
5. Interpret survey data and compute areas and volumes

**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**

**Linear distances -** Approximate methods, Direct Methods- Chains-Tapes, ranging, Tape corrections, indirect methods-optical methods-E.D.M.method.
**Prismatic Compass**-Bearings, included angles, Local Attraction, Magnetic Declination and dip.

**UNIT-II**
**Levelling and Contouring Leveling-**Basics definitions, types of levels and leveling 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 leveling 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, stadiaand tangentia l methods of Tacheometry.

**Curves:** Types of curves and their necessity, elements of simple curve, setting out of simple 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:
1. Surveying and leveling by R.Subramanian, Oxford university press, NewDelhi.
2. ChandraAM, "HigherSurveying", New age International Pvt.Ltd., Publishers, New Delhi, 2002.
3. Hoffman. B,H.Lichtenegga and J.Collins, Global Positioning System-Theory and Practice, Springer -Verlag Publishers,2001.

**REFERENCE BOOKS:**

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, Mc Graw Hill – 2000.
2. Arora K R"SurveyingVol1, 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., NewDelhi.
4. ChandraAM, "PlaneSurveying", New Age International Pvt.Ltd., NewDelhi, 2002.
5. Surveying by Bhavikatti; Vikas publishing house ltd.
6. DuggalS K, "Surveying (Vol– 1&2), Tata Mc Graw Hill Publishing Co.Ltd. NewDelhi, 2004.
7. Surveying and leveling by R.Agor Khanna Publishers 2015.

**APPLIED PHYSICS LAB**

**B Tech I Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23PH205** | **Humanities & Sciences** | **L** | **T** | **P** | **1.5** | **CIA** | **SEE** | **TOTAL** |
| | | **0** | **0** | **3** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 48** | | | **Total Classes:48** | | | |

**Course Ojectives: The objectives of this course for the student to**

1. Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.

2. Understand the characteristics of various devices such as PN junction diode, Zener diode, BJT, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.

3. Able to measure the characteristics of dielectric constant of a given material.

4. Study the behavior of B-H curve of ferromagnetic materials.

5. Understanding the method of least squares fitting.

**Course Outcomes: The students will be able to:**

1. Know the determination of the Planck's constant using Photo electric effect and identify the material whether it is n-type or p-type by Hall experiment.

2. Appreciate quantum physics in semiconductor devices and optoelectronics.

3. Gain the knowledge of applications of dielectric constant.

4. Understand the variation of magnetic field and behavior of hysteresis curve.

5. Carried out data analysis.

**LIST OF EXPERIMENTS:**

1. Determination of work function and Planck's constant using photoelectric effect.

2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.

3. Characteristics of series and parallel LCR circuits.

4. V-I characteristics of a p-n junction diode and Zener diode

5. Input and output characteristics of BJT (CE, CB & CC configurations)

6. a) V-I and L-I characteristics of light emitting diode (LED)

b) V-I Characteristics of solar cell

7. Determination of Energy gap of a semiconductor.

8. Study B-H curve of a magnetic material.

9. Determination of dielectric constant of a given material

10. a) Determination of the beam divergence of the given LASER beam

b) Determination of Acceptance Angle and Numerical Aperture of an optical fiber.

11. Understanding the method of least squares – torsional pendulum as an example.

Note: Any 8 experiments are to be performed.

**REFERENCE BOOK:** S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.

## PYTHON PROGRAMMING LABORATORY

**B Tech I Year II Sem**

| Course Code | Category | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CS206** | **Humanities & Sciences** | **L** | **T** | **P** | **2** | **CIA** | **SEE** | **TOTAL** |
| | | **1** | **0** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 32** | | | **Total Classes:48** | | | |

**Course Objectives:**
- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

**Course Outcomes:** After completion of the course, the student should be able to
1. Develop the application specific codes using python.
2. Understand Strings, Lists, Tuples and Dictionaries in Python.
3. Verify programs using modular approach, file I/O, Python standard library.
4. Implement digital system using Python.
5. Implement GUI program to create window wizard.

Note: The lab experiments will be like the following experiment examples

**Week -1:**
1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.

   ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator. 3.
    i.   Write a program to calculate compound interest when principal, rate and number of periods are given.
    ii.  Given coordinates (x1, y1), (x2, y2) find the distance between two points

4. Read name, address, email and phone number of a person through keyboard and print the details.

**Week - 2:**
1.  Print the below
    triangle using for loop.
    5

      4 4

      3 3 3

      2 2 2 2

      1 1 1 1 1
2.  Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3.  Python Program to Print the Fibonacci sequence using while loop
4.  Python program to print all prime numbers in a given interval (use break)

**Week - 3:**
1.  i) Write a program to convert a list and tuple into arrays.

     ii) Write a program to find common values between two arrays.

2.  Write a function called gcd that takes parameters a and b and returns their greatest common divisor.
3.  Write a function called palindrome that takes a string argument and returns True if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

**Week - 4:**
1.  Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
2.  Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
    i.    Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
    ii.   The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
    iii.  Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
3.  i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
ii.    Remove the given word in all the places in a string?

iii.    Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?

4.  Writes a recursive function that generates all binary strings of n-bit length

**Week - 5:**
1.  i) Write a python program that defines a matrix and prints
    ii.     Write a python program to perform addition of two square matrices
    iii.    Write a python program to perform multiplication of two square matrices
2.  How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3.  Use the structure of exception handling all general purpose exceptions.

**Week-6:**
1.  a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

    b.  Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
    c.  Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
    d.  Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.

2.  Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.
3.  Write a python code to read a phone number and email-id from the user and validate it for correctness.

