SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA, NAAC)
Sheriguda Village, Ibrahimpatnam Mandal, Ranga Reddy Dist. – 501 510

BACHELOR OF TECHNOLOGY
CIVIL ENGINEERING

CHOICE BASED CREDIT SYSTEM (CBCS)

ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI FOR

I, II, III & IV YEARS – I & II SEMESTERS

UNDER AUTONOMOUS STATUS FOR THE BATCHES ADMITTED FROM

THE ACADEMIC YEAR 2020 – 21

B.Tech. Regular Four Year Degree Programme
(For the batches admitted from the academic year 2020–21)
&
B.Tech. (Lateral Entry Scheme)
(For the batches admitted from the academic year 2021 - 22)

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

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi, Accredited by NAAC and Accredited by NBA)
Sheriguda Village, Ibrahimpatnam Mandal, Ranga Reddy Dist. – 501 510

Vision of the Institute

To be a premier institution in engineering & technology and management for competency, values and social consciousness

Mission of the Institute

IM_1: Provide high quality academic programs, training activities and research facilities.

IM_2: Promote continuous industry – institute interaction aimed at promoting employability, entrepreneurship, leadership and research aptitude among stakeholders

IM_3: Contribute the economic and technological development of the region, state and Nation.

PROGRAM OUTCOMES (POs):

PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**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.
PO3	**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.
PO4	**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.
PO5	**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.
PO6	**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.
PO7	**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.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**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.
PO11	**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.
PO12	**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.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

ACADEMIC REGULATIONS 2020 (BR20) FOR CHOICE BASED CREDIT SYSTEM (CBCS) B.TECH. DEGREE COURSES

(Applicable for Students admitted from the academic year 2020-2021)

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institute / College" means an institute / college designated as autonomous institute / college by the UGC, New Delhi and JNTUH Statutes, 2014.
- "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs granted by the University for promoting excellence.
- "Commission" means University Grants Commission (UGC), New Delhi.
- "AICTE" means All India Council for Technical Education.
- "University" means the Jawaharlal Nehru Technological University, Hyderabad.
- "College" means SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY, Hyderabad unless indicated otherwise by the context.
- "Programme" means: Bachelor of Technology (B.Tech) degree programme
- "Branch" means specialization in a programme like B.Tech degree programme in Electronics and Communication Engineering, B.Tech degree programme in Computer Science and Engineering etc
- "Course" or "Subject" means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester. For example, R20MTH1101: Mathematics - I, R20CSE1101 : Programming for Problem Solving etc.
- T – Tutorial, P – Practical, D – Drawing, L - Theory, C – Credits

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

ACADEMIC REGULATIONS 2020 (BR20) FOR CHOICE BASED CREDIT SYSTEM (CBCS) B.TECH. DEGREE COURSES

(Applicable for Students admitted from the academic year 2020-2021)

1 Courses of study

The following courses of study (Branches) are offered at present by the college with specialization in the B. Tech. Course:

Sl. No.	Branch Code	Branch
1	1	CIVIL ENGINEERING
2	2	ELECTRICAL & ELECTRONICS ENGINEERING
3	3	MECHANICAL ENGINEERING
4	4	ELECTRONICS & COMMUNICATION ENGINEERING
5	5	COMPUTER SCIENCE & ENGINEERING
6	12	INFORMATION TECHNOLOGY
7.	33	COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
8.	67	CSE (DATA SCIENCE)
9.	66	CSE (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)
10.	62	CSE (CYBER SECURITY)
11.	69	CSE – INTERNET OF THINGS (IoT)

1.1 Eligibility Criteria for Admission

The eligibility criteria for admission into First year of four year B.Tech. degree programme shall be as mentioned below:

- The candidate shall be an Indian National.
- The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted
- Passed either Intermediate Public Examination (I.P.E) conducted by the Board of Intermediate Education, Telangana State, with Mathematics, Physics and Chemistry as optional subjects or any equivalent examination recognized by Board of Intermediate Education, Telangana State
- Seats in each programme in the Institution are classified into category-A and Category-B as per the Government Orders (G.Os.)

1.1.1 Category–A Seats:

These seats will be filled through counseling as per the rank at the Common Entrance Test (EAMCET) conducted by the State Government and State Government G.Os. as per other admission criteria laid down in the G.Os.

1.1.2 Category-B Seats :

These seats will be filled by the institute as per the G.Os. Issued by State Government from time to time.

1.1.3 Category: Lateral Entry

The Candidates shall be admitted into the Third semester, based on the rank secured by the candidate at Engineering Common Entrance Test (ECET (FDH)) by the Convener, ECET

1.1.4 Medium of Instruction

The medium of instructions for the entire under graduate progrmme in Engineering & Technology will be English only.

2. B.Tech Program Structure

2.1 Semester Scheme

Each under graduate programme is of 4 academic years (8 semesters) with the academic year divided into two semesters of 22 weeks (≥ 90 instructional days) each, semester having – 'Continuous Internal Evaluation (CIE) 'AND' Semester End Examination (SEE)' under Choice Based Credit System (CBCS) indicated by UGC, and curriculum/course structure as suggested by JNTUH & AICTE are followed.

After eight academic years of course of study, the candidate is permitted to write only supplementary examinations for two more years so that within 10 years the students can complete the B.Tech Degree.

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

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.

2.3 Subject Course Classification

All subjects/ courses offered for the under graduate programme (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	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering.
6		OE – Open Electives	
7	Core Courses	Project Work	B.Tech. project or UG project or UG major project or Project Stage I & II
8		Industrial training/ Mini- project	Industrial training/ Summer Internship/ Industrial Oriented Mini-project/ Mini-project
9		Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branch
10	Minor courses	-	of Engineering. 1 or 2 Credit courses (subset of HS)
11	Mandatory Courses (MC)	-	Mandatory courses (non-credit)

3 Attendance Requirements:

3.1 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 (excluding attendance in mandatory courses like Environmental Science, Constitution of 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.

3.2 Shortage of attendance in aggregate up to 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.

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

3.4 Shortage of attendance below 65% in aggregate shall in no case be condoned.

3.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered.

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

4 Academic Requirements:

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in item no.3.

4.1 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% (25 marks out of 70 marks) in the semester end examination, 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.

4.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Industrial Oriented Mini Project/Summer Internship and 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 Industrial Oriented Mini Project/Summer Internship, or does not make a presentation of the same before the evaluation committee as per schedule, or (ii) does not present the seminar as required in the IV year I Semester, or (iii) secures less than 40% marks in Industrial Oriented Mini Project/Summer Internship and seminar evaluations.

4.3 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. ii) Must have secured at least 18 credits out of 37 credits i.e., 50% credits upto 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. ii) Must have secured at least 47 credits out of 79 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 year second semester. ii) Must have secured at least 73 credits out of 123 credits i.e.,60% credits upto third year second semester from all the relevant regular 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.

4.4. 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 ≥ 5.0 (in each semester), and CGPA (at the end of each successive semester) ≥ 5.0, (iv) passes all the mandatory courses, to successfully complete the under graduate programme. The performance of the student in these 160 credits shall be taken into account for the calculation of 'the final CGPA (at the end of under graduate programme), and shall be indicated in the grade card of IV year II semester.

4.5 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) then no SGPA/CGPA will be printed on the respective Grade Card. However he 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.

4.6 A student detained in a semester due to shortage of attendance may be readmitted in the same semester in the next academic year for fulfillment of academic requirements. The academic regulations under which a student has been readmitted shall be applicable. However, no grade allotments or SGPA/

CGPA calculations will be done for the entire semester in which the student has been detained.

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

4.8 Supplementary examinations in the failed subject only for five times, in addition to one regular attempt (total six attempts). If the student is unable to clear the subject in six attempts altogether, the student shall appear for the examination in the same subjects with the revised syllabus i.e, the syllabus of equivalent subjects prevailing for the regular students in that academic year. However if no subject with 'similar title is offered in the current regulations, the examination shall be conducted in the failed subject with the syllabus which the student studied during his/her regular course of study.

5 Evaluation - Distribution and Weightage of marks

The performance of a student in every subject/course (including Practical's and Project Stage – I & II) will be evaluated for 100 marks each, with 30 marks allotted for CIE (Continuous Internal Evaluation) and 70 marks for SEE (Semester End-Examination).

5.1 For theory subjects, during a semester, there shall be two mid-term examinations conducted as per the academic calendar. Each mid examination is evaluated for 25 marks. First mid examination should be conducted for 1 to 2 ½ Units of syllabus and the second mid examination shall be conducted for 2 ½ to 5 Units of syllabus. The mid descriptive type exam paper consists of Section-A and Section-B.

Section-A [compulsory] consists of 5 short answer questions and each carries one mark.

Section-B consists of 6 questions out of which 4 are to be answered and each question carries 5 marks. The time duration of each mid examination is 90 minutes

Two assignments are to be given to students covering the syllabus of first mid and second Mid examinations and these assignments and Attendance are evaluated for 5 marks each. The first assignment shall be submitted before first mid examinations and second Assignment should be submitted before second mid examination.

At the end of the semester Internal Marks Maximum of 30 for the respective subjects are calculated as an average of the two midterm examinations

5.2 The semester end examinations (SEE) will be conducted for 70 marks consisting of two parts viz. i) Part- A for 20 marks, ii) Part - B for 50 marks.

Part-A is a compulsory question (numbered 1) consisting of **FIVE** short answer questions of four marks each and only one question to be set from a unit.

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

5.2.1 For subjects like **Engineering Graphics/Engineering Drawing**, the SEE shall consist of five questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions. There shall be no Part – A, and Part – B system.

5.2.2 For subjects like **Machine Drawing Practice/Machine Drawing**, the SEE shall be conducted for 70 marks consisting of two parts viz. (i) Part – A for 30 marks. 3 out of 4 questions must be answered, (ii) Part – B for 40 marks. Part – B is compulsory.

5.2.3 For the Subject Estimation, Costing and Project Management, the SEE paper should consist of Part- A, Part-B and Part C.

Part – A : 1 out of 2 questions from Unit – I for 30 Marks,

Part – B : 1 out of 2 questions from Unit – II for 10 Marks

Part – C : 3 out of 5 questions from Units – III, IV, V for 30 Marks.

5.3 For practical subjects there shall be a continuous internal evaluation during the semester for 30 marks of CIE and 70 marks for semester end examination. Out of the 30 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned. The semester end examination shall be conducted with an external examiner and the laboratory teacher.

The external examiner shall be appointed by the Chief Superintendent in consultation with Dean/Controller of the Examination selects an external examiner from the list of experts in the relevant branch submitted by the HOD of the concern branch.

5.4 For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, machine drawing practice and estimation), the distribution shall be 30 marks for continuous internal evaluation (15 marks for day-to-day work and 15 marks for internal tests) and 70 marks for semester end examination. There shall be two internal tests in a semester and the average of the two shall be considered for the award of marks for internal tests.

5.5 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 marks allotted) in the continuous internal evaluation for passing the subject/course. No marks or letter grades shall be allotted for mandatory/non-credit courses. Only 'P'/'F' (Pass/Fail) shall be indicated in Grade Card.

5.6 There shall be a Technical seminar presentation in IV year I semester. For the Technical seminar, the student shall collect the information on a specialized topic, prepare a technical report, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 100 internal marks. There shall be no semester end examination for the seminar.

5.7 There shall be a Comprehensive Viva-Voce in IV year I semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated for 100 marks by the Committee. There will be no internal assessment for the Comprehensive viva-voce.

5.8 There shall be an Industrial Oriented Mini Project/Summer Internship, in collaboration with an industry of their specialization. Students will register for this immediately after III year II semester examinations and pursue it during summer vacation. Industrial Oriented Mini Project/Summer Internship shall be submitted in a report form and presented before the committee in IV year I semester. It shall be evaluated for 100 external marks.

The committee consists of an external examiner, Head of the Department, supervisor of the Industrial Oriented mini project/Summer Internship and a senior faculty member of the department. There shall be no internal marks for Industrial Oriented Mini Project/Summer Internship.

5.9 The Project work shall be started by the student in the beginning of the IV year II Semester. Out of a total of 200 marks for the project work, 50 marks shall be for Internal Evaluation and 150 marks for the Semester end Examination. The Semester end Examination (viva-voce) shall be conducted by a committee comprising of an external examiner, Head of the Department and the project supervisor. The evaluation of project work shall be conducted at the end of the IV year II Semester. The Internal Evaluation shall be on the basis of three seminars conducted during the IV year II semester for 20 marks by the committee consisting of Head of the Department, project supervisor and senior faculty member of the Department and for 30 marks by the supervisor of the project.

6 Credit Transfer System for MOOCs against Open / Professional Electives

The credit transfers of MOOC (Offered by SWAYAM/NPTEL / COURSERA etc.,) against Professional Electives **(3-I,3-II)** and Open electives **(4-I, 4-II)**. These rules shall be applicable from Academic Year 2020-2021.

6.1 The student shall be required to submit an **Application form/ UNDERTAKING**for final approval for credit transfer of MOOC against open electivealong with the photocopy of MOOC completion certificate to chairperson through HOD before the allotment of Professional Electives **(3-I, 3-II)** and Open electives **(4-I, 4-II)** to the UG/PG students.

6.2 Only those registered MOOC courses are allowed for Credit Transfer which have credits more than or equal to the credits assigned to Open Elective course or the MOOC course should be of minimum **4/8/12** weeks duration. The student can also choose to register and complete more than one MOOC of same or different subject areas. However, the total number of weeks of all such individual courses should be more than or equal to 4/8/12 and should either belong to SWAYAM-NPTEL OR otherwise COURSERA. However, the candidates have to submit MOOC certificate/certificates to acquire the total number of credits offered against the elective subject.

Credit Equivalence		
S. No.	**Course Duration**	**Credit Equivalence for Transfer of Credits**
UG / PG		
1	4 Weeks	1Credit
2	8 Weeks	2 Credits
3	12 Weeks	3 Credits

6.3 While transferring the credit from MOOC against open elective or professional elective, the student can opt following combinations of MOOC with the approval of coordinator and head of the department.

I) for **3 credits:** a) 12 Weeks **(1)** (or)
b) 8 Weeks **(1)** + 4 Weeks **(1)** (or)
c) 4 Weeks **(1)** + 4 Weeks **(1)** + 4 Weeks **(1)**

II) for **2 Credits:** a) 8 Weeks **(1)** (or)
b) 4 Weeks **(1)** + 4 Weeks **(1)**

6.4 Credit transfer shall not be allowed, if the contents and topic of the MOOC which is identical (20% overlapping is permissible) to any of the courses including Open Elective courses offered by any department for UG/PG students. It is the responsibility of the HOD to verify and recommend the courses requested by students is satisfying criteria 2.

6.5 Scores of the MOOC courses completed by the students on permitted platforms satisfying all above conditions are valid till **2** years. Only such MOOC courses/Scores will be considered for credit transfer.

6.6 If the MOOC course in which the student is interested does not fall in the parent discipline of the student and belongs to other Engineering disciplines existing at Basic Sciences/Humanities/Management, the Departmental coordinator will seek opinion of concerned HoD to verify the matching of content of MOOC with that of Open Elective courses/Professional Elective courses offered.

6.7 If the above mentioned conditions are fulfilled, the Departmental Interdisciplinary coordinator will recommend the case to coordinator, Interdisciplinary Courses for final approval and accordingly notify to the students. After getting approval from HoD, the student may register for the MOOC course he/she can be allowed for and complete the same as per the requirements for credit transfer.

6.8 The coordinator, Interdisciplinary Courses, will consolidate the lists from all departments and submit the same for final approval. Chairperson will submit the list to Principal / Chairman.the final list will be forwarded to the Controller of Examination for further action.

6.9 The department/institution is not responsible for the registration of online MOOC. The candidates have to pay for registration of such courses.

6.10 Alternatively for online MOOC courses, the candidates have a choice to opt a subject from open/professional electives. The credit grade point mapping framework could be awarded based on the Grading Procedure para 7.2

7 Grading procedure

7.1 Grades will be awarded to indicate the performance of students in each theory subject, Laboratory / Practical's, Seminar, Industry Oriented Mini Project, and Project Stage – I & II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 5 above, a corresponding letter grade shall be given.

7.2 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	**F(Ab)**	**0**

7.3 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.

7.4 To a student who has not appeared for an examination in any subject, 'F(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.

7.5 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.

7.6 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

7.7 A student passes the subject/ course only when GP ≥ 5 ('C' grade or above)

7.8 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of credit points (∑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

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

where 'i' is the subject indicator index (takes into account all subjects in a semester),'N' is the no. of subjects 'registered' for the semester (as specifically required and listed under the course structure of the parent department), 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 ith subject.

7.9 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 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

$$\mathbf{CGPA = \{ \sum_{j=1}^{M} C_j G_j \} / \{ \sum_{j=1}^{M} C_j \} \ldots for\ all\ S\ semesters\ registered}$$

(i.e., up to and inclusive of S semesters, S ≥ 2),

where 'M' is the total no. of subjects (as specifically required and listed under the course structure of the parent department) the student has 'registered' i.e., from the 1st semester onwards up to and inclusive of the 8th 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 jth 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

7.10 Calculation process of CGPA 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.

7.11 For merit ranking or comparison purposes or any other listing, only the 'rounded off' values of the CGPAs will be used. 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 sitting he passed his last exam in that semester.

8 Grace Marks

Examination branch adds the grace marks, not exceeding 0.15% marks of the course total marks to one or two subjects in which the student failed if adding these grace marks helps the student to

i) Pass in these one or two failed subjects and
ii) Get eligibility to receive the degree.

These grace marks shall be added only when the candidate submits an undertaking stating that **"he/she will never apply for the supplementary exams conducted by the Institution in the future"** to the Principal.

9 Passing standards

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

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. of credits, grade earned, etc.), credits earned.

10 Declaration of results

Computation of SGPA and CGPA are done using the procedure listed in 6.6 to 6.9.

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

% of Marks = (final CGPA – 0.5) x 10

11 Award of degree

11.1 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 ≥ 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 chosen branch of Engineering selected at the time of admission.

11.2 A student who qualifies for the award of the degree as listed in item 10.1 shall be placed in the following classes.

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

A. 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.
B. Should have secured a CGPA ≥ 8.00, at the end of each of the 8 sequential semesters, starting from I year I semester onwards.
C. 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'.**

11.4 Students with final CGPA (at the end of the under graduate programme) ≥ 6.50 but < 8.00 shall be placed in **'First Class'.**

11.5 Students with final CGPA (at the end of the under graduate programme) ≥ 5.50 but < 6.50, shall be placed in **'Second Class'.**

11.6 All other students who qualify for the award of the degree (as per item 10.1), with final CGPA (at the end of the under graduate programme) ≥ 5.00 but < 5.50, shall be placed in **'Pass Class'.**

11.7 A student with final CGPA (at the end of the under graduate programme) < 5.00 will not be eligible for the award of the degree.

12 Withholding of Results

If the student has not paid the fees to the University at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the 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.

13. Transitory Regulations

Students who have discontinued or have been detained for want of attendance or any other academic requirements, may be considered for readmission as and when they become eligible. They have to take up Equivalent subjects, as substitute subject in place of repetition of subjects as decided by the Institute Academic Committee.

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

15. The decision of the Institute Academic Committee will be final in respect of equivalent subjects for those students who are transferred from other colleges. The procedure for permitting students to transfer from other colleges will be decided by the principal / Institute Academic Committee keeping the Government Rules concerned in view.

16. TERMINATION FROM THE PROGRAMME

The admission of a student to the programme may be terminated and the student is asked to leave the college in the following circumstances:

i. The student fails to satisfy the requirements of the programme within the maximum period stipulated for that programme.

ii. The student fails to satisfy the norms of discipline specified by the institute from time to time.

17. CURRICULUM

i. For each programme being offered by the Institute, a Board of Studies (BOS) is constituted in accordance with AICTE / UGC / JNTUH statutes.

ii. The BOS for a programme is completely responsible for designing the curriculum once in three years for that programme.

18. GRIEVANCES REDRESSAL COMMITTEE

"Grievances and Redressal Committee" (General) constituted by the principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. The composition of the complaints cum redressal committee shall be:

Headed by Senior Faculty member
Heads of all departments

A senior lady staff member from each department (if available)

The committee constituted shall submit a report to the principal of the college, the penalty to be imposed. The Principal upon receipt of the report from the committee shall, after giving an opportunity of being heard to the person complained against, submit the case with the committee's recommendation to the Governing Body of the college. The Governing Body shall confirm with or without modification the penalty recommended after duly following the prescribed procedure.

19. MALPRACTICE PREVENTION COMMITTEE

A malpractice prevention committee shall be constituted to examine and punish the students who does malpractice / behaves indiscipline in examinations. The committee shall consist of:

Principal.
Subject expert of which the subject belongs to.
Head of the department of which the student belongs to.
The invigilator concerned.
In-charge Examination branch of the college.

The committee constituted shall conduct the meeting on the same day of examination or latest by next working day to the incidence and punish the student as per the guidelines prescribed by the JNTUH/SICET from time to time.

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

20. STUDENT'S FEEDBACK

It is necessary for the Colleges to obtain feedback from students on their course work and various academic activities conducted. For this purpose, suitable feedback forms shall be devised by the College and the feedback obtained from the students regularly in confidence, by administering the feedback form in print or on-line in electronic form.

The feedback received from the students shall be discussed at various levels of decision making at the College and the changes/ improvements, if any, suggested shall be given due consideration for implementation.

21. CONDUCT AND DISCIPLINE

i. Each student shall conduct himself / herself in a manner befitting his / her association with SICET.

ii. He / she is expected not to indulge in any activity, which is likely to bring disrepute to the college.

iii. He / she should show due respect and courtesy to the teachers, administrators, officers and employees of the college and maintain cordial

relationships with fellow students.

iv. Lack of courtesy and decorum unbecoming of a student (both inside and outside the college), willful damage or removal of Institute's property or belongings of fellow students, disturbing others in their studies, adoption of unfair means during examinations, breach of rules and regulations of the Institute, noisy and unruly behaviour and similar other undesirable activities shall constitute violation of code of conduct for the student.

v. **Ragging in any form is strictly prohibited and is considered a serious offence. It will lead to the expulsion of the offender from the college.**

vi. Violation of code of conduct shall invite disciplinary action which may include punishment such as reprimand, disciplinary probation, debarring from the examination, withdrawal of placement services, withholding of grades / degrees, cancellation of registration, etc., and even expulsion from the college.

vii. Principal, based on the reports of the warden of Institute hostel, can reprimand, impose fine or take any other suitable measures against an inmate who violates either the code of conduct or rules and regulations pertaining to college hostel.

viii. A student may be denied the award of degree / certificate even though he / she has satisfactorily completed all the academic requirements if the student is found guilty of offences warranting such an action.

ix. Attendance is not given to the student during the suspension period.

22. Other Issues

The quality and standard of engineering professionals are closely linked with the level of the technical education system. As it is now recognized that these features are essential to develop the intellectual skills and knowledge of these professionals for being able to contribute to the society through productive and satisfying careers as *innovators, decision makers and/or leaders* in the global economy of the 21st century, it becomes necessary that certain improvements are introduced at different stages of their education system. These include:

a) Selective admission of students to a programme, so that merit and aptitude for the chosen technical branch or specialization are given due consideration.

b) Faculty recruitment and orientation, so that qualified teachers trained in good teaching methods, technical leadership and student's motivation are available.

c) Instructional/Laboratory facilities and related physical infrastructure, so that they are adequate and are at the contemporary level.

d) Access to good library resources and Information & Communication Technology **(ICT)** facilities, to develop the student's *mind* effectively.

These requirements make it necessary for the College to introduce improvements like:

a) Teaching-learning process on modern lines, to provide *Add-On* Courses for *audit*/credit in a number of peripheral areas useful for student's self development.

b) Life-long learning opportunities for faculty, students and alumni, to facilitate their dynamic interaction with the society, industries and the world of work.

c) Generous use of ICT and other modern technologies in everyday activities.

23. General

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

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

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

iv. In the case of any discrepancy/ambiguity/doubt arises in the above rules and regulations, the decision of the Principal shall be final.

v. The College may change or amend any or all of the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students concerned with effect from the dates notified by the College.

24. Academic Regulations for B.Tech. (Lateral Entry Scheme)

(Applicable for students admitted from the academic year 2021-2022)

24.1 i. A student shall register for all 123 credits and secure 123 credits with CGPA ≥ 5 from II year to IV year B.Tech. Programme (LES) for the award of B.Tech. degree.

ii. A student who fails to fulfill the requirement for the award of the degree in six academic years from the year of their admission, shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

iii. The same attendance regulations are adopted as that of B.Tech. Four year degree course.

24.2 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	iii) Regular course of study of second year second semester. iv) Must have secured at least 21 credits out of 42 credits i.e., 50% 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	iii) Regular course of study of third year second semester. iv) Must have secured at least 51 credits out of 86 credits i.e.,60% credits upto 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.

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

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	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 candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Asst. – 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 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.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.

10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
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 candidate has appeared 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 University for further action to award suitable punishment.	

Note : Students are advised to read the above regulations thoroughly. Ignorance with regards to the regulations cannot be construed as an excuse.

Frequently asked Questions and Answers about autonomy

1. **Who grants Autonomy? UGC, Govt., AICTE or University**

   In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy.

2. **Shall SICET award its own Degrees?**

   No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY on the Degree Certificate.

3. **What is the difference between a Deemed University and an Autonomy College?**

   A Deemed University is fully autonomous to the extent of awarding its own Degree. A Deemed University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4. **How will the Foreign Universities or other stake – holders know that we are an Autonomous College?**

   Autonomous status, once declared, shall be accepted by all the stake holders. Foreign Universities and Indian Industries will know our status through our college website.

5. **What is the change of Status for Students and Teachers if we become Autonomous?**

   An autonomous college carries a prestigious image. Autonomy is actually earned out of continued past efforts on academic performances, capability of self-governance and the kind of quality education we offer.

6. **Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?**

   There is a built in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee is a Non – Statutory body, which will keep a watch on the academics and keep its reports and recommendations every year. In addition to Academic Council, the highest academic body also supervises the academic matters. At the end of three years, there is an external inspection by the University for this purpose. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7. **Will the students of SICET as an Autonomous College qualify for University Medals and Prizes for academic excellence?**

   No, SICET has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural and co-curricular organized by the University the students shall qualify.

8. **Can SICET have its own Convocation?**

   No, since the University awards the Degree the Convocation will be that of the University.

9. Can SICET give a provisional degree certificate?

Since the examinations are conducted by SICET and the results are also declared by SICET, the college sends a list of successful candidates with their final percentage of marks to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.

10. Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment, besides the autonomous status is more responsive to the needs of the industry. As a result, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11. What is the proportion of Internal and External Assessment as an Autonomous College?

Presently, it is 30% for internal assessment and 70% for external assessment. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12. Will there be any Revaluation or Re-Examination System?

No. There will not be any Revaluation system or Re-examination. But, there is a personal verification of the answer scripts.

13. How fast Syllabi can be and should be changed?

Autonomy allows us the freedom to change the syllabi as often as we need.

14. Will the Degree be awarded on the basis of only final year performance?

No. The percentage of marks will reflect the average performance of all the semesters put together.

15. Who takes Decisions on Academic matters?

The Academic Council of College is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like the BOS which are like Boards of Studies of the University.

16. What is the role of Examination committee?

The Exam Committee is responsible for the smooth conduct of inter and external examinations. All matters involving the conduct of examinations, spot valuations, tabulations, preparation of Memorandum of Marks etc fall within the duties of the Examination Committee.

17. Is there any mechanism for Grievance Redressal?

Yes, the college has grievance redressal committee, headed by a senior faculty member of the college.

18. How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulations.

19. Who declares the result?

The result declaration process is also defined. After tabulation work the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the College Academic Council for its approval. The result is then declared on the college notice boards as well put on the web site of the college. It is eventually sent to the University.

20. What is our relationship with the Jawaharlal Nehru Technological University, Hyderabad?

We remain an affiliated college of the Jawaharlal Nehru Technological University, Hyderabad. The University has the right to nominate its members on the academic bodies of the college.

21. Shall we require University approval if we want to start any New Courses?

Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

22. Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes are also enjoying autonomous status.

23. How many exams will be there as an autonomous college?

This is defined in the Rules & Regulations.

24 Is the College adapting Choice Based Credit System (CBCS) or Not ?
Yes, this College has adapted CBCS system with effect from the Academic Year 2016-17.

25. Note : What is Choice Based Credit System (CBCS)?

Choice Based Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).

******

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

Choice Based Credit System (CBCS)

REGULATIONS – BR20

B. Tech. - CIVIL ENGINEERING

(Common to ME & CIVIL)

I YEAR I SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20MTH1101	Mathematics – I (Linear Algebra and Calculus)	3	1	0	4
2	R20EPH1101	Engineering Physics	3	1	0	4
3	R20CSE1101	Programming for Problem Solving	3	1	0	4
4	R20MED1102	Engineering Graphics	1	0	4	3
5	R20EPH11L1	Engineering Physics Lab	0	0	3	1.5
6	R20CSE11L2	Programming for Problem Solving Lab	0	0	3	1.5
7	R20HAS1102	Environmental Science	3	0	0	0
8	R20IPG1101	Induction Programme for Three Weeks	0	0	0	0
		Total Credits	**13**	**3**	**10**	**18**

I YEAR II SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20MTH1102	Mathematics – II (Advanced Calculus)	**3**	**1**	**0**	**4**
2	R20ECH1101	Chemistry	**3**	**1**	**0**	**4**
3	R20MED1103	Engineering Mechanics	**3**	**1**	**0**	**4**
4	R20MED1101	Engineering Workshop	**1**	**0**	**3**	**2.5**
5	R20HAS1101	English	**2**	**0**	**0**	**2**
6	R20ECH11L1	Engineering Chemistry Lab	**0**	**0**	**3**	**1.5**
7	R20HAS11L2	English Language and Communication Skills Lab	**0**	**0**	**2**	**1**
8	R20COI1101	Constitution of India	3	0	0	0
9	R20ITK1101	Essence of Indian Traditional Knowledge	3	0	0	0
		Total Credits	**18**	**3**	**8**	**19**

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

Choice Based Credit System (CBCS)

REGULATIONS – BR20

B. Tech. CIVIL ENGINEERING

II YEAR I SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV2101	Surveying & Geomatics	3	0	0	3
2	R20MED2105	Hydraulics and Hydraulic Machinery	3	0	0	3
3	R20CIV2102	Strength of Materials-I	3	0	0	3
4	R20MTH2101	Probability Distributions and Statistical Methods	3	1	0	4
5	R20MED2106	Fluid Mechanics	3	0	0	3
6	R20CIV21L1	Surveying Lab	1	0	3	2
7	R20CIV21L2	Strength of Materials Lab	0	0	3	1.5
8	R20MED21L4	Hydraulics & Hydraulic Machinery Lab	0	0	3	1.5
9	R20MAC2100	Gender Sensitization Lab	0	0	2	0
		Total Credits	**16**	**1**	**11**	**21**

II YEAR II SEMESTER **COURSE STRUCTURE**

S.No	Course Code	Course Title	L	T	P	Credits
1	R20EEE2204	Basics of Electrical & Electronics Engineering	3	0	0	3
2	R20CIV2201	Building Materials, Construction and Planning	3	0	0	3
3	R20CIV2202	Strength of Materials-II	3	1	0	4
4	R20CIV2203	Structural Analysis -I	3	1	0	4
5	R20CIV2204	Engineering Geology	3	0	0	3
6	R20CIV22L1	Computer aided Civil Engineering Drawing	0	0	3	1.5
7	R20CIV22L2	Engineering Geology lab	0	0	3	1.5
8	R20EEE22L3	Electrical & Electronics Lab	0	0	2	1
9	R20MAC2200	Intellectual Property Rights	3	0	0	0
		Total Credits	**18**	**2**	**8**	**21**

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

Choice Based Credit System (CBCS)

REGULATIONS – BR20

B. Tech. CIVIL ENGINEERING

III YEAR I SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P/D	Credits
1	R20CIV3101	Structural Analysis-II	3	1	0	4
2	R20CIV3102	Geotechnical Engineering	3	1	0	4
3	R20CIV3103	Structural Engineering –I**(RCC)**	3	1	0	4
4	R20CIV3104	Transportation Engineering-I	3	1	0	4
Professional Elective-I						
5	R20CIV3111	Concrete Technology	3	0	0	3
	R20MBA3112	Management Fundamentals for Engineers				
	R20CIV3113	Basics of Mechanical Engineering				
	R20MAC3100	MOOCs-I				
6	R20CIV31L1	Highway Engineering and Concrete Technology Lab	0	0	2	1
7	R20CIV31L2	Geotechnical Engineering Lab	0	0	2	1
8	R20HAS31L1	Advanced Communication Skills Lab	0	0	2	1
9	R20CSE3124	Cyber Security	3	0	0	0
		Total Credits	**18**	**4**	**6**	**22**

III YEAR II SEMESTER **COURSE STRUCTURE**

S. No	Course Code	Course Title	L	T	P	Credits
1	R20CIV3201	Hydrology & Water Resources Engineering	3	1	0	4
2	R20CIV3202	Environmental Engineering	3	0	0	3
3	R20MBA3201	Engineering Economics & Accounting	3	0	0	3
4	R20CIV3203	Structural Engineering –II**(Steel)**	3	1	0	4
Professional Elective –II						
5	R20CIV3221	Prestressed Concrete Structures	3	0	0	3
	R20CIV3222	Elements of Earth Quake Engineering				
	R20CIV3223	Finite Element Analysis				
	R20MAC3200	MOOCs-II				
6		**Open Elective –I**	3	0	0	3
7	R20CIV32L1	Environmental Engineering Lab	0	0	2	1
8	R20CIV32L2	Computer Aided Design Lab	0	0	2	1
		Total Credits	**18**	**2**	**4**	**22**

***MC - Environmental Science – Should be Registered by Lateral Entry Students Only.**

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

Choice Based Credit System (CBCS)

REGULATIONS – BR20

B. Tech. CIVIL ENGINEERING

IV YEAR I SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV4101	Estimation, Costing and Project Management	3	1	0	4
2	R20CIV4102	Transportation Engineering-II	3	1	0	4
Professional Elective –III						
3	R20CIV4131	Remote Sensing &GIS	3	0	0	3
	R20CIV4132	Ground Improvement Techniques				
	R20CIV4133	Advance Structural Analysis				
Professional Elective –IV						
4	R20CIV4141	Irrigation and Hydraulic Structures	3	0	0	3
	R20CIV4142	Theory of Elasticity				
	R20CIV4143	Ground water Hydrology				
5		**Open Elective –II**	3	0	0	3
6	R20CIV41P1	Industrial Oriented Mini Project/ Summer Internship	0	0	0	2*
7	R20CIV41L1	Seminar	0	0	2	1
8	R20CIV41P2	Comprehensive Viva-voce	0	0	2	1
		Total Credits	**15**	**2**	**4**	**21**

*** To be carried out during the summer vacation between 6th and 7th semesters.**

Note: Students should submit report of Industrial Oriented Mini Project/ Summer Internship for evaluation.

IV YEAR II SEMESTER **COURSE STRUCTURE**

S. No.	Course Code	Course Title	L	T	P	Credits
Professional Elective -V						
1	R20CIV4251	Foundation Engineering	3	0	0	3
	R20CIV4252	Environmental Impact Assessment				
	R20CIV4253	Air pollution				
Professional Elective –VI						
2	R20CIV4261	Airports, railways and water ways	3	0	0	3
	R20CIV4262	Intelligent Transportation Systems				
	R20CIV4263	Urban Transportation Planning				
3		**Open Elective –III**	3	0	0	3
4	R20CIV42P1	Project Work	0	0	14	7
		Total Credits	**9**	**0**	**14**	**16**

LIST OF OPEN ELECTIVES

Open Elective – I

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV3271	Disaster Management & Mitigation	3	0	0	3
2	R20CSE3272	Database Concepts				
3	R20ECE3273	Consumer Electronics				
4	R20EEE3274	Electrical Estimation & Costing				
5	R20INF3275	Information Technology Essentials				
6	R20MED3276	Introduction to Robotics				
7	R20HMS3277	Fundamentals of Entrepreneurship				
8	R20HMS3278	Day to Day Biology				
9.	R20CIV3272	Building Architecture				

Open Elective –II

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV4181	Green Building Engineering	3	0	0	3
2	R20CSE4182	Cyber Security Fundamentals				
3	R20ECE4183	Principles of Modern Communication Systems				
4	R20EEE4184	Illumination Engineering				
5	R20INF4185	E-Commerce				
6	R20MED4186	Industrial Design & Ergonomics				
7	R20HMS4187	Creative Writing				
8	R20HMS4188	Design Thinking				
9.	R20CIV4182	Pre Fabricated Structures				
10		MOOCs – III				

Open Elective –III

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV4291	Spatial Technology Concepts	3	0	0	3
2	R20CSE4292	Fundamentals of Soft Computing				
3	R20ECE4293	Audio & Video Engineering				
4	R20EEE4294	Non Conventional Energy Resources				
5	R20INF4295	Information Security Fundamentals				
6	R20MED4296	Total Engineering Quality Management				
7	R20HMS4297	Human Values & Professional Ethics for Engineers				
8	R20HMS4298	Science Fiction				
9	R20CIV4292	Building Infrastructure Auditing				
10		MOOCs - IV				

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – I Semester

L	T	P	C
3	1	0	4

(R20MTH1101) Mathematics – I
(Linear Algebra and Calculus)

Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigen values and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyse the nature of sequence and series.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- Find the extreme values of functions of two variables with/ without constraints.

UNIT-I: Matrices

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values and 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: Sequences & Series

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: 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. 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-V: Multivariable calculus (Partial Differentiation and applications)

Definitions of Limit and continuity.

Partial Differentiation; Euler's Theorem; Total derivative; Jacobian; Functional dependence, independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint, 2002.

REFERENCES:

- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
- Engineering Mathematics by M.K.Jain, S.R.K. Iyengar, Narosa Publications

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – I Semester

L	T	P	C
3	1	0	4

(R20EPH1101) ENGINEERING PHYSICS

Course Objectives:

- The course aims at making students to understand the basic concepts of Principles of Physics in a broader sense with a view to lay foundation for the various engineering courses.
- Students will be able to demonstrate competency and understanding of the concepts found in Mechanics, Harmonic Oscillations, Waves in one dimension, wave Optics, Lasers, Fiber Optics and a broad base of knowledge in physics.
- The main purpose of this course is to equip engineering undergraduates with an understanding of the scientific method, so that they may use the training beneficially in their higher pursuits.
- Today the need is to stress principles rather than specific procedures, to select areas of contemporary interest rather than of past interest, and to condition the student to the atmosphere of change he will encounter during his carrier.

Course outcomes: Upon graduation, the graduates will have:

- The knowledge of Physics relevant to engineering is critical for converting ideas into technology.
- An understanding of Physics also helps engineers understand the working and limitations of existing devices and techniques, which eventually leads to new innovations and improvements.
- In the present course, the students can gain knowledge on the mechanism of physical bodies upon the action of forces on them, the generation, transmission and the detection of the waves, Optical Phenomena like Interference, diffraction, the principles of lasers and Fibre Optics.
- Various chapters establish a strong foundation on the different kinds of characters of several materials and pave a way for them to use in at various technical and engineering applications.

UNIT-I: Introduction to Mechanics

Transformation of scalars and vectors under Rotation transformation, Forces in Nature, Newton's laws and its completeness in describing particle motion, Form invariance of Newton's second law, Solving Newton's equations of motion in polar coordinates, Problems including constraints and friction, Extension to cylindrical and spherical coordinates.

UNIT-II: Harmonic Oscillations

Mechanical and electrical simple harmonic oscillators, Complex number notation and phasor representation of simple harmonic motion, Damped harmonic oscillator: heavy, critical and light damping, Energy decay in a damped harmonic oscillator, Quality factor, Mechanical and electrical oscillators, Mechanical and electrical impedance, Steady state motion of forced damped harmonic oscillator, Power observed by oscillator.

UNIT-III: Waves in one dimension

Transverse wave on a string , The wave equation on a string , Harmonic waves, Reflection and transmission of waves at a boundary, Impedance matching , Standing waves and their Eigen frequencies , Longitudinal waves and the wave equations for them, Acoustic waves and speed of sound, Standing sound waves.

UNIT-IV: Wave Optics

Huygen's principle, Superposition of waves and interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Newton's rings, Michelson's interferometer, Mach-Zehnder interferometer, Frunhofer diffraction from a single slit and circular aperture, Diffraction grating- resolving power.

UNIT-V: Lasers and Fibre Optics

Lasers: Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO_2) laser, He-Ne laser, Applications of laser. Fibre Optics: Introduction, Optical fibre as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres.

TEXT BOOKS:

1. Engineering Mechanics, 2nd ed.- MK Harbola, Cengage Learning
2. I. G. Main, "Vibrations and waves in physics', 3rd Edn, Cambridge University Press, 2018.
3. Ajoy Ghatak, " Optics", McGraw Hill Education, 2012

REFERENCES:

1. H. J. Pain, "The physics of vibrations and waves", Wiley, 2006
2. O. Svelto, "Principles of Lasers"
3. "Introduction to Mechanics", M.K.Verma, Universities Press

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – I Semester

L	T	P	C
3	1	0	4

(R20CSE1101) PROGRAMMING FOR PROBLEM SOLVING

Course Objectives:

a) To learn the fundamentals of computers.
b) To understand the various steps in program development.
c) To learn the syntax and semantics of C programming language.
d) To learn the usage of structured programming approach in solving problems.

Course Outcomes: The student will learn

a) To write algorithms and to draw flowcharts for solving problems.
b) To convert the algorithms/flowcharts to C programs.
c) To code and test a given logic in C programming language.
d) To decompose a problem into functions and to develop modular reusable code.
e) To use arrays, pointers, strings and structures to write C programs.
f) Searching and sorting problems.

Unit - 1: Introduction to Algorithms and Programming, Arrays

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming

Algorithms for finding roots of quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

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.

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

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays

Unit - II: Strings,Structures and Functions:

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 Pointers: Idea of pointers,

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

Unit - III: Pointers and Dynamic Memory Allocation:

Command line arguments

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions

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

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

Unit - IV: 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.

I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Unit - V: 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

TEXT BOOKS:

a) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
b) B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

REFERENCE BOOKS:

a) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
b) R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
c) Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
d) Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
e) E. Balaguruswamy, Programming in ANSI C, Tata McGraw - Hill

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – I Semester

L	T	P	C
1	0	4	3

(R20MED1102) ENGINEERING GRAPHICS

Course objectives:

a) To provide basic concepts in engineering drawing.
b) To impart knowledge about standard principles of orthographic projection of objects.
c) To draw sectional views and pictorial views of solids.

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

a) Preparing working drawings to communicate the ideas and information.
b) Read, understand and interpret engineering drawings.

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.