**Week- 7**
1.  Write a Python code to merge two given file contents into a third file.
2.  Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
3.  Write a Python code to Read text from a text file, find the word with most number of occurrences
4.  Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

**Week - 8:**
1.  Import numpy, Plotpy and Scipy and explore their functionalities.
2.  a) Install NumPy package with pip and explore it.
3.  Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4.  Write a program to implement Half Adder, Full Adder, and Parallel Adder

5.  Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.


**TEXT BOOKS:**
1.  Supercharged Python: Take your code to the next level, Overland.
2.  Learning Python, Mark Lutz, O'reilly.

**REFERENCE BOOKS:**
1.  Python for Data Science, Dr. Mohd. Abdul Hameed, Wiley Publications - 1st Ed. 2021.
2.  Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
3.  Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson.
4.  Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition.
5.  Think Python, Allen Downey, Green Tea Press.
6.  Core Python Programming, W. Chun, Pearson.
7.  Introduction to Python, Kenneth A. Lambert, Cengage.

**SURVEYINGLABORATORY-I**

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

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CIA | SEE | TOTAL |
| **23CE207** | **Engineering Sciences** | 0 | 0 | 2 | 1 | 40 | 60 | 100 |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 32** | | | | **Total Classes:32** | | |

**Course Objective:**

1. Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
2. Student will be able to learn and understand various instrument used in surveying.
3. Student will learn and understand how to calculate Area of plot and Ground.
4. Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

**Course Outcomes:** At the end of the course student will be able to:

1. Student will be able to prepare Map and Plan for required site with suitable scale.
2. Student will be able to prepare contour Map and Estimate the Quantity of earth work required for formation level for Road and Railway Alignment.
3. Student will be able to judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
4. Student will be able to judge the profile of ground by observing the available existing contour map.

**CYCLE-I**

1. Chaining of a line using chain, measurements of area by crossstaff survey.
2. Measurement of distance between two points when there is an obstacle for both chaining and ranging. Compass survey
3. Traversing by compass and adjustments in included angles and measurement of  area-graphical adjustments.
4. Distance between two in accessible points by compass. Plane Table

Surveying
5. Measurement & Plotting of the area by Radiation method.
6. Determination of Positions objects by Intersection Method – Plane Table Survey.
7. Traverse by Plane table Survey.

**CYCLE–II**
**Leveling**

8. Measurement of elevation of various given points.
9. Elevation difference between two given points by reciprocal leveling.
10. Longitudinal Leveling
11. Cross–section Leveling
12. Plotting of Contours by Indirect Method

**ENGINEERING WORKSHOP**

**B Tech I Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23ME208** | **Humanities & Sciences** | **L** | **T** | **P** | **2.5** | **CIA** | **SEE** | **TOTAL** |
| | | **1** | **0** | **3** | | **40** | **60** | **100** |
| **Contact Classes: 16** | **Tutorial Classes: Nil** | **Practical Classes: 48** | | | **Total Classes:64** | | | |

**Pre-requisites**: Practical skill

**Course Objectives:**

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

**Course Outcomes**: At the end of the course, the student will be able to:

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.
5. Apply basic mechanical knowledge for metal cutting and use of power tools in construction of wood working.

**1. TRADES FOR EXERCISES:**

**At least two exercises from each trade:**

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)

II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit)

III. Tin-Smithy – (Square Tin, Rectangular Tray & Conical Funnel)

IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)

V. Welding Practice – (Arc Welding & Gas Welding)

VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)

VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

## 2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

## TEXT BOOKS:

1. Workshop Practice /B. L. Juneja / Cengage

2. Workshop Manual / K. Venugopal / Anuradha.

## REFERENCE BOOKS:

1. Work shop Manual - P. Kannaiah/ K.L. Narayana/ Scitech

2. Workshop Manual / Venkat Reddy/ BSP

**PROBABILITY AND STATISTICS**

**B Tech II Year I Sem**

| Course Code | Category | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | **L** | **T** | **P** | | **CIA** | **SEE** | **TOTAL** |
| **23MA302** | **Basic Sciences** | | | | **4** | | | |
| | | **3** | **1** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: 16** | **Practical Classes: Nil** | | | **Total Classes:64** | | | |

**Pre-requisites:** Mathematics courses of first year of study

**Course Objectives:**

1. The theory of Probability, and probability distributions of single and multiple random variables
2. The sampling theory and testing of hypothesis and making statistical inferences.

**Course outcomes:** At the end of the course the student will be able to:
1. Apply the concepts of probability and distributions to some case studies.
2. Correlate the concepts of one unit to the concepts in other units.

**UNIT - I: Probability                                              8 L**

Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Baye's Rule.
**Random Variables and Probability Distributions:** Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions.

**UNIT - II: Expectation and discrete distributions               10 L**

Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables, Chebyshev's Theorem.
**Discrete Probability Distributions:** Binomial Distribution, Poisson distribution.

**UNIT - III: Continuous Distributions and sampling               10 L**

Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial Distributions.

**Fundamental Sampling Distributions:** Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, t –Distribution, F- Distribution.

**UNIT - IV: Estimation & Tests of Hypotheses**                           **10 L**

Introduction, Statistical Inference, Classical Methods of Estimation, standard error of a point estimate, prediction interval
**Statistical Hypotheses:** General Concepts, Testing a Statistical Hypothesis, Large Sample: Estimating a single mean and single proportion, Two sample: Estimating the difference between two means, and Two proportions, Small sample: Tests concerning a single mean and single proportion, Two samples: tests on two means and two proportions- Two sample tests concerning variances.

**UNIT - V: Applied Statistics**                                          **10 L**

Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves, Correlation and regression, Rank correlation.