UNIT- II

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT – III

Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere

UNIT – IV

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone,
Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder

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.
Introduction to the perspective views, their types & Perspective views of simple objects

Introduction to CAD:

Introduction to AUTOCAD Software Package Commands.- Creation of 2D Sketches by CAD Package

TEXTBOOKS:

a) Engineering Drawing N.D. Bhatt / Charotar
b) Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – I Semester

L	T	P	C
0	0	3	1.5

(R20EPH11L1) ENGINEERING PHYSICS LAB

List of Experiments:

1. Melde's experiment:
   To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.

2. Compound Pendulum
   Calculation of Acceleration due to gravity g.

3. Newton's rings:
   To determine the radius of curvature of the lens by forming Newton's rings.

4. Diffraction grating:
   To determine the number of lines per inch of the grating.

5. Coupled Oscillator:
   To determine the spring constant by single coupled oscillator.

6. LCR Circuit:
   To determine quality factor and resonant frequency of LCR circuit.

7. LASER:
   To study the characteristics of LASER sources.

8. Optical fibre:
   To determine the bending losses and Numerical aperture of a given Optical fibre.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – I Semester

L	T	P	C
0	0	3	1.5

(R20CSE11L2) PROGRAMMING FOR PROBLEM SOLVING LAB

[Note:The programs may be executed using any available Open Source/ Freely available IDE
Some of the Tools available are:
CodeLite: 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:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- 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 form standard input.

Simple numeric problems:

a. Write a program for find the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write 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:
   5 x 1 = 5

5 x 2 = 10

5 x 3 = 15

e. 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. $1-x/2 +x^2/4-x^3/6$
i. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays and Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
c. Write a C program that uses functions to perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices
   iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
d. Write C programs that use both recursive and non-recursive functions
   i. To find the factorial of a given integer.
   ii. To find the GCD (greatest common divisor) of two given integers.
   iii. To find x^n
e. Write a program for reading elements using pointer into array and display the values using array.
f. Write a program for display values reverse order from array using pointer.
g. Write a program through pointer variable to sum of n elements from 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 firs t 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:
   i. To insert a sub-string in to a given main string from a given position.
   ii. To delete n Characters from a given position in a given string.
d. 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.)
e. Write a C program that displays the position of a character ch in the string S or –1 if S doesn't contain ch.
f. 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

Suggested Reference Books for solving the problems:

i. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
iv. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
v. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
vi. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – I Semester

L	T	P	C
3	0	0	0

(R20HAS1102) ENVIRONMENTAL SCIENCE

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:**Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – II Semester

L	T	P	C
3	1	0	4

(R20MTH1102) MATHEMATICS – II
(Advanced Calculus)

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Evaluation of multiple integrals and their applications
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes: After learning the contents of this paper the student must be able to

- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems
- Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelopiped
- Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I: First Order ODE

Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous; terms of the type e^{ax}, sinax , cosax , polynomials in x, $e^{ax}V(x)$ and $xV(x)$; Method of variation of parameters, Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III: 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 (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).

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. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

REFERENCES:

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – II Semester

L	T	P	C
3	1	0	4

(R20ECH1101) CHEMISTRY

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
- To understand the concepts of Polymers and Lubricants.
- To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes: The basic concepts included in this course will help the student to gain:

- The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
- The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
- The knowledge of Polymers and Lubricants.
- The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.

Unit - I:

Molecular structure and Theories of Bonding: Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2 and O_2 molecules and their Magnetic properties.

Metallic Bonding, Valency Bond Theory(VBT), Crystal Field Theory (CFT): Salient features of CFT – Crystal Field splitting of transition metal ion d-orbitals in tetrahedral, octahedral and square planar geometries.

Unit - II:

Water and its treatment: Introduction – hardness of water – causes of hardness - types of hardness: temporary and permanent – expression and units of hardness, Numerical problems.

Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water – Disinfection of water by chlorination and ozonization. Boiler troubles-scales & sludges, priming and foaming, caustic embrittlement, boiler feed water-internal treatment – (Calgon conditioning, Phosphate conditioning and Colloidal conditioning).

External treatment of water – ion exchange process. Desalination of water – Reverse osmosis.

Unit - III:

Electrochemistry and corrosion: Electro chemical cells – electrode potential, standard electrode potential, types of electrodes – calomel, Quinhydrone and glass electrode. Nernst equation and its applications. Electrochemical series and its applications. Numerical problems.

Batteries – Primary (Lithium cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery). Fuel cells – Hydrogen – Oxygen fuel cell, methanol – oxygen fuel cell – construction, working, advantages and applications of fuel 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 – nature of metal & nature of environment.
Corrosion control methods- Cathodic protection - Sacrificial anode and impressed current cathodic methods. Surface coatings – metallic coatings - hot dipping, (galvanizing, tinning), electroplating (copper Plating), Electroless Plating (copper plating)

Unit - IV:
Stereochemistry, Reaction Mechanism and synthesis of drug molecules: Introduction to representation of 3-dimensional structures, Classification of Isomers - structural and stereoisomers. Enantiomers, diastereomers, measurement of optical activity, absolute configuration. conformational analysis of n- butane.
Types of Organic Reactions (Addition, Substitution and Elimination Reactions).
Substitution reactions: Nucleophilic substitution reactions: Mechanism of S_N1, S_N2 reactions.
Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Elimination reactions: Dehydro halogenation of alkylhalides. Saytzeff rule Grignard additions on carbonyl compounds. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid.
Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$.
Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

Unit - V:
Polymers : Definitions, Classification, properties of polymers – crystallinity, melting Point, boiling Point, glass Transition Temperature. Preparation, properties, engineering applications of: PVC, Teflon, Nylon & Bakelite.
Lubricants: classification, characteristics of a good Lubricant, mechanism of lubrication (thick film, thin film & extreme pressure lubrication) and properties of lubricants: flash and fire point, cloud and pour point, mechanical stability of lubricants.

Suggested Text Books:

1. Engineering Chemistry by P.C.Jain & M.Jain; Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2018.
2. Engineering Chemistry, by Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy, Subhendu Chakroborty, Cengage Learning India Pvt. Ltd., 2018.
3. Organic Chemistry: Structure and Function by K.P.C. Volhardt and N.E.Schore, 5^{th} Edition.
4. University Chemistry, by B.M. Mahan, Pearson IV Edition.
5. Text Book of Organic Chemistry by Bahl & Bahl.
6. Text Book of Stereo Chemistry by Kalsi.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – II Semester

L	T	P	C
3	1	0	4

(R20MED1103) ENGINEERING MECHANICS

Course Objectives: The objectives of this course are to

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

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

- Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
- Solve problem of bodies subjected to friction.
- Find the location of centroid and calculate moment of inertia of a given section.
- Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
- Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.

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, wedge friction, screw jack & differential screw jack; 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:

Review of particle dynamics- Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

UNIT-V:

Kinetics of Rigid Bodies -Basic terms, general principles in dynamics; Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work Energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation

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 Wiley & Sons, 2008.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – II Semester

L	T	P	C
1	0	3	2.5

(R20MED1101) ENGINEERING WORKSHOP

Pre-requisites: Practical skill

Course Objectives:

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

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

- Study and practice on machine tools and their operations
- Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

Syllabus :

- **Introduction to Carpentry :** Types Wood, Sizes of Wood or Timber, Characteristics of Wood, Types of Marking and Measuring Tools, Holding Tools, Cutting Tools, Planing Tools, Types of Chisels and their specifications, Drilling and Boring Tools and their Sketches, Wood Working Lathe and its parts, Drilling Machine and its parts, Types of saws, Sawing Machines such as Jigsaw, Bandsaw, Scrollsaw etc., Care and Maintenance of Tools.
- **Introduction to Fitting :** Holding Tools, Marking and Measuring Tools, Cutting Tools, Taps and Tap Wrenches, Dies and Die Holders, Bench Drilling Machine with Sketch and Specifications, Types of Files, File Card, Types of Hammers, Spanners, Screwdrivers, Fitting operations, Forms of Materials, Care and Maintenance of Tools
- **Introduction of Tin-Smithy :** Sheet Materials, Hand Tools, Hammers, Stakes, Sheet Metal Joints, Revets and Screws, Soldering and Brazing.
- **Introduction to Foundry :** Casting and its components such as Molding sands and their types, Properties, Types patterns, Pattern making materials, Tools used for the Molding, Melting Furnaces such as Cupola, Pot Furnace, Crucible Furnace
- **Introduction to Welding :** Various Welding processes such as Arc Welding, Gas Welding, Resistance Welding, Thermit Welding, Friction Welding, Elementary Symbols of the Welding, Transformers, Motor Generators, Rectifyers, Welding cables, Electrodes and their types, Electrode Holders, Techniques of Welding, Gas Welding their Types
- **Introduction to House-wiring :** Types of the Tools using House-wiring, Types of House-

wiring System, Fuses, Circuit Breakers, Switches, Sockets and Common House-wiring Methods, Various Symbol for Electrical Items.

- **Introduction to Black Smithy :** Tools and equipment used in the Black Smithy, Forging Temperatures of metals.
- Introduction to the Plumbing, Machine Shop, Metal Cutting, Power Tools.

1. TRADES FOR EXERCISES:

I. Carpentry – (T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
II. Fitting – (V-Fit, Dovetail Fit & Semi-circular fit & Drilling and tapping)
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

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – II Semester

L	T	P	C
2	0	0	2

(R20HAS1101) ENGLISH

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 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. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. *The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures.*

Learning Objectives: The course will help to

a. Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
b. Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
c. Develop study skills and communication skills in formal and informal situations.

Course Outcomes: Students should be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

SYLLABUS

UNIT –I

'The Raman Effect' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary Building: The Concept of Word Formation --The Use of Prefixes and Suffixes.

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

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

Basic Writing Skills: 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

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension
Writing: Format of a Formal Letter-**Writing Formal Letters** E.g.., Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III
'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-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- Skimming and Scanning
Writing: Nature and Style of Sensible Writing- **Defining- Describing** Objects, Process, Places and Events
Classifying- Providing Examples or Evidence

UNIT –IV
'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary: Standard Abbreviations in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension- Intensive Reading and Extensive Reading
Writing: Writing Practices--Writing Introduction and Conclusion - Essay Writing-Précis Writing.

UNIT –V
'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.
Vocabulary : Technical Vocabulary and their usage
Grammar : Common Errors in English
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.

Prescribed Textbook:

1. Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

References:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – II Semester

L	T	P	C
0	0	3	1.5

(R20ECH11L1) ENGINEERING CHEMISTRY LAB

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

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- The measurement of physical properties like Surface Tension and viscosity.
- The Measurement of conductance and EMF.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness and chloride content in water.
- Determination of physical properties like adsorption and viscosity.
- Measurement of conductance and EMF.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Conductometric titration of strong acid Vs strong base (HCl Vs NaOH)
4. Conductometric titration of Weak acid Vs strong base (CH3COOH Vs NaOH)
5. Titration of strong acid Vs strong base by potentiometry (HCl Vs NaOH)
6. Estimation of Fe^{2+} by Potentiometry using $K_2Cr_2O_7$ / $KMnO_4$.
7. Synthesis of Aspirin.
8. Synthesis of Paracetamol.
9. Determination of viscosity of lubricants by using Ostwald's viscometer.
10. Determination of surface tension of a given liquid by using stalagmometer.

References

1. Vogel's text book of practical chemistry 5^{th} edition
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
3. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - I Year – II Semester

L	T	P	C
0	0	2	1

(R20HAS11L2) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

The **Language 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:

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

Learning Outcomes : Students will be able to attain

- Better understanding of nuances of English language through audio- visual experience and group activities
- Neutralization of accent for intelligibility
- Speaking skills with clarity and confidence which in turn enhances their employability skills

Syllabus

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

a. **Computer Assisted Language Learning (CALL) Lab**
b. **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.

- Listening for general content
- Listening to fill up information
- Intensive listening
- 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: Just A Minute (JAM) Sessions
   - Describing objects/situations/people
   - Role play – Individual/Group activities

- **The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab)**

Exercise – I

CALL Lab:

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

Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand: Communication at Work Place- Spoken vs. Written language.

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 and Rhythm– Weak Forms and Strong Forms in Context.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

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

Exercise - III

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

Understand: How to make Formal Presentations.

Practice: Formal Presentations.

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks.

Practice: Making a Short Speech – Extempore.

Exercise – V
CALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Interview Skills.
Practice: Mock Interviews.

****

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**
   The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self-study by students.

System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration

ii) High Fidelity Headphones

0. **Interactive Communication Skills (ICS) Lab:**
   The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV2101) SURVEYING & GEOMATICS

Course Objectives: The object of the course student should have the capability to:

- Know the principle and methods of surveying.
- Measure horizontal and vertical- distances and angles
- Recording of observation accurately
- Perform calculations based on the observation
- Identification of source of errors and rectification methods
- Apply surveying principles to determine areas and volumes and setting out curves
- Use modern surveying equipment's for accurate results

Course Outcomes: Course will enable the student to:

- Apply the knowledge to calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments, measurement errors and
  corrective measures
- Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies
- Electronic distance measuring equipment, total stations, theodolites, compasses, remote sensing equipment, GPS base and rover receivers, data collectors and hand-help programmable calculators.
- Practice in the establishment of monuments, corners, lines and witness points in accordance with available data. Practice in the preparation of land boundary descriptions and survey plats.

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

UNIT - II Leveling- Types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, Effect of Curvature of Earth and Refraction. Contouring- Characteristics and uses of Contours, methods of contour surveying. Areas - Determination of areas consisting of irregular boundary

and regular boundary. Volumes -Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

UNIT - III Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible. Traversing: Methods of traversing, traverse computations and adjustments, Omitted measurements.

UNIT - IV Curves: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves. Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry, Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station advantages and Applications. Field Procedure for total station survey, Errors in Total Station Survey, Global Positioning System- Principle and Applications.

UNIT - V Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereoplotting instruments, mosaics, map substitutes.

TEXT BOOKS:

1. Chandra A M, “Plane Surveying and Higher Surveying”, New age International Pvt. Ltd., Publishers, New Delhi.
2. Duggal S K, “Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
3. Arora K R “Surveying Vol 1, 2 & 3), Standard Book House, Delhi.
4. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
3	0	0	3

(R20MED2105) HYDRAULICS AND HYDRAULIC MACHINERY

COURSE OBJECTIVES: the objective of the course is

- To Define the fundamental principles of water conveyance in open channels.
- To Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
- To Study the characteristics of hydroelectric power plant and its components.
- To analyze and design of hydraulic machinery and its modeling

COURSE OUTCOMES: At the end of the course the student will able to

- apply their knowledge of fluid mechanics in addressing problems in open channels and hydraulic machinery.
- Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions.
- apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.
- Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages
- To provide the students with a solid foundation in fluid flow principles
- To provide the students knowledge in calculating performance analysis in turbines and pumps and can be used in power plants

UNIT - I

Open Channel Flow: Types of flows - Types of channels - Velocity distribution - Energy and momentum correction factors - Chezy's, Manning's, and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth - computation of critical depth - critical sub - critical and super critical flows.

Non uniform flow - Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT - II

Dimensional Analysis and Similitude: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models - Geometric, kinematic and dynamic similarities dimensionless numbers - model and prototype relations.

UNIT - III

Hydrodynamic Force on Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency Angular momentum principle, Applications to radial flow turbines. Layout of a typical Hydropower installation - Heads and efficiencies.

UNIT - IV

Hydraulic Turbines: Classification of turbines-pelton wheel-Francis turbine-Kaplan turbine working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube - theory and function efficiency.

Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power specific

speed performance characteristics-geometric similarity-cavitation.

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.

Classification of Hydropower plants - Definition of terms - load factor, utilization factor, capacity factor, estimation of hydropower potential.

TEXT BOOKS:

1. Open Channel flow by K.Subramanya. Tata Mc.Graw Hill Publishers.
2. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
3. Fluid Mechanics & Fluid machines by Narayana pillai, Universities press.

REFERENCES:

1. Fluid Mechanics and Machinary, CSP OJHA, Oxford University Press
2. Elements of Open channel floe by Ranga Raju, Tata McGraw Hill, Pulications.
3. Fluid mechanics and fluid machines by Rajput, S.Chand & Co.
4. Open Channel flow by V.T.Chow, McGraw Hill book company.
5. Fluid Mechanics and Machinery by D.Ramdurgaia New Age Publications.
6. Mechanics of Fluids by Merle C.Potter, David C.Wiggert, Bassem H.Ramadan, Cengage Learning.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV2102) STRENGTH OF MATERIALS-I

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

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

- Determine stresses in the member subjected to Torsion
- Analyze columns and struts
- Understand the concept of direct and bending stresses
- Analyze and design springs, thin and thick cylinders
- Understand the concept of unsymmetrical bending.
- To understand the basics of material properties, stress and strain.

UNIT – I

Simple Stresses and Strains : 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 – Elastic modulii and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Elastic constants.

Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT – II

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

UNIT – III

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/I
= f/y = E/R - Neutral axis – Determination of bending stresses – Section modulus of rectangular and
circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

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

UNIT – IV

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

Theories of Failure: Introduction – Various theories of failure - Maximum Principal Stress Theory, Maximum Principal Strain Theory, Strain Energy and Shear Strain Energy Theory (Von Mises Theory).

UNIT – V

Deflection of Beams : Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to

point loads, U.D.L, Uniformly varying load-Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

Conjugate Beam Method: Introduction – Concept of conjugate beam method. Difference between
a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

TEXT BOOKS:

1) Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
3) Mechanics of Materials by Pytel, Cengage Learning Pvt. Ltd. .

REFERENCES:

1) Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.
2) Mechanics of Structures Vol –I by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
3) Strength of Materials by D.S Prakash Rao, Universities Press Pvt. Ltd.
4) Strength of Materials by S.S.Rattan, Tata McGraw Hill Education Pvt. Ltd.
5) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd
6) Strength of Materials and Structures by John Case et al., Butterworth-Heinemann.
7) Strength of Materials by R.Subramanian, Oxford University Press.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
3	1	0	4

(R20MTH2102) PROBABILITY DISTRIBUTIONS AND STATISTICAL METHODS

Objectives: To learn
- The theory of Probability, and probability distributions of single random variables
- The sampling theory and testing of hypothesis and making inferences

UNIT-I: : Probability
Sample Space, Events, Counting Sample Points, Probability of an Event, Additive Rules, Conditional Probability, Independence, and the Product Rule, Bayes' Rule,
Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous Probability Distributions, Statistical Independence.

UNIT-II: Mathematical Expectation
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: Introduction and Motivation, Binomial, Distribution, Geometric Distributions and Poisson distribution.

UNIT-III: Continuous Probability Distributions
Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Gamma and Exponential Distributions.
Fundamental Sampling Distributions: Random Sampling, Some Important Statistics, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, Sampling Distribution of S^2, t-Distribution, F-Distribution.

UNIT-IV: Estimation & Tests of Hypotheses
Introduction, Statistical Inference, Classical Methods of Estimation: Estimating the Mean, Standard Error of a Point Estimate, Prediction Intervals, Tolerance Limits, Estimating the Variance, Estimating a Proportion for single mean, Difference between Two Means, between Two Proportions for Two Samples and Maximum Likelihood Estimation.
Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

UNIT-V: Applied Statistics
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and
more general curves; Correlation and regression r Rank correlation.

Course outcomes:
After learning the contents of this paper the student must be able to
- Apply the concepts of probability and distributions to some case studies
- Correlate the material of one unit to the material in other units
- Resolve the potential misconceptions and hazards in each topic of study.
- Estimate the quantity of the items required to complete the project.
- Determine the line of best fit in any regression analysis using Least Square Method.

- Apply the Statistical Hypothesis Testing to determine whether an experiment conducted provides enough evidence to reject a proposition.

Text Books

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics For Engineers & Scientists, 9'h Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S.D.Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi

References

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.

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
3	0	0	3

(R20MED2106) FLUID MECHANICS

Course Objectives: Students who take this class can expect to
- Develop an appreciation for the properties of Newtonian fluids.
- Study analytical solutions to variety of simplified problems.
- Understand the dynamics of fluid flows and the governing non-dimensional parameters.
- Apply concepts of mass, momentum and energy conservation to flows.
- Grasp the basic ideas of turbulence.

Course Outcomes: At the end of the course, the student will be able to:
- Apply conservation laws to derive governing equations of fluid flows.
- Compute hydrostatic and hydrodynamic forces.
- Analyze and design simple pipe systems.
- Apply principles of dimensional analysis to design experiments.
- Compute drag and lift coefficients.
- Student will be able to apply Bernouli principle and compute pressure drop in flow systems of different configurations

UNIT - I

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

UNIT – II

Buoyancy and floatation: stability of bodies, meta centre, liquids in relative equilibrium.

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, circulation and vorticity, flownet analysis.

UNIT – III

Fluid Dynamics and Measurement of Flow: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, (Navier – stokes equations (Explanationary) Momentum equation and its application – forces on pipe bend. Pitot tube, Venturi meter, and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs.

UNIT - IV

Closed Conduit Flow: Reynold's experiment – Characteristics of Laminar & Turbulent flows. Laws of Fluid friction – Darcy's equation, ,variation of friction factor with Reynold's number – Moody's Chart, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems Flow between parallel plates, Flow through long tubes, flow through inclined tubes, water hammer.

UNIT – V

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

TEXT BOOKS:

1. Fluid Mechanics by F.M. White McGraw Hill Education (India) Pvt. Ltd, New Delhi, 2011
2. Fluid Mechanics by V.L. Streeter., E.B.Wylie and K.W. Bedford, McGraw Hill Education (India) Pvt. Ltd, New Delhi2016.
3. Fluid Mechanics by P.N. Modi and S.M.Seth, Standard Book House, Delhi, 2011.

REFERENCES:

1. Mechanics of Fluids by Potter, M.C D.C Wiggers, B.H Ramdan Cengage, 2012.
2. Fluid Mechanics by J F Douglas, J M Gasiorek, J A Swaffield and L B Jack, Pearson 2015.
3. Fluid Mechanics and Fluid Machines by S. K. Som, Gautam Biswas and S. Chakraborty, McGraw Hill Education (India) Pvt. Ltd, New Delhi 2015.
4. Engineering Fluid Mechanics by K L Kumar, S Chand, Eurasia Publishing House, New Delhi 2014.
5. Fluid Mechanics by Dr. A. K. Jain Khanna Publishers, twelfth edition 2014.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
1	0	3	2

(R20CIV21L1) SURVEYING LAB

Course Objectives:

- To have the ability for applying knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in land surveying
- To gain an appreciation of the need for lifelong learning through the discussion of recent changes in survey procedures and equipment
- To have the ability for using techniques, skills, and modern engineering tools necessary for engineering practice
- To build the ability for working as a member of a team
- To understand the importance of professional licensure to protect the public in the practice of land surveying.