**TEXT BOOKS:**

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics forEngineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

**REFERENCE BOOKS:**

1. T. T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press.

## BUILDING MATERIALS, CONSTRUCTION AND PLANNING

**B Tech II Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CIA | SEE | TOTAL |
| **23CE302** | **Professional core** | 3 | 0 | 0 | **3** | 40 | 60 | 100 |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:48** | | | |

**Course Objectives**: The objectives of the course is to

1. List  the construction material.
2. Explain different construction techniques.
3. Understand the building bye-laws.
4. Highlight the smart building materials.
5. To understand the different types of arches , roofs and floors.
6. To understand the different types of arches, roofs and floors.

**Course Outcomes:** After the completion of the course student should be able to

1. Understand the different construction material.
2. Understand the types of cement, its manufacturing, tests and uses
3. Understand the different component parts of building and their construction practices and techniques
4. Understand about mortar, fishes and form work
5. Identify the factors to be considered in planning and construction of buildings

## UNIT – I
Stones and Bricks, Tiles: Building stones – classifications and quarrying –properties- structural requirements – dressing. Bricks – Composition of Brick earth – manufacture and  structural requirements, Fly ash, Ceramics. Timber, Aluminum, Glass, Paints and Plastics: Wood - structure – types and properties – seasoning– defects; alternate materials for Timber – GI / fiber– reinforced glass bricks, steel & aluminum, Plastics.

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

## UNIT – III
Building Components: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed; foundations – types; Damp Proof Course; Joinery – doors – windows – materials -types.
**Building Services:** Plumbing Services: Water Distribution, Sanitary – Lines & Fittings; Ventilations: Functional requirements systems of ventilations. Air- conditioning - Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Hazards – Classification of fire- resistant materials and constructions

**UNIT – IV**

Mortars, Masonry and Finishing's Mortars: Cement Mortar, 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: Types: Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

**UNIT – V**

Building Planning: Classification of buildings ,functional Planning of buildings: Sustainability and concept of Green building, General aspects to consider for planning, bye-laws and regulations, Selection of site for building construction, Principles of planning, Orientation of building and its relation to outside environment.

**TEXT BOOKS**:

1. Building Materials and Construction – Arora & Bindra, Dhanpat Roy Publications.
2. Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.
3. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain –Laxmi Publications (P) ltd., New Delhi.

**REFERENCE BOOKS**:

1. Building Materials by Duggal, New Age International.
2. Building Materials by P. C. Varghese, PHI.
3. Building Construction by PC Varghese PHI.
4. Construction Technology – Vol – I & II by R. Chubby, Longman UK.
5. Alternate Building Materials and Technology, Jagadish, Venkatarama Reddy and others;New Age Publications.

## ENGINEERING GEOLOGY

**B Tech II Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE303** | **Professional core** | **L** | **T** | **P** | **3** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **0** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:48** | | | |

**Course Objectives**: The objective of this Course is

1. To give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and Environmental Geology.
2. To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Different methods of study of minerals
3. To understand the concept of structural geology.
4. To know the Importance of Geophysical Studies by different methods.
5. To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Planning and construction of major Civil Engineering projects.

**Course Outcomes**: At the end of the course, the student will be able to:

1. Site characterization and how to collect, analyze, and report geologic data using standards in engineering practice.
2. The fundamentals of the engineering properties of Earth materials and fluids.
3. To understand the common types of ground water
4. Rock mass characterization and the mechanics of planar rock slides and topples.
5. Identify the Geology of Dams, Reservoirs, and Tunnels and able to take the necessary precautions.

## 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 study 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, Chlorite, 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, Mega scopic and microscopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, 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  Insitu and drift soils, common types of soils, their origin and occurrence in India,
Stabilization 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

**Earth Quakes:** Causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect;measures to be taken to prevent their occurrence.
**Importance of Geophysical Studies:** Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology.

### UNIT – V

**Geology of Dams, Reservoirs, and Tunnels:** Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

**TEXT BOOKS:**

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

**REFERENCE BOOKS:**

1. F.G. Bell, Fundamental of Engineering B.S. Publications, 2005.
2. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers &Distribution
3. Engineering Geology by Subinoy Gangopadhyay, Oxford university press.
4. Engineering Geology for Civil Engineers – P.C. Varghese PHI.

## STRENGTH OF MATERIALS – I

### B Tech II Year I Sem

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE304** | **Professional core** | **L** | **T** | **P** | **3** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **0** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:48** | | | |

**Pre-Requisites**: Engineering Mechanics

**Course Objectives**: The objective of this Course is

1. To understand the nature of stresses developed in simple geometries such as bars, cantilevers and beams for various types of simple loads.
2. To calculate the elastic deformation occurring in simple members for different types of loading.
3. To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
4. To know the mechanism of the development of shear force and bending moments in beams.
5. To know different failure theories adopted in designing of structural members.

**Course Outcomes**: On completion of the course, the student will be able to:

1. Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
2. Recognize various types loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
3. To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
4. Analyze various situations involving structural members subjected to plane stresses by application of Mohr's circle of stress.
5. To evaluate the Shear Stresses and Theories of Failure.

## UNIT – I

**Simple Stresses and Strains:** Concept of stress and strain- St. Venant's Principle- Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain -Pure shear and Complementary shear - Elastic modulii, Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses.
**Strain Energy** – Resilience – Gradual, sudden, and impact loadings – simple applications.

**UNIT – II**

**Shear Force and Bending Moment:** Types of beams – Concept of shear force and bending moment S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

**UNIT – III**

**Flexural Stresses:** Theory of simple bending – Assumptions – Derivation of bending equation- Section Modulus Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.
**Shear Stresses:** Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections.

**UNIT – IV**

**Deflection of Beams:** 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 and couple -Mohr's theorems – Moment area method – Application to simple cases.
**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:** Introduction – Stresses on an oblique plane 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 – Principal stresses – Mohr's circle of stresses – ellipse of stress - Analytical and graphical solutions.
**Theories of Failure**: Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Maximum shear stress theory- Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

**TEXT BOOKS:**

1. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B.C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press
 **REFERENCE BOOKS:**
1. Mechanics of material by R.C. Hibbeler, Prentice Hall publications
2. Strength of Materials by R.K. Bansal, Lakshmi Publications House Pvt. Ltd.
3. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications
4. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
5. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Press.

## FLUID MECHANICS

**B Tech II Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CIA | SEE | TOTAL |
| 23CE305 | Professional core | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| Contact Classes: 48 | Tutorial Classes: Nil | Practical Classes: Nil | | | Total Classes:48 | | | |

**Course Objectives:** The objectives of the course are to

1. Introduce the concepts of fluid mechanics useful in Civil Engineering applications.
2. Learn about the application of mass, energy and momentum conservation laws for fluid flows.
3. To obtain the velocity and pressure variations in various types of simple flows.
4. To understand the flow through pipes and control measures.
5. To know the concepts of boundary layer.

**Course Outcomes:** Upon completion of this course, students should be able to:

1. Understand definitions of the basic terms used in fluid mechanics and the broad principles of fluid statics, kinematics and dynamics.
2. Understand classifications of fluid flow.
3. Be able to apply the continuity, momentum and energy principles.
4. Analyze and design simple pipe systems.
5. Apply boundary influences on a body moving within fluid.

## UNIT – I

**Properties of Fluid**
Distinction between a fluid and a solid; Properties of fluids – Viscosity, Newton law of viscosity; vapour pressure, boiling point, cavitation ; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

**Fluid Statics**
Fluid Pressure: Pressure at a point, Pascals law, Hydrostatic law, Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micro manometers. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces.

## UNIT - II
**Fluid Kinematics**
Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; One, two- and three-dimensional flows; Streamline, path line, streak line and stream tube; stream function, velocity potential function , flow net , One, two- and three-dimensional continuity equations in Cartesian coordinates applications.

**Fluid Dynamics**

Surface and Body forces -Euler's and Bernoulli's equation; Momentum equation. Correction factors. Bernoulli's equation to real fluid flows.

## UNIT – III

**Flow Measurement in Pipes**

Practical applications of Bernoulli's equation: venture meter, orifice meter and pitot tube, applications of Momentum equations; Forces exerted by fluid flow on pipe bend, sudden enlargement in pipes.

**Flow Over Notches & Weirs**

Flow through rectangular; triangular and trapezoidal notches and weirs; End contractions; Velocity of approach. Broad crested weir.

## UNIT – IV

**Flow through Pipes**

Reynolds experiment, Reynolds number**,** Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy line, hydraulic grade line, Pipes in series, equivalent pipes, pipes in parallel, siphon, branching of pipes, three reservoir problem, power transmission through pipes. Analysis of pipe networks: Hardy Cross method and EPA NET, water hammer in pipes and control measures.

## UNIT - V

**Laminar & Turbulent Flow**

Laminar flow through circular pipes, and fixed parallel plates.

**Boundary Layer Concepts**

Prandtl contribution, Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness concepts of laminar and turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control. Drag and Lift and types of drag, magnus effect.

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**TEXT BOOKS:**
1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning PrivateLimited,2015.
3. Fluid Mechanics by R.C. Hibbeler, Pearson India Education Services Pvt. Ltd.

**REFERENCE BOOKS:**

1. Fluid Mechanics – Frank M. White – 8th Edition – Mc Graw Hill Education.
2. *Theory and Applications of Fluid Mechanics, K.Subramanya, Tata McGraw Hill
3. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas,SumanChakraborthy, Mc Graw Hill Education (India) Private Limited
4. Fluid Mechanics and Machinery,C.S.P. Ojha, R. Berndtsson and P. N. Chadramouli, OxfordUniversity Press, 2010
5. Fluid mechanics & Hydraulic Machines, Domkundwar & Domkundwar Dhanpat Rai &Co
6. Fluid Mechanics and Hydraulic Machines, R. K. Bansal, Laxmi Publication Pvt Ltd.

## Surveying laboratory-II

**B Tech II Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE306** | **Professional core** | **L** | **T** | **P** | **2** | **CIA** | **SEE** | **TOTAL** |
| | | **0** | **1** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: 16** | **Practical Classes: 32** | | | **Total Classes:48** | | | |

**Course Objectives:**

1. Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Leveling Surveying.
2. Student will be able to learn and understand about theodolite and total station in surveying.
3. Student will learn and understand how to calculate Area of plot and Ground.
4. Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile using total station.
5. Be able to set out any Civil Engineering work in the field.

**Course Outcomes:** At the end of the course student will be able to:

1. Prepare Map and Plan for required site with suitable scale.
2. Prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
3. Judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
4. Use modern instruments such as Total Station and GPS for locating and plottingany/all ground features
5. Judge the profile of ground by observing the available existing contour map.