Course Outcomes: After the completion of the said lab, the students will

- Aappreciate the need for accurate and thorough note taking in field work to serve as a legal record
- Gain the ability to use modern survey equipment to measure angles and distances
- Gain a basic understanding of the principles and operation of the Global Positioning System
- Gain the ability to measure differences in elevation, draw and utilize contour plots, and calculate volumes for earthwork
- Improve ability to function as a member of a survey party in completing the assigned field work
- Appreciate the need for licensed surveyors to establish positioning information for property and structures.

LIST OF EXERCISES:

1. Survey of an area by chain survey (closed traverse) & Plotting Chaining across obstacles
2. Determination of distance between two inaccessible points with compass. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
3. Radiation method, intersection methods by plane Table survey. Two point and three point problems in plane table survey
4. Traversing by plane table survey. Fly leveling (differential leveling)
5. An exercise of L.S and C.S and plotting. Two exercises on contouring.
6. Study of theodolite in detail - practice for measurement of horizontal and vertical angles. Measurement of horizontal angles by method of repetition and reiteration.
7. Trigonometric Leveling - Heights and distance problem (Two Exercises). Heights and distance using Principles of tachometric surveying (Two Exercises)
8. Curve setting - different methods. (Two Exercises). Setting out works for buildings & pipe lines.
9. Determine of area using total station. Traversing using total station.
10. Contouring using total station. Determination of remote height using total station.
11. State-out using total station. Distance, gradient, Diff, height between tow inaccessible points using total stations

LIST OF EQUIPMENTS

1. Theodolites and leveling staffs.
2. Tachometers.
3. Total station.

LIST OF MAJOR EQUIPMENT:

1. Chains, tapes, Ranging rods, cross staff, arrows
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses
4. Leveling instruments and leveling staves
5. Box sextants, planimeter.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
0	0	3	1.5

(**R20CIV21L2**) **STRENGTH OF MATERIALS LAB**

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

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

- Conduct tension test on Materials like steel etc.
- Conduct compression tests on spring, wood and concrete
- Conduct flexural and torsion test to determine elastic constants
- Determine hardness of metals
- An ability to design a system, component, or process to meet desired needs such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

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

LIST OF MAJOR EQUIPMENT:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Spring testing machine
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.

IS-1608: - 2005, IS-1499- 1977, IS-1598 – 1977, IS-1500 – 1983, IS-1586-2000, IS-7906-2004

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
0	0	3	1.5

(R20MED21L4) HYDRAULICS & HYDRAULIC MACHINERY LAB

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

Course Outcomes: Hydraulics & Hydraulic Machinery

- Compute drag coefficients
- Test the performance of pumps and turbines
- Determine Manning's and Chezy's coefficients for smooth and rough channels
- Determine Energy loss in Hydraulic jump and Calibrate standing wave flume
- Develop understanding about fluid action in open channel flow
- Ability to select hydraulic turbines for hydropower plants
- Identify the application of fluid in open channel flow and hydraulic machines

1. Impact of jet on vanes
2. Study of Hydraulic jump in Open Channel.
3. Performance test on Pelton wheel turbine.
4. Performance test on Francis turbine.
5. Performance test on Kaplan turbine.
6. Performance characteristics of a single stage centrifugal pump.
7. Performance characteristics of a multi-stage centrifugal pump.
8. Performance characteristics of a reciprocating pump.
9. Study of Flow in Open Channel (Applying Chezy's and Manning's equations).
10. Determination of Coefficient of discharge for the given Weir (Sharp crested /Broad crested / Cippoletti weir).

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – I Semester

L	T	P	C
0	0	2	0

(**R20MAC2100**) **GENDER SENSITIZATION LAB**

Course Objectives:

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

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT – I UNDERSTANDING GENDER:

Gender: Why Should We Study It? (Towards a World of Equals: Unit -1) Socialization: Making Women, Making Men (Towards a World of Equals: Unit -2) Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT – II GENDER AND BIOLOGY Missing Women:

Sex Selection and Its Consequences (Towards a World of Equals: Unit-4) Declining Sex Ratio. Demographic Consequences. Gender Spectrum: Beyond the Binary (Towards a World of Equals: Unit -10) Two or Many? Struggles with Discrimination.

UNIT – III GENDER AND LABOUR Housework:

The Invisible Labour (Towards a World of Equals: Unit -3) "My Mother doesn't Work." "Share the Load." Women's Work: Its Politics and Economics (Towards a World of Equals: Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT – IV ISSUES OF VIOLENCE Sexual Harassment:
Say No! (Towards a World of Equals: Unit -6) Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking Out (Towards a World of Equals: Unit -8) Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice. Thinking about Sexual Violence (Towards a World of Equals: Unit -11) Blaming the Victim-"I Fought for my Life…." – Additional Reading: The Caste Face of Violence.

UNIT – V GENDER : CO – EXISTENCE Just Relationships:
Being Together as Equals (Towards a World of Equals: Unit -12) Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

Prescribed Textbook : All the five Units in the Textbook, "Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

REFERENCE BOOKS:

- Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
- Abdulali Sohaila. "I Fought For My Life…and Won."Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
3	0	0	3

(R20EEE2205) BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

Objective:

This course introduces the concepts of electrical DC and AC circuits, basic law's of electricity, instruments to measure the electrical quantities, different methods to solve the electrical networks, construction operational features of energy conversion devices i.e. DC and AC machines, transformers. It also emphasis on basics of electronics, semiconductor devices and their characteristics and operational features.

UNIT-I:

Electrical Circuits: Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations. **Instruments:** Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

UNIT-II:

DC Machines: Principle of operation of DC Generator – EMF equation - types – DC motor types – torque equation – applications – three point starter.

UNIT-III:

Transformers: Principle of operation of single phase transformers –EMF equation – losses – efficiency and regulation.

AC Machines: Principle of operation of alternators – regulation by synchronous impedance method –Principle of operation of induction motor – slip – torque characteristics – applications.

UNIT–IV:

Diodes: P-n junction diode, symbol, V-I Characteristics, Diode Applications, and Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems).

Transistors: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications.

UNIT-V:

Cathode Ray Oscillos Scope: Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

EEE: TEXT BOOKS:

1. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
2. Basic Electrical Engineering, S.N. Singh, PHI.

EEE: REFERENCE BOOKS:

1. Basic Electrical Engineering, Abhijit Chakrabarthi, Sudipta nath, Chandrakumar Chanda, Tata-McGrawHill.
2. Principles of Electrical Engineering, V.K Mehta, Rohit Mehta, S.Chand Publications.
3. Basic Electrical Engineering, T.K.Nagasarkar and M.S. Sukhija, Oxford University Press.
4. Fundamentals of Electrical Engineering, RajendraPrasad, PHI.
5. Basic Electrical Engineering by D.P.Kothari , I.J. Nagrath, McGraw-Hill.

ECE: TEXT BOOKS:

1. Electronic Devices and Circuits, S.Salivahanan, N.Suresh Kumar, A.Vallavaraj,Tata McGraw-Hill companies..
2. Electronic Devices and Circuits, K. Lal Kishore,BS Publications.

ECE: REFERENCE BOOKS:

1. Millman's Electronic Devices and Circuits,J. Millman, C.C.Halkias, and Satyabrata Jit, Tata McGraw- Hill companies.
2. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky,PEI/PHI.
3. Introduction to Electronic Devices and Circuits, Rober T. Paynter,PE.
4. Integrated Electronics, J. Millman and Christos C. Halkias, Tata McGraw-Hill companies.
5. Electronic Devices and Circuits, Anil K. Maini, Varsha Agarwal,Wiley India Pvt. Ltd.

Course Outcomes

1. Knowledge on basic electrical circuits, parameters, Solution of resistive circuits with independent sources and different types of instruments.
2. To explain the working principle, construction, applications of DC machines.
3. Highlight the importance of transformers in transmission and distribution of electric power.
4. To Gain the knowledge on working principle, construction ,applications of AC machines
5. Operation of diodes, transistors, realization of various electronic circuits with the various semiconductor devices.
6. Cathode ray oscilloscope, with which he/she can able to apply the above conceptual things to real world electrical and electronics problems and applications.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV2201) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

Course Objectives: To give the students a basic idea about the construction materials, building components and to introduce various.

Course Outcomes: At the end of the course, the student will be able to identify various building materials required for construction & planning.

UNIT- I

Stones and Bricks, Tiles: Building Stones - Classification and quarrying - properties – structural requirements - dressing Bricks - Composition of Brick earth - Manufacture and Structural requirements.

Wood, Aluminum, Glass and Paints: Wood - Structure - Types and Properties - Seasonining - defects; alternate materials for wood - GI/fiber - reinforced glass bricks, steel and aluminum.

UNIT - II

Cement & Admixtures: Ingredients of cement, manufacture - Chemical composition - Hydration - field and 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, Stationery - Lines & Fitting;
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

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

UNIT - V

Building Planning: Principles of Building Planning, Classification of buildings and Building by laws

TEXT BOOKS:

1. Building Materials and Construction - Arora and Bindra, Dhan Pat Roy Publications
2. Building Constructions by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Lakshmi Publications(P) Ltd., New Delhi.

REFERENCE:

1. Building Materials by Duggal, New Age Internationals.
2. Building Construction by PC Verghes PHI.
3. Constrution Technology - Vol - I & II by R. Chuddy, Longman UK.
4. Basics of Civil Engg by Subash Chander; Jain Brothers.

5. Alternate Building material and Technology, K.S. Jagadish, Venkatarama Reddy and Others;
New Age Publications.

Course Outcomes

1. Predict the properties of building stones and its classifications. Understand the concept of various methods of manufacture of bricks. Identify rock using basic geological classification systems.
2. Obtain differentiate the fine aggregates and coarse aggregates under various views. Explain various types of cements and their applications in construction. Various field and laboratory tests on cement.
3. Analyze the importance of mineral and chemical admixtures, requirements of the concrete in construction.
4. Explain different types of lintel, arches and the materials which are commonly used for construction.
5. Explain the suitability of floors in buildings like mosaic flooring, terrazzo flooring, rubber flooring, asphalt flooring.
6. Understand the different types of trusses, RCC roofs, and madras terrace/shell roofs.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
3	1	0	4

(R20CIV2202) STRENGTH OF MATERIALS-II

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

Course Outcomes: At the end of the course, the student will be able to Determine stresses in the member subjected to Torsion

- Analyze columns and struts
- Understand the concept of direct and bending stresses
- Analyze and design springs, thin and thick cylinders
- Understand the concept of unsymmetrical bending.
- Recognize physical phenomenon in the context of strength of materials. Demonstrate an understanding of the structural mechanics theory for deformable bodies
- Apply structural mechanics of deformable bodies to solve engineering problems Demonstrate an understanding of the relationships between loads, member forces and deformations and material stresses and strains
- Demonstrate an understanding of the assumptions and limitations of the structural mechanics theory Competence in problem identification, formulation and solution

UNIT - I

Torsion of Circular Shafts: Theory of pure torsion - Derivation of Torsion equations : $T/J = q/r – N\theta/L$ - Assumptions made in the theory of pure torsion - Torsional moment of resistance – Polar section modulus - Power transmitted by shafts - Combined bending and torsion and end thrust - 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 - Carriage or leaf springs.

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 - Rankine – Gordon formula - Long columns subjected to eccentric loading - Secant formula - Emirical formulae - Straight line formula - Prof. Perry's formula.

Beams Curved in Plan: Introduction - circular beams loaded uniformly and supported on symmetrically place Columns - Semi-circular beam simply-supported on three equally spaced supports.

UNIT - III

Beam Columns: Laterally loaded struts - subjected to uniformly distributed and concentrated loads - Maximum B.M. and stress due to transverse and lateral loading. **Direct and Bending Stresses:** Stresses under the combined action of direct loading and bending moment, core of a section - determination of stresses in the case of chimneys, retaining walls anddams - conditions for stability stresses due to direct loading and bending moment about both axis.

UNIT - IV

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

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

UNIT - V

Thin Cylinders: Thin seamless cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and Volumetric strains - changes in dia, 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 - Thick spherical shells.

TEXT BOOKS:

1. Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt. Ltd.
2. Strength of Materials by R.K.Rajput, S.Chand & Company Ltd.
3. Mechanics of Materials by Gere, Cengage Learning Pvt. Ltd.

REFERENCES:

1. Fundamentals to Solid Mechanics by M.L.Gambhir, PHI Learning Pvt. Ltd.
2. Introduction to Strength of Material by U.C.Jindal, Galgotia Publications Pvt. Ltd.
3. Strength of Materials by Bhattacharya, Cengage Learning
4. Strength of Materials by D.S Prakash Rao, Universities Press Pvt. Ltd.
5. Strength of Materials by S.S.Rattan, Tata McGraw Hill Education Pvt. Ltd.
6. Strength of Materials by R.Subramanian, Oxford University Press.
7. Mechanics of Materials by Ferdinand P.Beer et al., Tata McGraw Hill Education Pvt. Ltd.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
3	1	0	4

(R20CIV2203) STRUCTURAL ANALYSIS –I

Course Objectives: To make the students to understand the principles of analysis of structures subjected to static and moving loads by various methods.

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

- Analyze Perfect , Imperfect And Redundant Frames
- Formulate Equilibrium and compatibility equations for structural members
- Analyze one dimensional and two dimensional problems using classical methods
- Analyze indeterminate structures
- Analyze structures for gravity loads, moving loads and lateral loads
- Evaluate and draw the influence lines for reactions, shears, and bending moments in beams and girders due to moving loads.

UNIT - I

Analysis of Perfect Frames: Types of frames- Perfect, Imperfect and Redundant pin jointed frames. Analysis of determinate pin jointed frames using method of joints, method of sections and tension coeffective 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 axial load, bending moment and shear forces- castigliano's first theorem - Unit Load Method. Deflections of simple beams and pin - jointed plain tresses. Deflections of statically determinate bent frames.

Three Hinged Arches: Introduction - Types of arches - comparison between three hinged archs and two hinged arches. Linear Arch. Eddy's theorem. Analysis three hinged arches. Normal Thrust and radial shear in an arch. Geometrical properties of parabolic and circular arch. Three Hinged circular arch at Different levels. Absolute maximum bending moment diagram for a three hinged arch.

UNIT - III

Propped Cantilever and Fixed beams: Analysis of Propped Cantilever and Fixed beams, including the beams with varying moments of inertia, subjected to uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads- shear force and bending moment diagrams for Propped cantilever and Fixed beams; effect of sinking of support, effect of rotation of a support.

UNIT - IV

Slope - Deflection Method and Moment Distribution Method: Introduction - Continuous beams. Clapeyron's theorem of three moments- Analysis of continuous beams with constant variable moments of inertia with one or both ends fixed- continuous beams with overhang. Effects of sinking of supports. Derivation of slope- Deflection Equation, Application to continuous beams with and without settlement of supports. Analysis of continuous beams with and without settlement of supports using Moment Distribution Method. Shear force and bending moment diagrams, Elastic curve.

UNIT - V

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

TEXT BOOKS:

1. Structural Analysis Vol-I & II by Vazarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol-I & II by Pundit and Gupta, Tata McGraw Hill Publishers.

REFERENCE:

1. Structural Analysis by Hibbelar Pearson Education Ltd.
2. Basic Structural Analysis C.S. Reddy., Tata McGraw Hill Publishers
3. Fundamentals of Structural Analysis by M.L.Gamhir, PHI.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV2204) ENGINEERING GEOLOGY

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

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

- Understand weathering process and mass movement
- Distinguish geological formations
- Identify geological structures and processes for rock mass quality
- Identify subsurface information and groundwater potential sites through geophysical investigations
- Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels
- To understand issues concerning the geological basement and structure of a region. To describe and interpret the geological structures in the geological maps and cross sections.

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 minerals. Advantages of study of minerals by physical properties. Role of study of physical properties of following common rock forming minerals: Feldsper, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as yrite, Hematite, Magnetite, Chrorite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite. **Petrology:** Definition ofrock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates.

UNIT - III:

Structural Geology: Indian stratigraphy, paleontology and geological time scale, Out crop, strike and dip study of common geological structures associating with the rock such as folds, faults unconformities, and joints - their important types. Ground water: Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. earth quakes, their causes and effects, shield areas and seismic belts. Seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in

seismic areas. Land slides, land slides hazards, water in land slides their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, Earthquake and landslides.

UNIT - IV:

Geology of Dams and Reservoirs: 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 tightness and life of reservoirs. Geo hazards, ground subsidence. Geophysical studies: Importance of Geophysical studies Principles of geophysical stdy by Gravity methods. Magneticmethods, 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:

Tunnels: Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (lithological, structural and ground water) in tunneling over break and lining in tunnels, Tunnels in rock, subsidence over old mines, minining substances.

TEXT BOOKS:

1. Engineering Geology by N. Chennkesavulu, Mac-Millan, Publishers 2nd Edition India Ltd. 2010.
2. Principals of Engineering Geology by K.V.G.K Gokhale - B.S. Publications
3. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.

REFERENCES:

7. Engineering Geology for Civil Engineering, P.C. Varghese, PHI Learning & private Limited.
8. Geology basics of Engineering by Aurele Parriaux, CRC press
9. Krynine & Judd, principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution.
10. F.G. Bell Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
0	0	3	1.5

(R20CIV22L1) COMPUTER AIDED CIVIL ENGINEERING DRAWING

COURSE OBJECTIVES: The objective of this lab is to teach the student usage of Auto cad and basic drawing fundamentals in various civil engineering applications, specially in building drawing.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Use the Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications.
- Plan and draw Civil Engineering Buildings as per aspect and orientation.
- Presenting drawings as per user requirements and preparation of technical report
- Introduction to computer aided drafting, Software for CAD – Introduction to different softwares, Practice exercises on CAD software
- Drawing of plans of buildings using software
  a) Single storied buildings b) multi storied buildings
- Developing sections and elevations for
  a) Single storied buildings b) multi storied buildings
- Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD softwares. Exercises on development of working drawings of buildings

LIST OF EXPERIMENTS:

1. Introduction to computer aided drafting
2. Software for CAD - Introduction to different software's
3. Practice exercises on CAD software
4. Drawing of plans of buildings using software
   a. single storied buildings
   b. multi storied buildings
5. Developing sections and elevations for
   a. single storied buildings
   b. multi storied buildings
6. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software's
7. Exercises on development of working of buildings

TEXT BOOKS:

1. Computer Aided Design Laboratory by M.N. Sesha Praksh & Dr. G.S. Servesh - Laxmi Publications.
2. Engineering Graphics by P.J. Sha - S.Chand & Co.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
0	0	3	1.5

(R20CIV22L2) ENGINEERING GEOLOGY LAB

Course Objectives: The students should be able to
- Position to read, understand and interpret the supplied maps
- Understand the steps to be followed for completing any field job successfully

Course Outcomes: The student will be able to
- Position to read, understand and interpret different maps like Toposheet, Structural Geology maps, Stratigraphic maps, geological cross-sections, Isopach maps, Structural Contour maps etc.
- Understand how to locate own / outcrop positions on Toposheet and how to take traverse
- Understand geological formations and measure dip and strike reading correctly in the filed
- Calculate true dip, true thickness, Oil Water Contact (OWC) from given maps
- Explain different sediment depositional environments from stratigraphic columns
- Ability to categorize rocks and minerals by their origin and engineering properties.

List of Experiments
1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic and microscopic description and identification of rocks referred under theory.
3. Megascopic and microscopic identification of rocks & minerals.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
5. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

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

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
0	0	2	1

(R20EEE22L3) ELECTRICAL & ELECTRONICS LAB

SECTION A: ELECTRICAL ENGINEERING:

1. Verification of KCL and KVL.
2. Magnetization characteristics of D.C. Shunt generator.
3. Speed control of DC motor.
4. Swinburne's Test on DC shunt machine.
5. Brake test on DC shunt motor.
6. OC and SC tests on Single-phase transformer.
7. Brake test on 3-phase Induction motor.
8. Regulation by an alternator by synchronous impedance method.

SECTION B: ELECTRONICS ENGINEERING:

1. PN Junction Diode Characteristics (Forward bias, Reverse bias)
2. Study of CRO.
3. Zener Diode Characteristics
4. Rectifier without Filters (Full wave & Half wave)
5. Rectifier with Filters (Full wave & half wave).
6. Transistor CE Characteristics.

Course Outcomes

1. Explain the basic electrical DC and AC circuits.
2. Construction operation characteristics of DC and AC machines and also the constructional features and operation of measuring instruments like voltmeter, ammeter, wattmeter etc & different semiconductor devices.
3. Describe the operation of the transformers in the energy conversion process.
4. Summarize the operation of diodes, transistors, realization of various electronic circuits with the various semiconductor devices.
5. Explain the principles cathode ray oscilloscope and its applications.
6. Apply the above conceptual things to real world electrical and electronics problems and applications.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - II Year – II Semester

L	T	P	C
3	0	0	0

(R20MAC2200) INTELLECTUAL PROPERTY RIGHTS

UNIT – I: Introduction to Intellectual property:
Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II: Trade Marks:
Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III: Law of copy rights :
Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV: Trade Secrets:
Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V: New development of intellectual property:
New developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOKS & REFERENCES:

- Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
- Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tate McGraw Hill Publishing company ltd.,

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
3	1	0	4

(R20CIV3101) STRUCTURAL ANALYSIS –II

Course Objectives: To make the students to understand the principles of analysis of structures subjected to static and moving loads by various methods.