### CYCLE – I

**Theodolite surveying:**
1. Measurement of horizontal angles and vertical angles.
2. Distance between two inaccessible points.
3. Measurement of area by theodolite traversing (Gales traverse table).
4. Determination of tachometer constants.
5. Distance between two inaccessible points using the principles of tachometer surveying.
6. Distance between two inaccessible points using the principles of trigonometric surveying

**CYCLE – II**

**Total Station:**
1. Area Measurement 8. Stake Out
2. Remote Elevation Measurement
3. Missing Line Measurement
4. Longitudinal & Cross Section Profile
5. Contouring
6. Providing a Simple Circular Curve
7. Demonstration using DGPS

**Textbooks**
1. Surveying and Leveling by NN Basak, McGraw Hill – 2014
2. Laboratory Manual

**STRENGTH OF MATERIALS LABORATORY**

**B Tech II Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE307** | **Professional core** | **L** | **T** | **P** | **1** | **CIA** | **SEE** | **TOTAL** |
| | | **0** | **0** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes:Nil** | **Practical Classes: 32** | | | **Total Classes:32** | | | |

**Course Objectives:**

The objective of the course is to make the student understand the behavior of materials under different types of loading for different types structures
1. To conduct the Tension test ,Compression test on various materials
2. To conduct the Shear test, Bending test on determinate beams
3. To conduct the Compression test on spring and Hardness test using various machines
4. To conduct the Torsion test, Impact test on various materials.
5. To conduct the deflection test on continuous beam.

**Course Outcomes:** After the completion of the course, students should be able to

1. Determine the yield stress, ultimate tensile stress, percentage elongation of steel, compressive strength of brick and concrete
2. Determine the ultimate shear stress, modulus of elasticity of steel
3. Determine the stiffness of the close coiled helical spring and hardness number of mild steel, brass, copper and aluminum.
4. Determine the modulus of rigidity and impact strength of steel.
5. Conduct flexural and torsion test to determine elastic constants.

**List of Experiments:**

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 concrete.
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

**COMPUTER AIDED DRAFTING LABORATORY**

**B Tech II Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE308** | **Professional core** | **L** | **T** | **P** | **1** | **CIA** | **SE E** | **TOTAL** |
| | | **0** | **0** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 32** | | | **Total Classes:32** | | | |

**Course Objectives:**

1. To be able to plan buildings as per NBC**.**
2. To understand various types of conventional signs and brick bonds.
3. To draw the plan section and elevation for doors, trusses and staircases.
4. To use AutoCAD tools to draw building plans, sections and elevations from a given line diagram and specifications.
5. To develop working drawings of residential buildings.

**Course Outcomes:** After completion of the course, the student should be able to

1. Plan buildings as per NBC.
2. Use different Commands of selected drafting software to draw Conventional signs and brick bonds, Plan, Section and Elevation of buildings.
3. Draw section and elevation of panelled doors and trusses.
4. Draw and detail the different components of Stair cases.
5. Develop and draw single /two storey residential building and public building as per the building by-laws, Draw Electrical layout, Plumbing layout

**List of Experiments:**

1. Planning Aspects of Building systems as per National Building Code (NBC).
2. Brick bonds: English bond & Flemish bond – Odd and Even courses.
3. Developing plan and section of dog-legged staircase.
4. Developing plan of single storied residential building.
5. Developing section and elevation of single storied residential building.
6. Developing plan of single /two storied Residential building as per Building by-laws.
7. Developing plan of public building as per building by-laws.
8. Developing section and elevation of public building.
9. Development of working drawing of building –Electrical Layout.
10. Development of working drawing of building – Plumbing Layout.

**TEXT BOOKS:**

1. Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh –LaxmiPublications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.
3. Civil Engineering Drawing-I by N. Sreenivasulu, S. Rama Rao – Radiant Publishing House.
4. Civil Engineering Drawing-II by N. Sreenivasulu – Radiant Publishing House.

**REFERENCE BOOKS:**

1. Engineering Graphics by P. J. Sha - S. Chand & Co
2. Civil Engineering Drawing-I by S. Mahaboob Basha – Falcon Publishers
3. Building drawing by M. G. Shah - Tata McGraw-Hill Education
4. Structural Engineering Drawing by S. Mahaboob Basha – Falcon Publisher

**CONSTITUTION OF INDIA**

**B Tech II Year I Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **MC3002** | **Mandatory Course** | **L** | **T** | **P** | **0** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **0** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:48** | | | |

**Course Objectives:** Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

**Course Outcomes:** Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
4. Discuss the passage of the Hindu Code Bill of 1956.

**Unit – I:** History of Making of the Indian Constitution- History of Drafting Committee.

**Unit – II:** Philosophy of the Indian Constitution- Preamble Salient Features

**Unit – III:** Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

**Unit – IV:** Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

**Unit – V:** Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

**Unit –VI:** Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

**TEXT BOOKS:**

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015

**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

**B Tech II Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23EE401** | **Engineering science** | **L** | **T** | **P** | **3** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **0** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:48** | | | |

**Pre-requisites:** Basic Electrical and Electronics Engineering

**Course Objectives:**

1. To introduce the concepts of electrical circuits and its components
2. To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
3. To study and understand the different types of DC/AC machines and Transformers.
4. To import the knowledge of various electrical installations.
5. To introduce the concept of power, power factor and its improvement.

**Course Outcomes:**

1. To analyze and solve electrical circuits using network laws and theorems.
2. To understand and analyze basic Electric and Magnetic circuits
3. To study the working principles of Electrical Machines
4. To introduce components of Low Voltage Electrical Installations
5. To identify and characterize diodes and various types of transistors.

**UNIT - I:**

**D.C. Circuits:** Electrical circuit elements (R, L and C), voltage and current sources, Ohms Law, KVL&KCL, analysis of simple circuits with dc excitation.
**A.C. Circuits:** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single- phase ac circuits , Three-phase balanced circuits, voltage and current relations in star and delta connections.

**UNIT - II:**

**Electrical Installations:** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

**UNIT - III:**

**Electrical Machines:** Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, Three-phase transformer connections. Construction and working principle of DC generators, EMF equation, working principle of DC motors, Torque equations and Speed controlof DC motors, Construction and working principle of Three-phase Induction motor, Torques equations and Speed control of Three-phase induction motor. Construction and working principle of synchronous generators.