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

- Analyze Perfect , Imperfect And Redundant Frames
- Formulate Equilibrium and compatibility equations for structural members
- Analyze one dimensional and two dimensional problems using classical methods
- Analyze indeterminate structures
- Analyze structures for gravity loads, moving loads and lateral loads
- Students will learn Analysis of structures.

UNIT – I

Moment Distribution Method - Analysis of Single Bay Single Storey Portal Frames including side Sway. Analysis of inclined frames.

Kani's Method: Analysis of continuous beams including settlement of supports. Analysis of single bay single storey and single bay two Storey Frames by Kani's Method Including Side Sway. Shear force and bending moment diagrams. Elastic curve.

UNIT – II

Slope Deflection Method: Analysis of Single Bay – single storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and bending moment diagrams. Elastic curve.

Two Hinged Arches: Introduction – Classification of Two hinged Arches – Analysis of two hinged parabolic arches – Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

UNIT – III

Approximate Methods of Analysis: Introduction – Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method. Analysis of multi-storey frames for gravity (vertical) loads. Substitute Frame method. Analysis of Mill bents.

UNIT – IV

Matrix Methods of Analysis: Introduction – Static and Kinematic Indeterminacy - Analysis of continuous beams including settlement of supports, using stiffness method. Analysis of pin-jointed determinate plane frames using stiffness method- Analysis of single bay single storey frames including side sway, using stiffness method. Analysis of continuous beams upto three degree of indeterminacy using flexibility method. Shear force and bending moment diagrams. Elastic curve.

UNIT- V

Influence Lines for Indeterminate Beams: Introduction – ILD for two span continuous beam with constant and variable moments of inertia. ILD for propped cantilever beams.

Indeterminate Trusses: Determination of static and kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies –Castigliano's second theorem.

TEXT BOOKS:

1) Structural Analysis Vol –I &II by Vazarani and Ratwani, Khanna Publishers.
2) Structural Analysis Vol I & II by Pundit and Gupta., Tata McGraw Hill Publishers.
3) Structural Analysis SI edition by Aslam Kassimali, Cengage Learning.

REFERENCES:

1) Matrix Analysis of Structures by Singh, Cengage Learning Pvt. Ltd.
2) Structural Analysis by Hibbeler.
3) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.
4) Matrix Analysis of Structures by Pundit and Gupta., Tata McGraw Hill Publishers.
5) Advanced Structural Analysis by A.K.Jain, Nem Chand Bros.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
3	1	0	4

(R20CIV3102) GEOTECHNICAL ENGINEERING

Course Learning Objectives: The objective of this course is:

- To enable the student to determine the index properties of the soil and classify it.
- To impart the concept of seepage of water through soils and determine the discharge of water through soils.
- To impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
- To enable the student to understand the concept of shear strength of soils, determine the shear parameters of sands and clays and the areas of their application.

Course Outcomes: Upon the successful completion of this course

- The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships.
- The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
- The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
- The student should be able to apply the above concepts in day-to-day civil engineering practice.
- Understand the origin of the soil and geological cycle.
- Apply principles of phase diagram for soil properties and perform basic weight-volume calculations.

UNIT - I:

Introduction: Soil formation - clay mineralogy and soil structure and clay mineralogy - moisture content - weight - volume relationship - Relative density.

Index Properties of Soils: Grain size analysis - Sieve analysis, principle of Hydrometer method - consistency limits and indices - I. S. Classification of soils.

UNIT - II:

Permeability: Soil water - capilary rise - flow of water through soils - Darcy's law - permeability - Factors affecting permeability - laboratory determination of coefficient of permeability - permeability of layered soils - In-situ permeability tests (Pumping in & Pumping out test).

Effective Stress & Seepage Through Soils: Total, neutral and effective stress - principle of effective stress - quick sand condition - Seepage through soils - Flownets: Characteristics and Uses.

UNIT - III:

Stress Distribution in Soils: Boussinesq's and Westergaard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horicontal plane, and Newmark's influence chart for irregular areas.

Compaction: Mechanism of compaction - factors affecting compaction - effects of compaction on soil properties - Field compaction Equipment - compaction quality control.

UNIT - IV:

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

UNIT - V:

Shear Strength of Soils: Importance of shear strength - Mohr's - Coulomb Failure theories - Types of laboratory tests for strength parameters - strength tests based on drainage conditions - strength envelops - Shear strength of sands - dilatancy - critical void ratio - Liquefaction - shear strength of clays.

TEXT BOOKS:

1. Principals of Geotechnical Engineering by Braja M. Das, Cengage Learning Publishers.
2. Soil Mechanics and Foundation Engineering by VNS Murthy, CBS Publishers and Distributors.
3. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt. Ltd, New Delhi.

REFERENCES:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd. (2002).
2. Geotechnical Engineering Handbook By Das - JRoss Publishing.
3. Geotechnical Engineering Principles and Practices by Cuduto, PHI International.
4. Geotechnical Engineering by Manoj Dutta & Gulati S. K - Tata Mc.Graw Hill Publishers New Delhi.
5. Soil Mechanics and Foundation Engg. By K. R. Arora, Standard Publishers and Distributors, Delhi.
6. Soil Mechanics and Foundation by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, Publishers Pvt. Ltd., New Delhi

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
3	1	0	4

(R20CIV3103) STRUCTURAL ENGINEERING-I(RCC)

PRE-REQUISITES: Structural Analysis I & II

COURSE OBJECTIVES: Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability. Course Objectives The objectives of the course are to

- Identify the basic components of anystructural system and the standard loading for the RC structure
- Identify and tell the various codal provisions given in IS. 456
- Describe the salient feature of limit state method, compare with other methods and the concepts of limit state of collapse and limit state of serviceability
- Evaluatethe behaviour of RC member under flexure, shear and compression, torsion and bond.

COURSE OUTCOMES: At the end of the course, the student will be able to:

- Design RC Structural elements
- Design the Reinforced Concrete beams using limit state Design
- Design Reinforced Concrete slabs
- Design the Reinforced Concrete Columns and footings
- Design structures for serviceability
- Design staircases, canopy
- Outcomes After the completion of the course student should be able to
- Compare and Design the singly reinforced, doubly reinforced and flanged sections.
- Design the axially loaded, uniaxial and biaxial bending columns.
- Classify the footings and Design the isolated square, rectangular and circular footings
- Distinguish and Design the one-way and two-way slabs.

UNIT -I Introduction- Structure - Components of structure - Different types of structures - Equilibrium and compatibility– Safety and Stability - Loads – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load– Forces – What is meant by Design? – Different types of materials – RCC, PSC and Steel – Planning of structural elements- Concepts of RCC Design – Different methods of Design- Working Stress Method and Limit State Method – Load combinations as per Limit state method - Materials - Characteristic Values – Partial safety factors – Behaviour and Properties of Concrete and Steel- Stress Block Parameters as per IS 456 -2000. Limit state Analysis and design of sections in Flexure – Behaviour of RC section under flexure - Rectangular, T and L-sections, singly reinforced and doubly reinforced Beams – Detailing of reinforcement

UNIT – II Design for Shear, Bond and Torsion - Mechanism of shear and bond failure - Design of shear using limit state concept – Design for Bond –Anchorage and Development length of bars - Design of sections for torsion - Detailing of reinforcement

UNIT - III Design of Two-way slabs with different end conditions, one way slab, and continuous slab Using I S Coefficients - Design of dog-legged staircase – Limit state design for serviceability for deflection, cracking and codal provisions.

UNIT – IV Design of compression members - Short Column - Columns with axial loads, uni-axial and biaxial bending – Use of design charts- Long column – Design of long columns - I S Code provisions.

UNIT – V Design of foundation - Different types of footings – Design of wall footing – Design of flat isolated square, rectangulal, circular footings and combined footings for two columns.

Note : IS Code Book IS-456 – 2000 to be provided for Exams
IS Code 383- 1993, IS-875 – Part 1 to 4 – 1987, SP-16-1978, 1980

Note : Drawing Class to be conducted for every week. The list of Drawing sheets 10 Nos. as per Course Outcomes

TEXT BOOKS:

1. Limit state designed of reinforced concrete – P.C.Varghese, PHI Learning Pvt. Ltd.
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers.

REFERENCES :

1. 1.Reinforced concrete design by S.Unnikrishna Pillai &Devdas Menon, Tata Mc.Graw Hill.
2. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.
3. Fundamentals of Reinforced concrete design by M.L. Gambhir,Printice Hall of India Pvt.Ltd.,
4. Design of Reinforced Concrete Structures by N.Subramanian, Oxford University Press
5. Design of concrete structures by J.N.Bandhyopadhyay PHI Learning Private Limited.
6. Design of Reinforced Concrete Structures by I.C.Syal and A.K.Goel, S.Chand& company.
7. Design of Reinforced Concrete Foundations – P.C. Varghese Prentice Hall of India.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
3	1	0	4

(R20CIV 3104) TRANSPORTATION ENGINEERING - 1

PRE-REQUISITES: Surveying

COURSE OBJECTIVES:

- This course aims at providing a comprehensive insight of various elements of Highway transportation engineering. Topics related to the highway development, characterisation of different materials needed for highway construction, structural and geometric design of highway pavements along with the challenges and possible solutions to the traffic related issues will be covered as a part of this course.

Course Out Comes At the end of this course, the students will develop:

- An ability to apply the knowledge of mathematics, science and engineering in the areas of traffic engineering, highway development and maintenance
- An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the students will develop the ability to interpret the results and assess the suitability of these materials for construction of highways.
- An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil subgrade and environmental conditions using the standards stipulated by Indian Roads Congress.
- An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures or designed overlays using Indian Roads congress guidelines.
- An ability to assess the issues related to road traffic and provide engineering solutions supported with an understanding of road user psychological and behavioural patterns.
- Understand the factors influencing road vehicle performance characteristics and design.

UNIT I

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

UNIT – II

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

UNIT – III

Traffic Engineering & Regulations: Basic Parameters of Traffic-Volume, Speed and Density - Traffic Volume Studies - Data Collection and Presentation - Speed studies - Data Collection and Presentation - Origin & Destination studies, Parking Studies – On street & Off street Parking - Road Accidents - Causes and Preventive Measures - Accident Data

Recording – Condition Diagram and Collision Diagrams - Traffic Signs – Types and Specifications – Road Markings - Need for Road Markings-Types of Road Markings - Design of Traffic Signals – Webster Method.

UNIT – IV

Intersection Design: Types of Intersections – Conflicts at Intersections – Requirements of At-Grade Intersections - Types of At-Grade Intersections: Channelized and Unchannelized Intersections – Traffic Islands - Types of Grade Separated Intersections - Rotary Intersection – Concept of Rotary – Design Factors of Rotary – Advantages and Limitations of Rotary Intersections.

Unit - V

Highway Material, Construction and Maintenance: Highway Material Characterization: Sub grade Soil, Stone Aggregates, Bitumen Materials, Construction of Gravel Roads - Construction of Water Bound Macadam Roads - Construction of Bituminous Pavements: Surface Dressing, Bitumen Bound Macadam, Bituminous Concrete - Construction of Cement Concrete Pavements - Construction of Joints in Cement Concrete Pavements – Joint
Filler and Seal - Pavement Failures – Maintenance of Highways – Highway Drainage.

IRC – 37-2012, IRC-067-2012, IRC-58-1988

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna Publications – 6th Edition – 1997.

REFERENCES:

1. Principles of Traffic and Highway Engineering – Garber & Hoel, Cengage Learning.
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali and Dr.N.BLal - Khanna Publications.
3. Highway Engineering – S.P.Bindra , Dhanpat Rai & Sons. – 4th Edition (1981).

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV3111) CONCRETE TECHNOLOGY
(PROFESSIONAL ELECTIVE -I)

PRE REQUISITES: Building Materials

COURSE OBJECTIVES: The objectives of the course are to

- Knowdifferent types of cement as per their properties for different field applications.
- Understand Design economic concrete mix proportion for different exposure conditions and intended purposes.
- Know field and laboratory tests on concrete in plastic and hardened stage.

COURSE OUTCOMES: After the completion of the course student should be able to

- 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.
- Apply the use of various chemical admixtures and mineral additives to design cement based materials with tailor-made properties
- Use advanced laboratory techniques to characterize cement-based materials.
- Perform mix design and engineering properties of special concretes such as high performance concrete, self-compacting concrete, and fibre reinforced concrete.
- The course is the basis for the use of concrete, with emphasis on requirements and possibilities within the standard for consultants, concrete producers, contractors and owners.
- Proportioning of concrete including principles for self-compacting concrete taking into account fresh (rheology, stability) and hardened concrete (strength, durability, economy, sustainable development).

UNIT - I: Cement: Portland cement- chemical composition- Hydration of cement- Structure of hydrate cement- Test on physical properties- Different grades of cement.
Admixtures: Types of admixtures- mineral and chemical admixtures- properties- dosages- effects- usage.
Aggregates: Classification of aggregate- Particle shape & texture- Bond, Strength & other mechanical properties of aggregate- Specific gravity, Bulk density, Porosity, adsorption & moisture content of aggregate- Bulking of sand- Deleterious Substance of aggregate- Soundness of aggregate- Alkali Aggregate reaction- Thermal properties- Sieve analysis- Fineness modulus- Grading curves- Grading of fine & coarse Aggregates- Gap graded aggregate- Maximum aggregate size.

UNIT - II: Fresh Concrete: Workability- Factors affecting workability- Measurement of workability of tests- Setting times of concrete- Effect of time and temperature on workability- Segregation & bleeding- Mixing and vibration of concrete- Steps in manufacture of concrete- Quality of mixing water.

UNIT - III: Hardened Concrete: Water/ Cement ratio- Abram's Law- Gelspace ratio- Nature of strength of concrete- Maturity concept- Strength in tension & compression- Factors affecting strength- Relation between compression & tensile strength- Curing.
Testing of Hardened Concrete: Compression tests- Tension tests- Factors affecting strength- Flexure tests- Splitting tests- Pull- out tests, Non- destructive testing methods- codal provisions for NDT.
ELASTICITY, CREEP & SHRINKAGE- Modulus of elasticity- Dynamic modulus of elasticity- Posisson's ratio- Creep of concrete- Factors influencing creep- Relation between creep & time- Nature of creep- Effects of creep- Shrinkage - types of shrinkage.

UNIT - IV: Mix Desgin: Factors in the choice of mix proportions- Durability of concrete- Quality Control of concrete- Statistical Quality control- Acceptance criteria- Proportioning of concrete mix by normal pumpable concretes by- BIS method of mix design.

UNIT - V:
Special Concretes: Light weight concrete- Light weight aggregate concrete- Cellular concrete- No-fines concrete- Fibre reinforced concrete- Polymer concrete- Types of Polymer concrete- Self compacting concrete.

TEXT BOOKS:

1. Properties of Concrete by A.M.Naville - Low priced Edition - 4th edition.

2. Concrete Technology by M.S.Shetty. - S.Chand & Co.

REFERENCES BOOKS:

1. Concrete Technology by Job Thomas, Cengage Learning.
2. Concrete Technology by M.L. Gambir. - Tata Mc.Graw Hill Publishers, New Delhi.
3. Concrete Technology by A.R. Santha Kumar, Oxford university Press New Delhi.
4. Concrete: Micro structure, Properties and Materials - P.K.Metha and J.M.Monteiro, Mc-Graw Hill Publisher.

IS Codes:
IS 383, IS 516, IS 10262 - 2009

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
3	0	0	3

(R20MBA3112) MANAGEMENT FUNDAMENTALS FOR ENGINEERS (PROFESSIONAL ELECTIVE -I)

Course Objective

To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.

Course Outcome

The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

UNIT I :

Introduction to Management

Evolution of Management, Nature & Scope-Functions of Management-Role of Manager-levels of Management-Managerial Skills - Challenges-Planning-Planning Process-Types of Plans-MBO.

UNIT II

Organization Structure & HRM

Organization Design-Organizational Structure-Departmentation–Delegation-Centralization - Decentralization-Recentralization-Organizational Culture- Organizational climate-Organizational change. Human Resource Management-HR Planning - Recruitment & Selection - Training & DevelopmentPerformance appraisal - Job satisfaction-Stress Management Practices.

UNIT III

Operation Management

Introduction to Operations Management-Principles and Types of Plant layout-Methods of production (Job Batch and Mass production) - Method study and Work measurement-Quality Management - TQM-Six sigma - Deming's Contribution to Quality - Inventory Management – EOQ - ABC Analysis - JIT System-Business Process Re-engineering(BPR).

UNIT IV

Marketing Management

Introduction to Marketing-Functions of Marketing-Marketing vs. Selling-Marketing Mix - Marketing Strategies - Product Life Cycle - Market Segmentation -Types of Marketing - Direct MarketingNetwork Marketing - Digital Marketing-Channels of Distribution - Supply Chain Management (SCM).

UNIT V

Project Management

Introduction to Project Management-steps in Project Management - Project Planning - Project Life Cycle-Network Analysis-Program Evaluation & Review Technique(PERT)-Critical Path Method(CPM) - Project Cost Analysis - Project Crashing - Project Information Systems.

Suggested Readings

1. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
2. Fundamentals of Management, Stephen P.Robbins, Pearson Education, 2009.
3. Essentials of Management, Koontz Kleihrich, Tata Mc - Graw Hill.
4. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
5. Industrial Engineering and Management: Including Production Management, T.R.Banga, S.C Sharma , Khanna Publishers.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV3113) BASICS OF MECHANICAL ENGINEERING
(PROFESSIONAL ELECTIVE -I)

COURSE OBJECTIVES: Understanding of basic principles of Mechanical Engineering is required in various field of engineering.

COURSE OUTCOMES: After learning the course the students should be able to

1. The ability to analyze and model physical systems or components using (apply knowledge of) mathematics (including multivariable calculus and differential equations), basic science and engineering.
2. The ability to design and conduct experiments, as well as to analyze and interpret data.
3. The ability to design and realize a physical system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. The ability to function on multidisciplinary teams.
5. The ability to identify, formulate, and solve engineering problems.
6. The understanding of professional and ethical responsibility. The ability to communicate effectively.

UNIT – I Introduction: Prime movers and its types, Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Change of state, Path, Process, Cycle, Internal energy, Enthalpy, Statements of Zeroth Law and First law. Energy: Introduction and applications of Energy sources like Fossil fuels, nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion.

UNIT – II Properties of gases: Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Relation between Cp and Cv, Various non-flow processes like constant volume process, constant pressure process, Isothermal process, Adiabatic process, Poly-tropic process Properties of Steam: Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables, steam calorimeters. Steam Boilers: Introduction, Classification, Cochran, Lancashire and Babcock and Wilcox boiler, functioning of different mountings and accessories.

UNIT – III Heat Engines: Heat Engine cycle and Heat Engine, working substances, Classification of heat engines, Description and thermal efficiency of Carnot; Rankine; Otto cycle and Diesel cycles. Internal Combustion Engines: Introduction, Classification, Engine details, four- stroke/ two-stroke cycle Petrol/Diesel engines, Indicated power, Brake Power, Efficiencies.

UNIT – IV Pumps: Types and operation of Reciprocating, Rotary and Centrifugal pumps, Priming Air Compressors: Types and operation of Reciprocating and Rotary air compressors, significance of Multistage. Refrigeration & Air Conditioning: Refrigerant, Vapor compression refrigeration system, vapor absorption refrigeration system, Domestic Refrigerator, Window and split air conditioners.

UNIT – V Couplings, Clutches and Brakes: Construction and applications of Couplings (Box; Flange; Pin type flexible; Universal and Oldham), Clutches (Disc and Centrifugal), and Brakes (Block; Shoe; Band and Disc). Transmission of Motion and Power: Shaft and axle, Belt drive, Chain drive, Friction drive, Gear drive. Engineering Materials: Types and applications of Ferrous & Nonferrous metals, Timber, Abrasive material, silica, ceramics, glass, graphite, diamond, plastic and polymer.

TEXT BOOKS:

- Basic Mechanical Engineering / Pravin Kumar/ Pearson
- Introduction to Engineering Materials / B.K. Agrawal/ Mc Graw Hill

REFERENCE BOOKS:

- Fundamental of Mechanical Engineering/ G.S. Sawhney/PHI
- Thermal Science and Engineering / Dr. D.S. Kumar/ Kataria

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
0	0	2	1

(R20CIV31L1) HIGHWAY ENGINEERING AND CONCRETE TECHNOLOGY LAB

PRE-REQUISITES: Building Materials,Concrete Technology, Highway Materials
COURSE OBJECTIVES: The objectives of the course

- To learn laboratory tests and their procedures cement, fine aggregate, course aggregates and bitumen
- To Evaluate fresh concrete properties
- To Understand the test procedures for characterization of Concrete and bituminous mixes
- Student shall be able to
- Categorize the test on materials used Civil Engineering Building&Pavement constructions
- To perform the tests on concrete for it characterization.
- To Design Concrete Mix Proportioning by Using Indian Standard Method.
- Examine the tests performed for Bitumen mixes.
- To prepare a laboratory report

Course Outcomes
Outline the importance of testing of cement and its properties

1. Perform different tests conducted on cement, aggregate and concrete at site.
2. Perform non-destructive test on concrete.
3. Design the concrete mix as per the site conditions and specification of materials available there.
4. Assess the different properties of aggregate
5. Summarise the concept of workability and testing of concrete
6. Describe the preparation of green concrete.Describe the properties of hardened concrete

LIST OF EXPERIMENTS

I.Test on Cement

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

II. TEST ON AGGREGATES (COARSE AND FINE)

1. Specific gravity (Pycnometer and wire basket),water absorption
2. Shape(Flakiness and elongation indices)
3. Impact and abrasion value tests
4. Crushing resistance and durability tests
5. Sieve Analysis and gradation charts (Job mix formula using Rothfuch's charts)
6. Bulking of sand, Bulk and compact densities of fine and coarse aggregates

III.TEST ON FRESH CONCRETE

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

IV.TEST ON HARDENED CONCRETE

1. Compression test on cubes & Cylinders
2. Flexure test
3. Split Tension Test
4. Modulus of Elasticity

V. TESTS ON BITUMEN AND BITUMINOUS CONCRETE

1. Penetration, softening point and spot test
2. Ductility, Elastic recovery and viscosity
3. Flash and fire points and specific gravity
4. Marshall's Stability (sample preparation and testing for stability and flow values)

TEXT BOOKS:

1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
2. Highway Material Testing manual, Khanna ,Justo and Veeraraghavan, Nemchand Brothers

IS CODES:

1. IS 10262 :2009 "Concrete Mix Proportioning – Guidelines"
2. 1S 516:2006 "Methods of Tests on Strength of Concrete"
3. IS 383 :1993 "Specification For Coarse And Fine Aggregates From Natural Sources For Concrete"
4. 1S 1201 -1220 (1978) "Methods for testingtars and bituminous materials"
5. IRC SP 53 -2010 "Guidelines on use of modified bitumen" 6. MS-2 Manual for Marshalls Mix design 2002

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
0	0	2	1

(R20CIV31L2) GEOTECHNICAL ENGINEERING LAB

PRE-REQUISITES: Soil Mechanics (Co-requisite)

COURSE OBJECTIVES: To obtain index and engineering properties of locally available soils, and to understand the behaviour of these soil under various loads.

COURSE OUTCOMES: At the end of the course, the student will be able to Classify and evaluate the behaviour of the soils subjected to various loads.

1. Carry out soil mechanics fundamental experiments according to IS standards
2. Collect, analyze and interpret experimental data
3. Design soil mechanics experiments and determine which test is needed in designing civil engineering projects
4. Use communication skills to transfer their findings in a formal report format

LIST OF EXPERIMENTS

1. Atterberg's Limits (LL & PL)
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

REFERENCE:

1. Measurement of Engineering Properties of Soils by. E. Saibaba Reddy & K. Rama Sastri, New Age International
IS – 2720 all parts

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – I Semester

L	T	P	C
0	0	2	1

(R20HAS31L1) ADVANCED COMMUNICATION SKILLS LAB

PRE-REQUISITES: English

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

COURSE OUTCOMES:

Communicate efficiently in the work place up professional context

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

Introduction

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

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

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Syllabus:

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

1. **Activities on Fundamentals of Inter-personal Communication and Building Vocabulary** - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills-using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. **Activities on Reading Comprehension** –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.
3. **Activities on Writing Skills** – Structure and presentation of different types of writing – *letter writing/Resume writing/ e-correspondence/ Technical report writing/ Portfolio writing* – planning for writing – improving one's writing.

4. **Activities on Presentation Skills** – Oral presentations (individual and group) through JAM sessions/seminars/**PPTs** and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. **Activities on Group Discussion and Interview Skills** – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.

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

- **Spacious room with appropriate acoustics.**
- **Round Tables with movable chairs**
- **Audio-visual aids**
- **LCD Projector**
- **Public Address system**
- **P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ**
- **T. V, a digital stereo & Camcorder**
- **Headphones of High quality**

Prescribed Lab Manual: A book titled ***A Course Book of Advanced Communication Skills (ACS) Lab*** published by Universities Press, Hyderabad.

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

- **Oxford Advanced Learner's Compass**, 7th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- **The following software from 'train2success.com'**
  - **Preparing for being Interviewed**
  - **Positive Thinking**
  - **Interviewing Skills**
  - **Telephone Skills**
  - **Time Management**

Books Recommended:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, Pearson Education 2011.
3. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
4. Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
5. The Basics of Communication: A Relational Perspective. Steve Duck & David T. McMahan. Sage South Asia Edition. Sage Publications. 2012.
6. English Vocabulary in Use series, Cambridge University Press 2008.
7. Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
8. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
9. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
10. Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.
11. Job Hunting by Colm Downes, Cambridge University Press 2008.
12. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hil 2009.
14. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/ Cambridge University Press.
15. International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

DISTRIBUTION AND WEIGHTAGE OF MARKS:

***Advanced Communication Skills Lab Practicals**:*

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

Mini Project: As a part of Internal Evaluation

1. Seminar/ Professional Presentation

2. A Report on the same has to be prepared and presented.

**** Teachers may use their discretion to choose topics relevant and suitable to the needs of students.***

**** Not more than two students to work on each mini project.***

**** Students may be assessed by their performance both in oral presentation and written report.***

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY					
(An Autonomous Institution under UGC, New Delhi)					
B.Tech. - III Year – I Semester		L	T	P	C
		0	0	2	0
(R20MAC3100) MOOCS-I					

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
3	1	0	4

(R20CIV3201)HYDROLOGY &WATER RESOURCES ENGINEERING

PRE-REQUISITES: Fluid Mechanics & HHM

COURSE OBJECTIVES: This course provides the description of hydrological cycle and derive various formulas used in estimation of different basic components of surface and Ground water cycle. and its components. Further it will explain the water requirement for irrigation and connectivity of hydrology to the field requirement.

COURSE OUTCOMES: At the end of the course the student will be able to

- Understand the different concepts and terms used in engineering hydrology
- To identify and explain various formulae used in estimation of surface and Ground water hydrology components
- Demonstrate their knowledge to connect hydrology to the field requirement
- The basic requirements of irrigation and various irrigation techniques, requirements of the crops
- Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design
- Basic components of river Training works. Various components of hydrologic cycle that affect the movement of water in the earth

UNIT - I Introduction: Concepts of Hydrologic cycle, Global Water Budget, Applications in Engineering. Sources of data. Precipitation Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, rain gauge network: mean precipitation over an area: Arithmetic, The issen's and Isohyetal methods, Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area-duration relationships, maximum intensity/depth-duration frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

UNIT - II Abstractions from precipitation Evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations: Penman and Blaney & Criddle Methods, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modeling infiltration capacity, classification of infiltration capacities, infiltration indices. Runoff Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff – Analysis.

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

UNIT – IV GROUNDWATER HYDROLOGY

Occurrence, movement and distribution of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. Well Hydraulics - Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants. Crop Water Requirements– Water requirement of crops Crops and cropse as onsin India, cropping pattern, duty and delta; Quality of irrigation water; Soil water relationships, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle /dripirrigation.

UNIT - V Canal Systems: Canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels-rigid boundary channels, alluvial channels, Regime channels, Kennedy's and Lacey's theory of regime channels. Canal outlets: non-modular, semi-modular and modular outlets. Water logging : causes, effects and remedial measures. Lining of canals Types of lining-Advantages and disadvantages. Drainage of irrigated lands-necessity, methods.

TEXT BOOKS

1. Hydrology by K. Subramanya (Tata McGraw-Hill)
2. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg Khanna publishers

REFERENCE BOOKS

1. Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill)
2. Engineering Hydrology by Jaya Rami Reddy (Laxmi Publications
3. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
4. Elements of Water Resources Engineering by K.N.Duggal and J.P.Soni (New Age International) G L Asawa, IrrigationEngineering, WileyEastern

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV3202)ENVIRONMENTAL ENGINEERING

PRE REQUISITES: Fluid Mechanic

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

COURSE OUTCOMES : At the end of the course, the student will be able to:

- Assess characteristics of water and wastewater and their impacts
- Estimate quantities of water and waste water and plan conveyance components
- Design components of water and waste water treatment plants
- Be conversant with issues of air pollution and control
- Air quality, emissions and pollution control and Environmental health.
- Water and wastewater quality and treatment ,Hazardous and solid waste engineering

UNIT – I: Introduction: Water supply schemes – Protected water supply – Population forecasts, design period – water demand – Types of demand – factors affecting – fluctuations – fire demand – Sources of Water– intakes – infiltration galleries, confined and unconfined aquifers – water quality parameters and testing – drinking water standards.

UNIT II : Layout and general outline of water treatment units – sedimentation, uniform settling velocity– principles – design factors – surface loading – Jar test – optimum dosage of coagulant - coagulation-flocculation, clarifier design – coagulants – feeding arrangements. Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – types of disinfection - theory of chlorination - chlorine demand - other disinfection treatment methods. Distribution systems – Types of layouts of Distribution systems – design of distribution systems - Hardy Cross and equivalent pipe methods - service reservoirs – Determination of Storage capacity.

UNIT – III : Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – examination of sewage – B.O.D. – C.O.D. equations. Design of sewers – shapes and materials – sewer appurtenances manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses – house drainage – components requirements – sanitary fittings-traps – one pipe and two pipe systems of plumbing.

UNIT – IV: Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles and design of biological treatment – trickling filters – standard and high rate-Filters – ASP – ASP modification – Aeration.

UNIT – V : Construction and design of oxidation ponds – Oxidation ditches – Sludge Treatment - Sludge digestion tanks –design of Digestion tank –Factors affecting sludge digestion - Sludge disposal by drying – septic tanks - working principles and design – soak pits. Ultimate disposal of waste water – self purification of rivers – Sewage farming..

TEXT BOOKS:

1. Water Supply & Sanitory Engineering by G.S.Bindie.
2. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi.
3. Water Supply Engineering Vol.1 & Waste water Engineering Vol. II, P.N. Modi, Standard Book Publishers, Newdelhi.
4. Environmental Engineering by H.S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014
5. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.

REFERENCS :

1. Environmental Engineering I and II by BC Punmia, Std. Publications.
2. Environmental Engineering I and II by SK Garg, Khanna Publications.
3. Environmental Pollution and Control Engineering CS Rao,Wiley Publications
4. Water and Waste Water Technology by Steel, Wiley
5. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
6. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley, 2011
7. Water and Waste Water Technology by Mark J Hammar and Mark J. HammarJr.Wiley,
   2007.
8. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
9. Introduction to Environmental Engineering by P. AarneVesilind, Susan M. Morgan, a. Thompson /Brooks/Cole; Second Edition 2008.
10. Integrated Solid Waste Management, Tchobanoglous, Theissen& Vigil. McGraw Hill a. Publication

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
3	0	0	3

(R20MBA3201) ENGINEERING ECONOMICS & ACCOUNTING

Pre-Requisites: Mathematics

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

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

Unit I : Introduction & Demand Analysis:Definition, Nature and Scope of Managerial Economics. Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

Unit II : Production & Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts. Break-even Analysis (BEA)- Determination of Break-Even Point (simple problems) - Managerial Significance.

Unit III : Markets & New Economic Environment: Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing. Methods of Pricing. Business:Features and evaluation of different forms of Business Organisation: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types,New Economic Environment: Changing Business Environment in Post-liberalization scenario.

Unit IV : Capital Budgeting: Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital Trading Forecast Capital Budget, Cost Budget. Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) and Net Present Value Method (simple problems).

Unit V : Introduction to Financial Accounting & Financial Analysis: Accounting concepts and Conventions Introduction IFRS Double-Entry Book Keeping, Journal, Ledger, Trial Balance-Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios. Du Pont Chart.

Text books:

1. Aryasri: Managerial Economics and Financial Analysis, TMH, 2012.
2. Vijay Kumar & Appa Rao Managerial Ecoconomics & Financial Analysis, Cengage 2011.
3. J. V. Prabhakar Rao & P.V. Rao Managerial Ecoconomics & Financial Analysis, Maruthi Publishers, 2011.

References:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.2012.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, Pearson, 2012.
3. Lipsey & Chrystel, Economics, Oxford University Press, 2009
4. Domnick Salvatore: Managerial Economics In a Global Economy, Thomson, 2012.
5. Narayanaswamy: Financial Accounting—A Managerial Perspective, PHI, 2012.
6. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas, 2012.
7. Truet and Truet: Managerial Economics: Analysis, Problems and Cases, Wiley, 2012.
8. Dwivedi: Managerial Economics, Vikas, 2012.
9. Kasi Reddy Sraswathi, MEFA PHI Learning, 2012.
10. Shailaja &Usha : MEFA, University Press, 2012.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
3	1	0	4

(R20CIV3203) STRUCTURAL ENGINEERING-II (STEEL)

PRE-REQUISITES: Structural Analysis I & II

COURSE OBJECTIVES The objectives of the course is to

- Explain the mechanical properties of structural steel , plasticity ,yield .
- Describe the salient features of Limit State Method of design of Steel structures.
- Identify and explain the codal provisions given in IS. 800.
- Analyze the behaviour of steel structures under tension, compression and flexure.
- Design the tension, compression , flexural members andplate girder
- Design the connectrion in steel structure,build -up member and (bolted and welded).

COURSE OUTCOMES: After the completion of the course student should be able to

- Analyze the tension members, compression members.
- Design the tension members, compression members and column bases and joints and connections
- Analyze and Design the beams including built-up sections and beam and connections.
- Identify and Design the various components of welded plate girder including stiffeners
- Students are able to design the connection of steel structure and students are able to design the tension and compression members
- Students are able to design the beam and roof truss in steel structure and Students able to design the plate and gantry design

UNIT – I Materials – Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel. Concepts of limit State Design – Different Limit States – Load combinations for different Limit states - Design Strengths- deflection limits – serviceability – stability check. Design of Connections– Different types of connections – Bolted connections –Design strength – efficiency of joint– prying action - Welded connections – Types of welded joints – Design requirements - Design of Beam-column connections- Eccentric connections - Type I and Type II connection – Framed connection– stiffened / seated connection.

UNIT – II Design of tension members –Simple and built up members - Design strength – Design procedure for splicing - lug angle. Design of compression members – Buckling class – slenderness ratio –Design of simple compression members - laced – battened columns – splice – column base – slab base.

UNIT – III Plastic Analysis;Plastic moment – Plastic section modulus - Plastic analysis of continuous beams Design of Flexural Members –Laterally supported and unsupported Beams – Design of laterally supported beams- Bending and shear strength/buckling – Built-up sections - Beam splice

UNIT – IV Design of welded plate girders – elements – economical depth – design of main section – connections between web and flange – design of stiffeners - bearing stiffener– intermediatestiffeners – Design of web splice and flange splice.

UNIT – V Design of Industrial Structures;Types of roof trusses - loads on trusses – wind loads - Purlin design – truss design –Design of welded Gantry girder Note: Design of structural members include detailed sketches.

Note : Drawing Class to be conducted for every week. The list of Drawing sheets 10 Nos. as per Course Outcomes
IS Code – 800-2007, Steel Tables to be provided for Exams

TEXT BOOKS:

1. Design of steel structures by S.K.Duggal,Tata Macgrawhill publishers,2000,2nd Edition
2. Design of steel structures by N.Subramanian,Oxford University press,2008

REFERENCE BOOKS:

1. Design of steel structures by K.S.Sairam,Pearson Educational India, 2nd Edition,2013
2. Design of steel structures by Edwin H.Gayrold and Charles Gayrold,Tata Mac-grawhill publishers,1972
3. Design of steel structures by L.S.JayaGopal,D.Tensing,Vikas Publishing House

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV3221) PRESTRESSED CONCRETE STRUCTURES
(PROFESSIONAL ELECTIVE -II)

PRE-REQUISITES: Rein forced Concrete Design

COURSE OBJECTIVES: The objectives of the course are to
- Understand the principles &necessity of prestressed concrete structures.
- Know different techniques of prestressing.
- Get the knowledge on various losses of prestress.
- Understand Analysis and design of prestressed concrete members.

COURSE OUTCOMES: After the completion of the course student should be able to
- Acquire the knowledge of evolution of process of prestressing.
- Acquire the knowledge of various prestressing techniques.
- Develop skills in analysis design of prestressed structural elements as per the IS codal provisions
- To design prestressed concrete beam and also design prestressed composite beams
- To design flexural members with partial prestressing and also design prestressed concrete tanks, poles and sleepers
- To design prestressed concrete bridges

UNIT I: Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing-Materials- high strength concrete and high tensile steel their characteristics.
Methods and Systems of prestressing: Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

UNIT II: Losses of Prestress: Loss of prestress in pretensioned and post-tesnioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

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

UNIT IV: Transfer of Prestress in Pretensioned Members : Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block – Analysis by Guyon, Magnel, Zielinski and Rowe's methods – Anchorage zone reinforcement- BIS Provisions

UNIT V Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- BIS code requirements.
Note : IS Code – 1343 – 2012 to be provided for Exams

TEXT BOOK:

1. Prestressed concrete by N.Krishna Raju, 5th Edition,Tata McGraw Hill Book Education Pvt. Ltd.

REFERENCES :

1. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
2. Prestressed concrete by S. Ramamrutham, Dhanpat Rai & Sons, Delhi.
3. Prestressed Concrete by N. Rajagopalan, Narosa Publishing House.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV3222) ELEMENTS OF EARTH QUAKE ENGINEERING (PROFESSIONAL ELECTIVE -II)

COURSE OBJECTIVES:

To impart knowledge on the seismology and behavior of buildings during earthquakes.

COURSE OUTCOMES :

The learner will be able to analyse and design buildings to resist seismic forces.

1. Understand and apply the basics of structural dynamics in analysis of structures subjected to earthquakes.
2. Understand plate tectonics.
3. Understand ground motion magnitude, intensity, and frequency.
4. Understand and compute ground motion intensity measures and attenuation relationships.
5. Understand and compute earthquake hazard and design response spectra.
6. Understand and apply building code earthquake requirements in design of structural systems.

UNIT - I : Engineering Seismology: Earthquake phenomenon cause of earthquakes-Faults-Plate tectonics- Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy released-Earthquake measuring instruments-Seismo scope, Seismograph, accelerograph-strong ground motions- Seismic zones of India.

Theory of Vibrations: Elements of a vibratory system- Degrees of Freedom-Continuous system-Lumped mass idealization-Oscillatory motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) system-undamped and damped-critical damping-Logarithmic decrement-Forced vibrations-Harmonic excitation-Dynamic magnification factor-Excitation by rigid based translation for SDOF system-Earthquake ground motion.

UNIT - II : Conceptual design: Introduction-Functional planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and Vertical members-Twisting of buildings-Ductility-definition-ductility relationships-flexible buildings-framing systems-choice of construction materials-unconfined concrete-confined concrete-masonry-reinforcing steel.

Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method.

UNIT-III : Reinforced Concrete Buildings: Principles of earthquake resistant deign of RC members- Structural models for frame buildings- Seismic methods of analysis- Seismic deign methods- IS code based methods for seismic design-Seismic evaluation and retrofitting-Vertical irregularities- Plan configuration problems- Lateral load resisting systems-Determination of design lateral forces- Equivalent lateral force procedure- Lateral distribution of base shear.

UNIT - IV : **Masonry Buildings**: Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behaviour of unreinforced and reinforced masonry walls- Behaviour of walls- Box action and bands- Behaviour of infill walls- Improving seismic behaviour of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

UNIT – V : Structural Walls and Non-Structural Elements: Strategies in the location of structural walls- sectional shapes- variations in elevation- cantilever walls without openings – Failure mechanism of non-structures- Effects of non-structural elements on structural system- Analysis of non-structural elements-Prevention of non-structural damage- Isolation of non-structures. Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility-Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behaviour of beams, columns and joints in RC buildings during earthquakes-Vulnerability of open ground storey and short columns during earthquakes

TEXT BOOKS:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press.
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

REFERENCES:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons.
2. Eartquake Resistant Design of Buidling structures by Vinod Hosur, Wiley India Pvt. Ltd.
3. Elements of Mechanical Vibration by R.N.Iyengar, I.K.International Publishing House Pvt. Ltd.
4. Masory and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros.
5. Earthquake Tips – Learning Earthquake Design and Construction C.V.R. Murthy.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV3223) FINITE ELEMENT ANALYSIS
(PROFESSIONAL ELECTIVE -II)

PRE REQUISITES: SA – I & SA – II

COURSE OBJECTIVES: To introduce the numerical method FEM and its features with the help of simple problem.

COURSE OUTCOMES: Understand the principles, procedure and applicability of FEM in Civil Engineering problem.

1. Understand the concepts behind variational methods and weighted residual methods in FEM.
2. Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element.
3. Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
4. Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
5. Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer, and fluid flow.
6. Identify the application and characteristics of FEA elements such as bars, beams, plane and isoparametric elements, and 3-D element.

UNIT – I

Introduction to Finite Element Method – Basic Equations in Elasticity – stress strain equations – concept of plane stress – plane strain— advantages and disadvantages of FEM. Element shapes – nodes – nodal degree of freedom – strain displacement relations.

UNIT – II

Finite Element Analysis (FEA) of – one dimensional problems – Bar element – Shape functions stiffness matrix FEA Beam elements – stress strain relation- shape functions - stiffness matrix– continuous beams.

UNIT – III

FEA Two dimensional problem – CST – LST element – shape function – stress – strain. Lagrangian – Serendipity elements – Hermite polynomials – regular, Irregular 2 D & 3D – Element –shape functions.

UNIT – IV

Isoparametric formulation – Concepts of isoperimetric elements for 2D analysis -formulation of CST element, 4 –nodded and 8-noded iso-parametric quadrilateral elements.

UNIT-V

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

TEXT BOOKS:

1. Introduction to Finite elements in engineering by Chandrupatla, Belegundu, Prentice Hall.

2. Finite element method by Daryl L. Logan, CENGAGE Learning.
3. A first course in Finite Element Method by Daryl L. Logan, 5th Edition, Cengage Learning India Pvt. Ltd.
4. Introduction to finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D.Belegundu, Prentice Hall of India

REFERENCES:

1. Finite element analysis by S.S. Bhavikatti-New age International publishers.
2. Finite Element Aanalysis by P.Seshu, PHI Learning Private Limited
3. Concepts and applications of Finite Element Analysis by Robert D. Cook et al., Wiley India Pvt. Ltd.
4. Applied Finite Element Analysis by G.Ramamurty, I.K.International Publishing House Pvt.Ltd.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
0	0	2	1

(R20CIV32L1) ENVIRONMENTAL ENGINEERING LAB

COURSE OBJECTIVES: the objectives of the course are to

- Perform the experiments to determine water and waste water quality
- Understand the water & waste water sampling, their quality standards
- Estimate quality of water, waste water, Industrial water

COURSE OUTCOMES: After the completion of the course student should be able to

- Understand about the equipment used to conduct the test procedures
- Perform the experiments in the lab
- Examine and Estimate water, waste water, air and soil Quality
- Compare the water, air quality standards with prescribed standards set by the local governments
- Develop a report on the quality aspect of the environment
- Perform common environmental experiments relating to water and wastewater quality, and know which tests are appropriate for given environmental problems.