**UNIT - IV:**

**P-N Junction and Zener Diode:** Principle of Operation Diode equation, Volt-Ampere characteristics, Zener diode characteristics and applications.
**Rectifiers and Filters:** P-N junction as a rectifier - 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 - V:**

**Bipolar Junction Transistor (BJT):** Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations.
**Field Effect Transistor (FET):** Construction, Principle of Operation, Comparison of BJT and FET, Biasing FET.

**TEXT BOOKS:**

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

**REFERENCE BOOKS:**

1. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH,2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6thedition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition byRaymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

**CONCRETE TECHNOLOGY**

**B Tech II Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | | CIA | SEE | TOTAL |
| 23CE402 | Engineering science | 3 | 0 | 0 | 3 | 40 | 60 | 100 |
| Contact Classes: 48 | Tutorial Classes: Nil | Practical Classes: Nil | | | Total Classes:48 | | | |

**Pre-Requisites**: Building Materials

**Course Objectives:** The objectives of the course are to

1. Know different types of cements as per their properties for different field applications.
2. Understand the workability setting time of concrete, segregation and bleeding.
3. Understand Design economic concrete mix proportion for different exposure conditions and intended purposes.
4. Understand the workability elasticity, creep, and shrinkage
5. Understand about the fresh concrete and know the field and laboratory tests on concrete in plastic and hardened stage.

**Course Outcomes:** After the completion of the course student should be able to

1. Determine the properties of concrete ingredients i.e., cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
2. Apply the use of various chemical admixtures and mineral additives to design cement- based materials with tailor-made properties
3. Know the elasticity ,creep, and shrinkage
4. Use advanced laboratory techniques to characterize cement-based materials.
5. Perform mix design and engineering properties of special concretes such as high- performance concrete, self-compacting concrete, and fiber reinforced concrete.

**UNIT I**

**Aggregate:** Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction– Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size- Properties Recycled aggregate.

**UNIT – II**

**Fresh Concrete:** Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing, vibration and revibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

**UNIT – III**

**Hardened Concrete:** Water / Cement ratio – Abram's Law – Gel/space ratio – Gain of strength of concrete – Maturity concept – Strength in tension and compression – Factors affecting strength – Relation between compression and tensile strength - Curing.

**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 – IV**

**Elasticity, Creep & Shrinkage** – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep– Effects of creep – Shrinkage – types of shrinkage.

**UNIT – V**

**Admixtures:** Types of admixtures – mineral and chemical admixtures.

**Mix Design:** Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

**Special Concretes:** Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete Self compacting concrete, Nano silica and Nano Alumina concrete.

**TEXT BOOKS:**

1. Concrete Technology by M.S. Shetty. – S. Chand & Co.; 2004
2. Concrete Technology by A.R. Santhakumar, 2nd Edition, Oxford university Press,New Delhi
3. Concrete Technology by M. L. Gambhir. – Tata Mc. Graw Hill Publishers, 5THEdition,New Delhi

**REFERENCE BOOKS:**

1. Properties of Concrete by A. M. Neville – Low priced Edition – 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M. Monteiro, Mc-Graw Hill Publishers.

**STRENGTH OF MATERIALS – II**

**B Tech II Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | **L** | **T** | **P** | | **CIA** | **SEE** | **TOTAL** |
| **23CE403** | **Engineering science** | | | | **3** | | | |
| | | **3** | **0** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | | **Total Classes:48** | | |

**Pre-Requisites**: Strength of Materials – I

**Course Objectives:** The objective of this Course is

1. To understand the nature of stresses developed in simple geometries shafts, springs, columns & cylindrical and spherical shells for various types of simple loads.
2. To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
3. To study deflection of beams, in different types of loadings and support conditions.
4. To study thin and thick cylinders.
5. To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural member of having different axis of symmetry.

**Course Outcome:** On completion of the course, the student will be able to:

1. Describe the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression.
2. To evaluate the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
3. Analyze strength and stability of structural members subjected to Direct, and Direct and Bending stresses.
4. To evaluate the deflection of beams subjected to various loads.
5. Understand and evaluate the shear center and unsymmetrical bending.

**UNIT – I**

**Torsion of Circular Shafts:** Theory of pure torsion – Derivation of Torsion equation - Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts – Combined bending and torsion – Design of shafts according to theories of failure. **Springs:** Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

**UNIT – II**

**Columns and Struts:** Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory– Long columns subjected to eccentric loading – Secant formula – Empirical formulae — Rankine – Gordon formula- Straight line formula – Prof. Perry's formula.
**Beam Columns:** Laterally loaded struts – subjected to uniformly distributed and concentrated loads.

**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 retaining walls chimneys and dams – conditions for stability-Overturning and sliding – stresses due to direct loading and bending moment about both axis.

**UNIT – IV**

**Thin Cylinders:** Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells.
**Thick Cylinders:** Introduction - Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders compound cylinders – Necessary difference of radii for shrinkage.

**UNIT – V**

**Unsymmetrical Bending:**
Introduction – Centroidal principal axes of section –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.
**Shear Centre:** Introduction - Shear center for symmetrical and unsymmetrical (channel, I, T and L) sections.

**TEXT BOOKS:**

1. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B. C Punmia, Dr. Ashok Kumar Jain and Dr. Arun KumarJain
3. Strength of Materials by R. Subramanian, Oxford University Press.