LIST OF EXPERIMENTS

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

TEXT/REFERENCE BOOKS:

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
2. Introduction to Environmental Engineering by P. AarneVesilind, Susan M.Morgan, Thompson / Brooks/Cole; Second Edition 2008.
3. Peavy, H.s, Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw – Hill International Editions, New York 1985.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L	T	P	C
0	0	2	1

(R20CIV32L2) COMPUTER AIDED DESIGN LAB

PRE-REQUISITES: Computer Aided Civil Engineering Drawing or AUTO CAD Principles – Excel-
Structural Engineering -1 & 2

COURSE OBJECTIVES : The objectives of the course are to

- Learn the usage of any fundamental software for design
- Create geometries using pre-processor
- Analyseand Interpret the results using post processor
- Design the structural elements

COURSE OUTCOMES

- After the completion of the course student should be able to
- Model the geometry of real world structure Represent the physical model of structural element/structure
- Perform analysis
- Interpret from the Post processing results
- Design the structural elements and a system as per IS Codes
- Apply basic concepts to develop construction (drawing) techniques and Ability to manipulate drawings through editing and plotting techniques

LIST OF EXPERIMENTS

1. Analysis &Design determinate structures using a software
2. Analysis &Design of fixed & continuous beams using a software
3. Footings, Columns, Beams, Slabs & all structural members to be drawn in AUTOCAD
4. Analysis & Design of Plane Frames
5. Analysis &Design of space frames subjected to DL & LL
6. Analysis &Design of residential building subjected to all loads (DL,LL,WL,EQL)
7. Analysis & Design of Roof Trusses
8. Design and detailing of built up steel beam
9. Developing a design programme for foundation using EXCEL Spread Sheet
10. Detailing ofRCC beam and RCCslab
11. Detailing of Steel built up compression member

Note: Drafting of all the exercises is to be carried out using commercially available designing software's.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY					
(An Autonomous Institution under UGC, New Delhi)					
B.Tech. - III Year – II Semester		L	T	P	C
		0	0	2	0
(R20MAC3200) MOOCS-II					

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester

L	T	P	C
3	1	0	4

(R20CIV4101) ESTIMATION,COSTING AND PROJECT MANAGEMENT

COURSE OBJECTIVES: The subject provide process of estimations required for various work in construction.To have knowledge of using SOR & SSR for analysis of rates on various work sand basics of planning tools for a construction projects.

COURSE OUTCOME: On completion of the course, the students will be able to:

- Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
- Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
- Understand how competitive bidding works and how to submit a competitive bid proposal.
- An idea of how to optimize construction projects based on costs
- An idea how construction projects are administered with respect to contract structures and issues.
- An ability to put forward ideas and understandings to others with effective communication processes

UNIT – I

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. Detailed Estimates of Buildings

UNIT – II

Reinforcement bar bending and bar requirement schedules Earthwork for roads and canals.

UNIT – III

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

UNIT-IV

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation - Standard specifications for different items of building construction.

UNIT-V

Construction project planning- Stages of project planning: pre-tender planning, preconstruction planning, detailed construction planning, role of client and contractor, level ofdetail. Process of development of plans and schedules, work break-down structure, activity lists,assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts.

Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion

NOTE : Number of Exercises Proposed :

1. Three in flat Roof & one in Sloped Roof
2. Exercises on Data – three Nos.

TEXT BOOKS

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

REFERENCE BOOKS:

1. Estimating and Costing by G.S. Birdie
2. Chitkara, K. K. Construction Project Management. Tata McGraw-Hill Education, 2014 Standard Schedule of rates and standard data book by public works department.
3. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
4. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
5. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
6. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
7. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester

L	T	P	C
3	1	0	4

(R20CIV4102) TRANSPORTATION ENGINEERING-II

PRE-REQUISITES: Surveying

Course Objectives:

This course aims at providing a comprehensive insight of various elements of Highway transportation engineering. Topics related to the highway development, characterisation of different materials needed for highway construction, structural and geometric design of highway pavements along with the challenges and possible solutions to the traffic related issues will be covered as a part of this course.

Course Outcomes: At the end of this course, the students will develop:

- An ability to apply the knowledge of mathematics, science and engineering in the areas of traffic engineering, highway development and maintenance
- An ability to design, conduct experiments to assess the suitability of the highway materials like soil, bitumen, aggregates and a variety of bituminous mixtures. Also the students will develop the ability to interpret the results and assess the suitability of these materials for construction of highways.
- An ability to design flexible and rigid highway pavements for varying traffic compositions as well as soil sub grade and environmental conditions using the standards stipulated by Indian Roads Congress.
- An ability to evaluate the structural and functional conditions of in-service highway pavements and provide solution in the form of routine maintenance measures order signed overlays using Indian Roads congress guidelines.
- An ability to assess the issues related to road traffic and provide engineering solutions supported with an understanding of road user psychological and behavioural patterns.
- Differentiate the working of various transport systems and their working in different scenarios

UNIT – I : Introduction to Railway : Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast, Gauge – Creep of Rails- Theories related to Creep – Sleeper density.

UNIT – II : Geometric Design of Railway Track: Gradients- Grade Compensation-Cant and Negative Super elevation- Cant Deficiency – Degree of Curve, Points and Crossing, Rail Joints & Welding of Joints, Railway station& Yards, Signalizing & interlocking.

UNIT – III : Airport Engineering: Airport Site selection – Runway Orientation – Basic Runway Length – Corrections for Elevation, Temperature – Airport Classification - Runway Geometric design – Factors Controlling Taxiway Layout - Terminal Area – Apron – Hangar – Blast Considerations, Typical Airport Layouts – Wind rose diagram - Runway Lightening system & Marking.

UNIT – IV : Port and Harbour Engineering: Requirements of Port and Harbour, Classification of Port & Harbour, Features of a Harbour, Planning of Harbour, Breakwaters, Dry docks, Jetties, Aprons, Transit shed and Warehouses, Navigational aids, Maintenance of Port and Harbours, Inland Water Transport

UNIT –V : Intelligent Transport Systems: ITS Definition, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications; Advanced Traffic Management systems (ATMS), Advanced Public Transportation systems (APTS), ITS architecture components and standards, Overview of ITS implementations in developed countries.

TEXT BOOKS:

1. Satish Chandra and Agarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi.
2. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
3. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
4. Transportation Engineering and Planning – C.S. Papacostas, P.D.Prevedouros.

REFERENCES:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian.
3. Harbour, Dock and Tunnel Engineering – R. Srinivasan. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV4131) REMOTE SENSING & GIS
(PROFESSIONAL ELECTIVE -III)

PRE REQUISITES: Surveying

COURSE OBJECTIVES:

- The objectives of the course are to
- Know the concepts of Remote Sensing, its interpreting Techniques and concepts of
  Digital images
- know the concept of Geographical Information System (GIS), coordinate system GIS
  Data and its types
- Understand the students managing the spatial Data Using GIS.
- Understand Implementation of GIS interface for practical usage.

COURSE OUTCOMES: After the completion of the course student should be able to

- Describe different concepts and terms used in Remote Sensing and its data
- Understand the Data conversion and Process in different coordinate systems of GIS interface
- Evaluate the accuracy of Data and implementing a GIS
- Understand the applicability of RS and GIS for various applications.
- Understand the basic concept of GIS and its applications; know different types of data representation in GIS.
- Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer.

UNIT – I

Introduction to Photogrammetry: Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducially line.

UNIT – II

Remote Sensing –: Basic concept of Remote sensing, Data and Information, Remote sensing data Collection, Remote sensing advantages & Limitations, Remote Sensing process.

Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT – III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data – Joining Spatial and Attribute data; GIS Operations: Spatial Data Input- Attribute data Management –Data display- Data Exploration- Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections-Map projection parameters-Commonly used Map Projections - Projected coordinate Systems

UNIT –IV

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

UNIT –V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data.

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

TEXT BOOKS:

1 Remote sensing of the environment – An earth resource perspective – 2nd edition – by John R. Jensen, Pearson Education.
2 Introduction to Geographic Information System – Kang-Tsung Chang, Tata McGraw-Hill Education Private Limited.

REFERENCES:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S.Publications.
3. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.
4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV4132) GROUND IMPROVEMENT TECHNIQUES
(PROFESSIONAL ELECTIVE -III)

PREREQUISITES: Geo-Technical Engineering, Foundation Engineering

Course Objectives: The objectives of the course are

- To know the need of ground improvement
- To acquire the knowledge on the various ground improvement techniques available and their applications for different types of soils
- To understand suitable ground improvement technique for given soil conditions.

Course Outcomes: at the end of the course the student able to

- Know the necessity of ground improvement
- Understand the various ground improvement techniques available
- Select & design suitable ground improvement technique for existing soil conditions in the field
- Understand the different ground improvement techniques
- Understand the methods of stabilization
- Understand the methods and properties of reinforced soil

UNIT – I

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

UNIT – II

Mechanical Modification – Deep Compaction Techniques- Blasting Vibrocompaction, Dynamic Tamping and Compaction piles.

UNIT – III

Hydraulic Modification – Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Electro-kinetic dewatering. Filtration, Drainage and Seepage control with Geosynthetics, Preloading and vertical drains,

UNIT – IV

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

UNIT – V

Modification by Inclusions and Confinement - Soil reinforcement, reinforcement with strip, and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

TEXT BOOKS

1. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hill publications.

REFERENCES:

1. Koerner, R. M (1994) – Designing with Geosynthetics – Prentice Hall, New Jersey.
2. Jones C. J. F. P. (1985) – Earth Reinforcement and soil structures – Butterworths, London.
3. Xianthakos, Abreimson and Bruce - Ground Control and Improvement Mosley – Ground Improvement.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV4133) ADVANCED STRUCTURAL ANALYSIS
(PROFESSIONAL ELECTIVE -III)

Course objectives:

- To understand the influence line concepts for indeterminate structures
- To understand the methods of analysis of intermediate trusses for external loads, lack of fit and thermal effect
- To study behavior of arches and their methods of analysis
- To know the concept and analysis of cable stayed bridge
- To study the multi storey frames subjected to gravity loads and lateral loads

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

- Demonstrate the concepts of qualitative influence line diagram for continuous beams and frames.
- Apply the methods of indeterminate truss analysis
- Demonstrate the behavior of arches and their methods of analysis analyze cable suspension bridges
- Analyze multi story frames subjected to gravity loads and lateral loads
- Ability to analyze statically determinate trusses, beams, and frames and obtain internal loading
- Ability to analyze cable and arch structures. Ability to determine deflections of beams and frames using classical methods

UNIT – I: Analysis of Frames: Castigliano's second theorem Indeterminate Trusses: Determination of static and kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies. Two Hinged Arches: Introduction – Classification of Two hinged Arches – Analysis of two hinged parabolic arches – Secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

UNIT – II: Slope Deflection Method: Analysis of Single Bay – single storey Portal Frames by Slop Deflection Method Including Side Sway. Shear force and bending moment diagrams. Elastic curve, Analysis of inclined frames Moment Distribution Method – Analysis of Single Bay Single Storey Portal Frames including side Sway. Analysis of inclined frames.

UNIT – III: Kani's Method: Analysis of continuous beams including settlement of supports. Analysis of single bay single storey and single bay two Storey Frames by Kani's Method Including Side Sway. Shear force and bending moment diagrams. Elastic curve.

UNIT – IV: Matrix Methods of Analysis: Introduction – Static and Kinematic Indeterminacy – Analysis of continuous beams including settlement of supports, using stiffness method. Analysis of pin-jointed plane frames using stiffness method- Analysis of single bay single storey frames including side sway, using stiffness method. Analysis of continuous beams upto three degree of indeterminacy using flexibility method. Shear force and bending moment diagrams.

UNIT – V: Approximate Methods of Analysis: Introduction – Analysis of multi-storey frames for lateral loads: Portal Method, Cantilever method and Factor method. Analysis of multi-storey frames for gravity (vertical) loads. Substitute Frame method. Influence Lines for Indeterminate Beams: Introduction – ILD for two span continuous beams with constant and variable moments of inertia. ILD for propped cantilever beams. Muller Breslau's principle.

TEXT BOOKS:

- Structural Analysis Vol – I &II by Vazarani and Ratwani, Khanna Publishers.
- Structural Analysis Vol I & II by Pundit and Gupta. Tata McGraw Hill Publishers.
- Structural Analysis SI edition by Aslam Kassimali, Cengage Learning

REFERENCES:

- Matrix Analysis of Structures by Singh, Cengage Learning Pvt. Ltd.
- Structural Analysis by R. C. Hibbeler Pearson Education.
- Basic Structural Analysis by C. S. Reddy., Tata McGraw Hill Publishers.
- Matrix Analysis of Structures by Pundit and Gupta. Tata McGraw Hill Publishers.
- Advanced Structural Analysis by A. K. Jain, Nem Chand Bros

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV4141) IRRIGATION AND HYDRAULIC STRUCTURES (PROFESSIONAL ELECTIVE -IV)

Course Objective

This course is aimed to develop the understanding of basic principles and concepts of analysis and design of hydraulic structures on permeable foundation such as weirs and barrages, canal falls and various river training works along with the detailed insight in to the theories of sub-surface flow. The course also intends to learn the detailed design principles of canal transitions and regulation works.

UNIT-I

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

UNIT-II

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

UNIT-III

Earth dams: types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.

Spillways: types of spillways, Design principles of Ogee spillways - Spillway gates. Energy Dissipaters and Stilling Basins Significance of Jump Height Curve and Tail Water Rating Curve - USBR and Indian types of Stilling Basins.

UNIT-IV

Diversion Head works: Types of Diversion head works- weirs and barrages, layout of diversion head work - components. Causes and failure of Weirs and Barrages on permeable foundations,- Silt Ejectors and Silt Excluders

Weirs on Permeable Foundations – Creep Theories - Bligh's, Lane's and Khosla's theories, Determination of uplift pressure- Various Correction Factors – Design principles of weirs on permeable foundations using Creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron.

UNIT-V

Canal Falls - types of falls and their location, Design principles of Notch Fall and Sarada type Fall. Canal regulation works, design principles of distributory and head regulators, Cross Regulators - canal outlets, types of canal modules,

Cross Drainage works: types, selection of site, Design principles of aqueduct, siphon aqueduct and super passage.

TEXT BOOKS:

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

REFERENCES:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers.
2. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta.
3. Irrigation engineering by K.R.Arora.
4. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers.
5. Introduction to hydrology by Warren Viessvann, Jr, Garyl. Lewis, PHI.
6. Engineering Hydrology by CS Pojha, R. Berndtsson and P. Bhunya, Oxford University Press.

Course Outcomes

1. Understand the design aspects of various hydraulic structures on permeable foundation and their causes of failure.
2. Plan and design the efficient silt control structures and relevant river training works.
3. Plan and design suitable transition structures for subcritical and supercritical flow conditions using standard available methods.
4. Plan and design of canal regulation works.
5. Able to classify the canal and tube well irrigation and applicability of various theories on it.
6. Able to understand various techniques and parameters of irrigation.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV4142) THEORY OF ELASTICITY
(PROFESSIONAL ELECTIVE -IV)

Course Objectives: To impart knowledge on the basic concepts of theory of elasticity, and solve the Structural Engineering problems.

Course outcomes: The learner will be able to solve problems of elasticity and be able to apply numerical methods to solve continuum problems.

1. Of the application basic science systematization thought excavation, the evaluation, the diagnosis project question, and plans and carries out ability of the special study and the solution.
2. Have independent research, collection the data, standard problem take into analytical the identification acquire conclusion, and have development innovation and compose the ability of professional thesis.
3. Usage mathematics engineering realm is related analysis and design software, explanation data with independently solve the ability of problem.
4. Effectively communicate, expression integrity, leadership management, team cooperation division of labor and moderate integration of ability.
5. Has mathematical and the project professional field self-study, the innovation ponder and ability of the sustained development.
6. Have international machine and aviation of control to develop trend and technique ability

UNIT-I : Introduction: Elasticity – notation for forces and stress – components of stresses – components of strain – Hooks law. Plane stress and plane strain analysis – differential equations of equilibrium – boundary conditions – Strain Displacement Relations – compatibility equations – stress function

UNIT – II : Two dimensional problems in rectangular coordinates – solution by polynomials – Saint-Venants principle – determination of displacements – bending of simple beams – Simple Supported and Cantilever Beam.

UNIT – III : Two dimensional problems in polar coordinates – stress distribution symmetrical about an axis – pure bending of curved bars – strain components in polar coordinates – displacements for symmetrical stress distributions Edge Dislocation – general solution of two-dimensional problem in polar coordinates – application to Plates with Circular Holes – Rotating Disk. Bending of Prismatic Bars: Stress function – bending of cantilever – circular cross section – elliptical cross section – rectangular cross section.

UNIT – IV : Analysis of stress and strain in three dimensions – principal stress – stress ellipsoid – director surface – determination of principal stresses Stress Invariants – max shear stresses Stress Tensor – Strain Tensor- Homogeneous deformation – principal axes of strain-rotation. General Theorems:Differential equations of equilibrium – conditions of compatibility – determination of displacement – equations of equilibrium in terms of displacements – principle of super position – uniqueness of solution – the reciprocal theorem Strain Energy.

UNIT – V : Torsion of Circular Shafts – Torsion of Straight Prismatic Bars– Saint Venant's Method – torsion of prismatic bars – bars with elliptical cross sections – membrane analogy – torsion of a bar, of narrow rectangular bars – solution of torsional problems by energy method – torsion of shafts, tubes bars etc. – Torsion of Rolled Profile Sections.

TEXT BOOKS

- Theory of Elasticity by Timoshenko, Mc-Graw hill Publications
- Advanced Mechanics of Materials by Arthur P. Boresi, John Willey publishers

REFERENCES:

- Theory of Elasticity by Y.C. Fung, Dover publications, New york
- Theory of Elasticity by Sadhu singh, Khanna Publishers
- Advanced Mechanics of solids by L.S.Srinath, Tata Mc-Graw Hill
- Continuum Mechanics by P.N. ChandraMouli, Yes Dee Publishers

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester

L	T	P	C
3	0	0	3

(R20CIV4143) GROUND WATER HYDROLOGY
(PROFESSIONAL ELECTIVE -IV)

Course Objective: In we are working in the field of irrigation Engg. we should know how much water is going into the ground from where the plants can take their water If we are concerned about the water resources we should know how much water is going into the river so that we can control the floods or we can avoid the lack of water for irrigation other area

1. The knowledge of hydrology is prerequisite for the irrigation engineering and also for design of hydraulic structure. So one of the objective of this course is to impart the knowledge of hydrology that deals with the occurrence, distribution, movement and properties of water on the earth
2. To impart the knowledge of various irrigation techniques , requirements of the crops,
3. To learn about distribution systems for canal irrigation, design of unlined and lined irrigation canals design sediment problems associated with canal

Course Outcome: On completion of this course, the student shall learn:

1. Various components of hydrologic cycle that affect the movement of water in the earth
2. Various Stream flow measurements technique
3 the concepts of movement of ground water beneath the earth
4 the basic requirements of irrigation and various irrigation techniques, requirements of the crops
5 Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals design
6 Basic components of river Training works.
7 Apply math, science, and technology in the field of water resource Engineering

UNIT – I

Ground Water Occurrence and Movement: Ground water hydrologic cycle, origin of ground Water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention. Permeability, Darcy's law, storage coefficient, Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinates system, ground water flow contours their applications.

UNIT – II

Analysis of Pumping Test data-I: Steady flow ground water flow towards a well in confined and unconfined aquifers-Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests. Unsteady flow towards a well – Non equilibrium equations-Thesis solution-Jacob and Chow's simplifications, Leak aquifers.

UNIT – III

Surface and Subsurface Investigation: Surface methods of exploration-Electrical resistivity and Seismic refraction methods. Subsurface methods-geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

UNIT – IV

Artificial Recharge of Ground Water: Concept of artificial recharge-recharge methods, relative merits. Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT – V

Saline Water Intrusion In aquifers: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion.

TEXT BOOKS:

1 Ground Water Hydrology by H. M. Raghunath, Wiley Eastern Ltd.
2 Introduction to Hydraulics & Hydrology: With Applications for Stormwater Management, 4th Edition, Cengage Learning.

REFERENCES:

1 Ground water Hydrology by David Keith Todd, John Wiley &sons. New York.
2 Ground water by Bawver, John Wiley &sons.
3 Hydrology by Subramanya K.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY					
(An Autonomous Institution under UGC, New Delhi)					
B.Tech. - IV Year – I Semester		L	T	P	C
		0	0	2	1
(R20CIV41L1) TECHNICAL SEMINAR					

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY					
(An Autonomous Institution under UGC, New Delhi)					
B.Tech. - IV Year – I Semester		L	T	P	C
		0	0	2	1
(R20CIV41P2) Comprehensive Viva-voce					

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY					
(An Autonomous Institution under UGC, New Delhi)					
B.Tech. - IV Year – I Semester		L	T	P	C
		0	0	0	2*
(R20CIV41P1) INDUSTRIAL ORIENTEDMINI PROJECT/SUMMER INTERNSHIP					

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV4251) FOUNDATION ENGINEERING
(PROFESSIONAL ELECTIVE -V)

PRE-REQUISITES: Soil Mechanics

COURSE OBJECTIVES:
- To Plan Soil exploration programme for civil Engineering Projects
- To check the stability of slopes
- To determine the lateral earth pressures and design retaining walls
- To determine the Bearing capacity of Soil
- To design pile group foundation

COURSE OUTCOMES: At the end of the course the student will able to
- Understand the principles and methods of Geotechnical Exploration
- Decide the suitability of soils and check the stability of slopes
- Calculate lateral earth pressures and check the stability of retaining walls
- Analyse and design the shallow and deep foundations
- The study of Foundation engineering .subject develops the knowledge & confidence level of the students to select the proper type of foundation & its safe & economic design
- To introduce purposes, extent and methods of soil exploration. To understand analysis of lateral earth pressure for design of earth retaining structures

UNIT – I

Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

UNIT – II

Slope Stability: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number-Stability of slopes of earth dams under different conditions.