**REFERENCE BOOKS:**

1. Mechanics of Materials by R.C. Hibbeler, Pearson Education
2. Engineering Mechanics of Solids by Popov E.P. Prentice-Hall Ltd
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd

## HYDRAULICS AND HYDRAULIC MACHINERY

**B Tech II Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE404** | **Engineering science** | **L** | **T** | **P** | **3** | **CIA** | **SEE** | **TOTAL** |
| | | **3** | **0** | **0** | | **40** | **60** | **100** |
| **Contact Classes: 48** | **Tutorial Classes: Nil** | **Practical Classes: Nil** | | | **Total Classes:48** | | | |

**Course Objectives:** The objective of the course is

1. To Define the fundamental principles of water conveyance in open channels.
2. To Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
3. To discuss Dimensional analysis and hydraulic similitude.
4. To Study the characteristics of hydroelectric power plant and hydraulic turbines.
5. To analyze and design of hydraulic machinery and its modeling.

**Course Outcomes:** At the end of the course the student will able to

1. Apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery.
2. Understand and solve problems in uniform, gradually and rapidly varied flows inopen channel in steady state conditions.
3. Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.
4. To know the characteristics of hydroelectric power plant and its components.
5. Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages.

**UNIT – I**

**Open Channel Flow – I:** Introduction to Open channel flow-Comparison between open channel flow and pipe flow, Classification of open channel flows, Velocity distribution. Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient. Most economical sections. Computation of Uniform flow, Normal depth.
**Critical Flow:** Specific energy – critical depth - computation of critical depth – critical, sub

critical and super critical flows-Channel transitions.

**UNIT – II**

**Open Channel Flow – II:** Non-uniform flow – Gradually Varied Flow - Dynamic equation for G.V.F; Classification of channel bottom slopes – Classification and characteristics of Surface profiles – Computation of water surface profiles by Numerical and Analytical approaches. Direct step method. **Rapidly varied flow:** Elements and characteristics (Length and Height) of Hydraulic jump in rectangular channel– Types, applications and location of hydraulic jump, Energy dissipation and other uses – Positive and Negative Surges (Theory only).

**UNIT – III**

**Dimensional Analysis and Hydraulic Similitude:** Dimensional homogeneity – Rayleigh's method and Buckingham's π methods – Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problems. Distorted models.
**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.

**UNIT – IV**

**Hydraulic Turbines – I:** Elements 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 – Classification, functions and efficiency.
**Hydraulic Turbines – II:** Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed– Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation. Selection of turbines.

**UNIT – V**

**Centrifugal Pumps:** Pump installation details – classification – work done – Manometric head minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation. Reciprocating pumps – Working, discharge, slip indicator diagrams.

**TEXT BOOKS:**
1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning PrivateLimited,2015
3. Open channel flow by V.T. Chow (McGraw Hill Book Company).

**REFERENCE BOOKS:**
1. Fluid Mechanics by R. C. Hibbeler, Pearson India Education Services Pvt. Ltd
2. Fluid Mechanic & Fluid Power Engineering by D. S. Kumar (Kataria & Sons PublicationsPvt.Ltd.).
3. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, SumanChakraborthy, Mc Graw Hill Education (India) Private Limited
4. Hydraulic Machines by Banga& Sharma (Khanna Publishers).

## STRUCTURAL ANALYSIS – I

**B Tech II Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | 3 | CIA | SEE | TOTAL |
| 23C3405 | Professional Core | 3 | 0 | 0 | | 40 | 60 | 100 |
| Contact Classes: 48 | Tutorial Classes: Nil | Practical Classes: Nil | | | | Total Classes:48 | | |

**Pre-Requisites**: Strength of Materials – I

**Course Objectives:** The objective of the course is to

1. Differentiate the statically determinate and indeterminate structures.
2. To understand the nature of stresses developed in perfect frames and three hinged arches for various types of simple loads
3. Analyse the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
4. Understand the energy methods used to derive the equations to solve engineering problems
5. Evaluate the Influence on a beam for different static & moving loading positions

**Course Outcomes:** At the end of the course the student will able to

1. Analyse the statically indeterminate bars and continuous beams
2. Draw strength behavior of members for static and dynamic loading.
3. Calculate the stiffness parameters in beams and pin jointed trusses.
4. Understand the indeterminacy aspects to consider for a total structural system.
5. Identify, formulate, and solve engineering problems with real time loading

## UNIT – I

**Analysis of Perfect Frames:** Types of frames- Perfect, Imperfect and Redundant pin jointed plane frames - Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

## UNIT – II

**Energy Theorems:** Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's theorem-Unit Load Method - Deflections of simple beams and pin- jointed plane frames - Deflections of statically determinate bent frames.

**Three Hinged Arches –** Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular arches having supports at different levels.

## UNIT – III

**Propped Cantilever and Fixed Beams:** Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to uniformly distributed load - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams-Deflection of Propped cantilever and fixed beams - effect of sinking of support, effect of rotation of a support.

## 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 - effect of sinking of supports.
**Slope Deflection Method:** Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports -Determination of static and kinematic indeterminacies for frames
- Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway
- Shear force and bending moment diagrams and Elastic curve.

## UNIT – V

**Moving Loads and Influence Lines:** Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,uniformly distributed load longer than the span, uniformly distributed 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 shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span.

**TEXT BOOKS:**

1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G. S. Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt.Ltd.
3. Structural analysis T. S Thandavamoorthy, Oxford university Press

**REFERENCE BOOKS:**

1. Structural Analysis by R. C. Hibbeler, Pearson Education
2. Basic Structural Analysis by K.U. Muthu *et al.,* I.K. International Publishing House Pvt. Ltd
3. Mechanics of Structures Vol – I and II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.
4. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.
5. Fundamentals of Structural Analysis by M.L. Gamhir, PHI Learning Pvt. Ltd.

## BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

**B Tech II Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23EE406** | **Professional Core** | **L** | **T** | **P** | **1** | **CIA** | **SEE** | **TOTAL** |
| | | **0** | **0** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 32** | | | **Total Classes:32** | | | |

**Pre-requisites:** Basic Electrical and Electronics Engineering

**Course Objectives:**

1. To introduce the concepts of electrical circuits and its components
2. To understand magnetic circuits, DC circuits and AC single phase & three phase circuits and DC and AC machines.
3. To import the knowledge of various electrical installations.
4. To introduce the concepts of diodes & transistors, and
5. To impart the knowledge of various configurations, characteristics and applications.

**Course Outcomes:**

1. To analyze and solve electrical circuits using network laws and theorems.
2. To understand and analyze basic Electric and Magnetic circuits
3. To study the working principles of Electrical Machines
4. To introduce components of Low Voltage Electrical Installations
5. To identify and characterize diodes and various types of transistors.

**List of Experiments/ Demonstrations: PART A: ELECTRICAL**

1. Verification of KVL and KCL
   (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
2. Measurement of Active and Reactive Power in a balanced Three-phase circuit
3. Performance Characteristics of a Separately Excited DC Shunt Motor
4. Performance Characteristics of a Three-phase Induction Motor
5. No-Load Characteristics of a Three-phase Alternator

**PART B: ELECTRONICS**

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

**TEXT BOOKS:**

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

**REFERENCE BOOKS:**

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH,2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6thedition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition byRaymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

## FLUID MECHANICS AND HYDRAULICS MACHINERY LABORATORY

**B Tech II Year II Sem**

| Course Code | Category | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | **L** | **T** | **P** | | **CIA** | **SEE** | **TOTAL** |
| **23CE407** | **Professional Core** | **0** | **0** | **2** | 1 | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 32** | | | **Total Classes:32** | | | |

**Course Objectives**

1. To identify the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows.
2. To explain the standard measurement techniques of fluid mechanics and their applications.
3. To illustrate the students with the components and working principles of the Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
4. To identify the minor and major losses in a pipe line.
5. To analyze the laboratory measurements and to document the results in an appropriate format.

**Course Outcomes:** Students who successfully complete this course will have demonstrated ability to:

1. Describe the basic measurement techniques of fluid mechanics and its appropriate application.
2. Interpret the results obtained in the laboratory for various experiments.
3. Discover the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
4. Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
5. Write a technical laboratory report

**List of Experiments**

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulic jump
8. Determination of Manning's and Chezy's constants for Open channel flow.
9. Impact of jet on vanes
10. Performance Characteristics of Pelton wheel turbine
11. Performance Characteristics of Francis turbine
12. Performance characteristics of Keplan Turbine
13. Performance Characteristics of a single stage / multi stage Centrifugal Pump

**TEXT BOOKS:**

1. Fluid Mechanics by Modi and Seth, Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning PrivateLimited,2015
3. Open channel flow by V.T. Chow (McGraw Hill Book Company).

# CONCRETE TECHNOLOGY LABORATORY

**B Tech II Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **23CE408** | **Professional Core** | **L** | **T** | **P** | **1** | **CIA** | **SEE** | **TOTAL** |
| | | **0** | **0** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 32** | | | **Total Classes:32** | | | |

**Course Objectives:**

1. To know the various procedures to determine the characteristics of cement
2. To understand the test procedures to evaluate the characteristics of aggregates
3. To know the test procedures to find the properties of fresh concrete
4. To know the IS Method Of Mix Design Of Concrete As Per IS:10262
5. To understand the test procedures to find mechanical properties of hardened concrete

**Course Outcomes**: After completion of the course, the student should be able to

1. Perform various tests required to assess the characteristics of cement
2. Test and evaluate the properties of fine and coarse aggregates and determine its suitability for construction
3. Evaluate the fresh and hardened properties of concrete
4. Design the concrete mix for required strength and test its performance characteristics
5. To know the test procedures to find mechanical properties of hardened concrete

**LIST OF EXERCISES:**
  **1. Tests on Cement:**
   a) Soundness.
   f) Compressive strength.
  **2. Tests on Aggregates:**
   a) Specific gravity of fine aggregate.
   b) Specific gravity of coarse aggregate.
   c) Bulking of fine aggregate.
   d) Grading of fine aggregate
  **3. IS method of mix design of normal concrete as per IS : 10262**
  **4. Tests on Fresh Concrete:**
   a) Slump cone test.
   b) Compacting factor test.
   c) Vee-Bee consist meter test.
  **5. Tests on Hardened Concrete:**
   a) Compressive & Tensile strength tests.
   b) Modulus of elasticity of concrete.
   c) Non-destructivetestingofconcrete.

**GENDER SENSITIZATION LABORATORY**

**B Tech II Year II Sem**

| Course Code | Category | Hours/ Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| **MC4002** | **Professional Core** | **L** | **T** | **P** | **1** | **CIA** | **SE E** | **TOTAL** |
| | | **0** | **0** | **2** | | **40** | **60** | **100** |
| **Contact Classes: Nil** | **Tutorial Classes: Nil** | **Practical Classes: 32** | | | **Total Classes:32** | | | |

**Course Description**

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

**Course Objectives:**

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

**Learning Outcomes:**

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labor and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. 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.

## Unit-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men- Preparing for Womanhood. Growing up Male. First lessons in Caste.

## Unit – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

## Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Sharethe Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. - Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights- Gender and Mainstreaming

## Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu*".
Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

**Unit – V: GENDER AND CULTURE**

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender andPopular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

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.**

➤ *Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".*

**ESSENTIAL READING**: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender*" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

**ASSESSMENT AND GRADING:**

1. Discussion & Classroom Participation: 20%
2. Project/Assignment: 30%
3. End Term Exam: 50%