UNIT – III

Earth Pressure Theories: Rankine's theory of earth pressure – earth pressures different soils and layered soils – Coulomb's earth pressure theory – Culmann's graphical method.
RETAINING WALLS: Types of retaining walls – stability of retaining walls against overturning, sliding, bearing capacity and drainage from backfill

UNIT – IV

Shallow Foundations - Strength Criteria - Types - choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi, Meyerhof, Skempton and IS Methods
Shallow Foundations - Settlement Criteria - Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity - allowable settlements of structures.
Pile Foundation: Types of piles – Load carrying capacity of piles based on static pile

formulae in different soils- Dynamic pile formulae – Pile load tests - Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

UNIT - V

Well Foundations: Types – Different shapes of wells – Components of wells – Sinking of wells – Tilts and shifts.

TEXT BOOKS:

1. Das, B.M., - (2012) Principles of Foundation Engineering –Cengage Learning
2. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004)
3. .Geotechnical Engineering : Principles and practices of soil mechanics and foundation Engineering by VNS Murthy, Taylor & Francis Group.

REFERENCES:

1. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd 1998.
2. Geotechnical Engineering by S. K.Gulhati & Manoj Datta – Tata Mc.Graw Hill Publishing company New Delhi. 2005.
3. Teng,W.C – Foundation Design , Prentice Hall, New Jersy.
4. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV4252) ENVIRONMENTAL IMPACT ASSESSMENT
(PROFESSIONAL ELECTIVE -V)

Course Objective:

- Students will be able to describe the National Environmental Policy Act (NEPA) and its requirements
- Students will become familiar with some of the basic environmental assessment policies and requirements
- Through case studies, students will learn to present and explain the components and decision making processes involved in environmental assessment
- Students will consider and evaluate applications of environmental assessment through critical reflection and dialogue of case material and readings
- Students will critically reflect on ways to improve the environmental impact assessment process at state and federal levels

UNIT I

Definition of EIA, Types of EIA, Various types of Environmental Impacts: Direct Impacts, Indirect Impacts, Cumulative Impacts, Induced Impacts**,** EIA Principles, Process, Benefits and Flaws, Environmental Impact Statement, Objectives of EIA, Environmental Sustainability, Identification of Potential Impacts , Affected Environment, Impact prediction, Impact Assessment, Impact Mitigation, Selecting the Proposed Action, Environmental Monitoring, Public consultation.

UNIT II

Creation of EIA Data Base, Compilation, Environmental Inventory: Baseline Data Generation, Environmental Monitoring Networking Design (EMND), Monitoring Stations, Data Products and Sources, Impact Identification (II) Methodologies, Interaction-Matrix Methods, Use of the Leopold Matrix, Checklist Methodologies: Simple Checklists, Descriptive Checklists, Uses of Checklists, Network Methodologies.

UNIT III

Meteorological Data, Ambient Air Quality Monitoring, Air Quality Standards and Regulations, Impact Prediction, Impact Prediction Approach, Utilization of Dispersion Models, Impact Prediction Tools, Impact Assessment (IA): Significance and Assessment of the Impacts, Impact Mitigation Measures**, Impacts on Water Environment** - Sources of Pollution, Major Pollutants- Water Quality parameters, Surface Water Contaminants and their Impacts, Existing Groundwater Quality Environment – Standards – Prediction and Assessment of Impacts – Mitigation measures.

UNIT IV

Soil Pollution, Causes, Soil erosion, Desertification, Stalinization, Acidification, Land Filling of Waste, Impacts on Soils, Conceptual Approach: Identification, prediction and assessment of Soil Quantity-Quality Impacts, Description of Existing Resources, Identification and Incorporation of Mitigation Measures, Impacts on Noise Environment: Basics of Noise Pollution, Noise Exposure Forecast (NEF), Standards and Guidelines, Impact Prediction, Assessment of Impact Significance, Identification and Incorporation of Mitigation Measures.

UNIT V

Status of Wetlands, Threats to Wetlands, Ecology Impact Assessment System**: Importance of Biological Impact Assessment**, Identification, Prediction and Assessment and Significance of Biological Impacts, Mitigation Measures, Conservation of Flora & Fauna, **Impacts on Socio Economic and Other Environment:** Components, C o n s id e r a t i o n s , Human Environment: Socio Economic Factors - Advantages of Impact Assessment – Assessment of Impact on Historical Structures – Mitigation Measures.

TEXT BOOKS:

1. Environmental Impact Assessment, Canter, L.W., 1977, McGraw Hills, New York.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers.

REFERENCES:

1. Technological guidance manuals of EIA. MoEF, GoI.
2. Environmental Impact Assessment, 2003, Y. Anjaneyulu, B.S Publications.
3. Environmental Impact Assessment Principles and applications, Erickson, P.A.
4. Environmental Impact Assessment: Theory and Practice, Dr.M.Anji Reddy, BS Publications.

Course Outcomes

1. Understand the different steps within environmental impact assessment
2. Discuss the implications of current jurisdictional and institutional arrangements in relation to environmental impact assessment
3. Communicate both orally and in written form the key aspects of environmental impact assessment
4. Understand how to liaise with and the importance of stakeholders in the EIA process
5. Be able to access different case studies/examples of EIA in practice
6. To provide students with the knowledge and professional skills necessary to enable them to undertake environmental impact assessment.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV4253) AIR POLLUTION
(PROFESSIONAL ELECTIVE -V)

Course Objectives

1) Introduction of major problems in indoor air pollution and control, regulations
2) Familiar with regulations pertinent to air pollutions
3) Describe general air pollution problems, meteorological definitions, air transport equations and pollution control matters and devices

UNIT – I

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary air pollutants, Point, Line and Areal Sources of air pollution- Stationary and mobile sources. Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT – II

Meteorology and Plume Dispersion; Properties of atmosphere; Heat, Pressure, Wind forces, Moisture and Relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams. Lapse Rates, Pressure Systems, Winds and moisture, plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT-III

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.

Equipment's – Settling Chambers, Cyclone separators, filters, Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

Control of gaseous emissions - General Methods of Control of NOx and SOx emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling – Adsorption – Absorption – Combustion.

UNIT – V

Air Quality Management – Monitoring of SPM, SOx; NOx and CO Emission Standards– Air sampling – Sampling Techniques – High volume air sampler

– Stack sampling - Analysis of Air pollutants – Air quality standards – Air pollution control act.

TEXT BOOKS:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.
2. Air pollution by Wark and Warner.- Harper & Row, New York.

REFERENCE:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.

Course Outcomes

1. to understand basic aspects on air pollution and the quality of atmospheric environment
2. to describe and clearly understand the sources causing the air pollution
3. to clearly understand, interpret and explain aspects regarding the air pollution and also to estimate, assess and came to conclusions
4. to perform statistical analysis of pollutant concentration and compare to limit values
5. to evaluate different types of air pollution and the means of abatement control
6. to carry out write-ups and reports based on measurements

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV4261) AIRPORTS,RAILWAYS AND WATER WAYS
(PROFESSIONAL ELECTIVE -VI)

Course Objectives

- Introduce different transportation systems and their importance and their role in development
- Understand standards and norms of National and International organisations which are framed for efficient functioning of existing transport systems
- Impart Knowledge regarding the functioning of various components like rails, sleepers, Tracks, Geometric curves, Runways, Taxiways Aprons Wear houses, Jetties etc
- Design elements like horizontal curves, vertical curves, super elevation etc

UNIT-I AIRPORT PLANNING

Air transport characteristics – airport classification –airport planning: objectives, components, layout characteristics, socio –economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, Typical airport layouts. Case studies, Parking and circulation area.

UNIT-II AIRPORT DESIGN

Runway Design: Orientation, Wind Rose Diagram – Runway length –Problems on basic and Actual Length. Geometric design of runways. Configuration and Pavement Design Principles – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services –Runway and Taxiway Markings and lighting.

UNIT- III RAILWAY PLANNING

Significance of Road. Rail, Air and Water transports-Coordination of all modes to achieve sustainability - Elements of permanent way -Rails. Sleepers, Ballast, rail fixtures and fastenings,-Track Stress, coning of wheels, creep in rails. Defects in rails – Route alignment surveys, conventional and modern methods – Soil suitability analysis.-Geometric design of railways, gradient. Super elevation, widening of gauge on curves – Points and Crossings.

UNIT-IV RAILWAY CONSTRUCTION AND MAINTENANCE

Earthwork – Stabilization of track on poor soil –Tunneling Methods. Drainage and ventilation – Calculation of Materials required for track laying – Construction and maintenance of tracks –Modern methods of construction & maintenance – Railway stations and yards and passenger amenities – Urban rail – Infrastructure for Metro, Mono and underground railways.

UNIT – V HARBOUR ENGINEERING

Definition of Basic Terms: Harbor, Port, Satellite Port. Docks, Waves and Tides – Planning and Design of Harbours: Requirements. Classification, ocation and Design Principles – Harbour Layout and Terminal Facilities –Coastal Structures: Piers, Break waters, Wharves. Jetties, Quays. Spring Fenders. Dolphins and Floating Landing Stage – Inland Water Transport –Wave action on Coastal Structures and

Coastal Protection Works –Environmental concern of Port Operations – Coastal Regulation Zone. 2011.

TEXT BOOKS:

1. Saxena Subhash C and Satyapal Arora, "A Course in Railway Engineering", Dhanpat Rai and Sons, Delhi, 2003
2. Satish Chandra and Agarwal M.M, "Railway Engineering", 2 nd Edition, Oxford University Press, New Delhi, 2013.
3. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nemchand and Brothers, Roorkee, 2012.
4. Bindra S P, "A Course in Docks and Harbour Engineering", Dhanpat Rai and Sons, New Delhi, 2013

REFERENCES:

1. Rangwala, "Railway Engineering", Charotar Publishing House, 2013.
2. Rangwala, "Airport Engineering", Charotar Publishing House, 2013.
3. Rangwala, "Harbor Engineering", Charotar Publishing House, 2013.
4. Oza.H.P. and Oza.G.H., “A course in Docks & Harbour Engineering”. Charotar Publishing Co., 2013
5. Mundrey J.S. “A course in Railway Track Engineering”. Tata McGraw Hill, 2007.
6. Srinivasan R. Harbour, “Dock and Tunnel Engineering", 26th Edition 2013

OUTCOMES:

On completing the course, the students will have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.

1. Explain the working of various design elements used in different Transport systems
2. Calculate entities like maximum permissible loads on rails ,degree of curves, permissible speeds on various gauges etc
3. Prepare master plans for Airports, harbour site considering natural phenomenon and different harbour railway airport elements
4. Exposure to new technologies which are currently in use for safe and efficient travel
5. Predict the upcoming trends and changes which are likely to take place in transport and travel modes.
6. Introduce the recent advancements in the field of Sustainable Urban Development, Traffic Engineering and Management, Systems Dynamics Approach to Transport Planning

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV4262) INTELLIGENT TRANSPORTATION SYSTEMS
(PROFESSIONAL ELECTIVE -VI)

Course Objectives: Within the core module students will have been introduced to some of the basic concepts of Intelligent Transport Systems. The objective of this module is to explore ITS in more detail. The detailed

Objectives are:

- To develop an understanding of system engineering processes
- To describe the concepts of system architecture and their evolution
- Understand the capability of key technologies
- Understand impact of technology on different modes and movement
- Understand how to evaluate technologies, applications and services

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

- Differentiate different ITS user services
- Select appropriate ITS technology depending upon site specific conditions.
- Design and implement ITS components
- Assess the range of options available for the management of freeway and arterial traffic
- Investigate and analyse the current applications and trends in the context of AVCS
- Research the contemporary issues in the application of advanced technology in transport

UNIT- I : Fundamentals of ITS: Definition of ITS, the historical context of ITS from both public policy and market economic perspectives, Types of ITS; Historical Background, Benefits of ITS.

UNIT- II : Sensor technologies and Data requirements of ITS: Importance of telecommunications in the ITS. Information Management, Traffic Management Centers (TMC).Application of sensors to Traffic management; Traffic flow sensor technologies; Transponders and Communication systems; Data fusion at traffic management centers; Sensor plan and specification requirements; Elements of Vehicle Location and Route Navigation and Guidance concepts; ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), GIS, video data collection.

UNIT- III : ITS User Needs and Services and Functional areas – Introduction, Advanced Traffic Management systems (ATMS), Advanced Traveler Information systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control systems (AVCS), Advanced Public Transportation systems (APTS), Advanced Rural Transportation systems (ARTS).

UNIT – IV : ITS Architecture – Regional and Project ITS architecture; Concept of operations; ITS Models and Evaluation Methods; Planning and human factor issues for ITS, Case studies on deployment planning and system design and operation; ITS and safety, ITS and security, ITS as a technology deployment program, research, development and business models, ITS planning.

UNIT – V : ITS applications: Traffic and incident management systems; ITS and sustainable mobility, travel demand management, electronic toll collection, ITS and road-pricing.; Transportation network operations; commercial vehicle operations and intermodal freight; public transportation applications; ITS and regional strategic transportation planning, including regional architectures: ITS and changing transportation institutions Automated Highway Systems- Vehicles in Platoons – Integration of Automated Highway Systems. ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries.

TEXT BOOKS / REFERENCES:

- Fundamentals of intelligent transportation systems planning By Mashrur A. Chowdhury, Adel Wadid Sadek
- Lawrence A. Klein, Sensor technologies and Data requirements of ITS
- ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.
- Sussman, J. M., Perspective on ITS, Artech House Publishers, 2005.
- National ITS Architecture Documentation, US Department of Transportation, 2007

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – II Semester

L	T	P	C
3	0	0	3

(R20CIV4263) URBAN TRANSPORTATION PLANNING
(PROFESSIONAL ELECTIVE -VI)

Course Objectives: The course introduces students to the fundamentals of urban transportation planning and the types of skills and knowledge that transportation planners need.

- It further familiarizes students with contemporary transportation planning issues and methods of analysis.
- The course is highly relevant regardless if students intend to focus on transportation itself, or other aspects of urban planning.
- The basically deals with data collection urban transportation planning. The travel demand issues & planning of demand & supply.
- To discuss the preparation & evaluation of alternative strategy of transportation facilities.
- Relationships between transportation and urban land use systems and new tools to address environmental and quality of life impacts of transportation are presented.
- Transportation investment decisions (or lack thereof) have been held accountable for increased economic prosperity or spiraling economic decline.

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

- Identify urban transportation problems.
- Estimate urban travel demand.
- Plan urban transport networks.
- Identify urban transport corridors.
- Prepare urban transportation plans
- Apply the fundamentals of traffic flow theory in the management and operations of road traffic

Unit – I: Introduction: Role of transportation in the economic development of nations, overview of transport modes, growth trends, National Transport Policy of India – Case studies, transportation planning in the developing world; and comparative international transportation policies; Fundamentals of transportation , Principles of planning, evaluation, selection, adoption, financing, and implementation of alternative urban transportation systems; formulation of community goals and Objectives, inventory of existing conditions; transportation modeling trip generation, distribution, modal choice, assignment

Unit – II: Data Collection And Inventories: Collection of data – Organization of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

Unit – III: Travel Demand issues: Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Detailed approach on 4 step travel demand estimation; Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

Unit – IV: Demand and supply planning : Planning for sustainable urban mobility, positive and negative externalities in urban transport, congestion pricing, parking policy, demand management , Urban travel and transportation system characteristics – a systems perspective, Data management and use in decision making , Demand analysis , Urban activity analysis, Supply analysis; Plan Preparation And Evaluation: Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis.

Unit – V: Metropolitan cities: Design issues in urban mobility, integrating land use and transport planning; , Overview of urbanization process, city structure and urban activity and infrastructure systems, Economic and social significance of urban infrastructure systems; Transport's Role in tackling Social Inclusion, Economic Impacts of Transport Policy

Text Books / References:

- Introduction to Transportation Planning – M.J. Bruton; Hutchinson of London Ltd.
- Introduction to Urban System Planning – B.G. Hutchinson; McGraw Hill.
- Traffic Engineering and Transport Planning – Kadiyali L.R., Khanna Publishers
- Lecture notes on UTP – Prof. S. Raghavachari , R.E.C. Warangal.
- Metropolitan transportation planning – John W. Dickey, Tata McGraw Hill, New Delhi, 1975.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY					
(An Autonomous Institution under UGC, New Delhi)					
B.Tech. - IV Year – II Semester		**L**	**T**	**P**	**C**
		0	**0**	**14**	**7**
(R20CIV42P1) PROJECT Work					

LIST OF OPEN ELECTIVES

Open Elective – I

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV3271	Disaster Management & Mitigation	3	0	0	3
2	R20CSE3272	Database Concepts				
3	R20ECE3273	Consumer Electronics				
4	R20EEE3274	Electrical Estimation & Costing				
5	R20INF3275	Information Technology Essentials				
6	R20MED3276	Introduction to Robotics				
7	R20HMS3277	Fundamentals of Entrepreneurship				
8	R20HMS3278	Day to Day Biology				
9.	R20CIV3272	Building Architecture				

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester	OPEN ELECTIVE- I	L	T	P	C
		3	0	0	3

(R20CIV3271) Disaster Management & Mitigation

The objective of this course is to provide an understanding of basic concepts of various disasters and its management. In addition, the course is expected to develop scientific temperament and mitigation techniques to manage disaster.

1. To understand basic concepts of disaster and hazards if India.
2. To study the various natural disasters.
3. To study the various manmade disasters.
4. To understand the disaster management principles.
5. To study the modern techniques used in disaster mitigation and management.

UNIT I - Introduction To Disaster - Meaning, Nature, Importance of Hazard, Risk, Vulnerability and DisasterDimensions & Scope of Disaster Management - India's Key Hazards – Vulnerabilities - National disaster management framework - Disaster Management Cycle.

UNIT II - Natural Disaster - Natural Disasters- Meaning and nature of natural disaster; their types and effects. Various Floods such as Urban Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

UNIT III - Anthropogenic Disaster - Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

UNIT IV - Approaches in Disaster Management - Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief - Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect.

UNIT V - Disaster Mitigation - Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate.Technology in Disaster Management Emergency Management Systems (EMS) in the Disaster Management Cycle Remote Sensing and Geographic Information Systems(GIS) in Disaster Management.

TEXT BOOK

1. Sharma.S.R, "Disaster management", A P H Publishers, 2011.

REFERENCES

1. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
2. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.
3. Gupta.H.K, "Disaster Management", University Press, India, 2003.
4. Gupta.M.C, "Manuals on Natural Disaster management in India", National Centre for Disaster Management,IIPA, New Delhi, 2001.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester	OPEN ELECTIVE- I	L	T	P	C
		3	0	0	3

(R20CSE3272) Database Concepts

To study the concepts of Relational Database design and query languages

1. To provide a general introduction to relational model
2. To learn about ER diagrams
3. To learn about Query processing and Transaction Processing

UNIT I: **Introduction to Database Management -** Introduction to Database Management systems – History - Characteristics – Users- three-level architecture- Entity-- relationship data model.

UNIT II: The Relational Data Model and Relational Algebra - Data structures – Mapping E-R Model to Relational model – data manipulation – integrity – advantages – rules for fully relational systems – relational algebra – relational algebra queries.

UNIT III: Structured Query Language and Normalization - SQL – Data definition – manipulation – views SQL in procedural programming – data integrity and constraints – triggers – data control – database security.Normalization – Undesirable properties – single-valued normalization – desirable properties of decompositions – multivalued dependencies

UNIT IV: Storage Indexing and Transactions Management - Different types of memories – secondary storage – buffer management – file structures – heap files – sorted files – index and types – indexed sequential file – B-tree – B+ tree.Transaction management – concepts – examples – schedules – serializability – concurrency control – deadlocks – lock and multiple granularity – nonlocking techniques.

UNIT V: Database Backup, Recovery and Security - Database system failure – backup – recovery and concept of log – log-based recovery techniques – types of recovery – log-based immediate update recovery technique. Database Security – violations – identifications and authentication – authorization / access control – security of statistical databases – audit policy – internet applications and encryption.

TEXT BOOK

1. Gupta.G.K, “Database Management Systems”, Tata McGraw Hill, 2011.

REFERENCES

1. Silberschatz, Korth.H and Sudarshan.S, “Database System Concepts”, 6th Edition, McGraw-HillInternational, 2011.
2. Hector Garcia-Molina, Jeffrey D.Ullman, Jennifer Widom, “Database System The Complete Book, 1st Edition, Pearson 2002.
3. RamezElmasri and ShamkantB.Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson, 2008.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester **OPEN ELECTIVE- I**

L	T	P	C
3	0	0	3

(R20ECE3273) Consumer Electronics

Course Objectives:

- Students are able to understand consumer electronics fundamentals, microprocessors and microcontrollers, energy management and intelligent building perspective. Audio systems, Display systems, video systems and recording systems
- Student is able to demonstrate smart Home, Home Virtual Assistants, Home security systems and types of sensors RFID Home , kitchen electronics and smart alarms, smart toilet, smart floor and smart locks
- Students are able to discuss cordless telephones, Fax machines PDA's TABLETs Smart phones and Smart watches. Video conferencing systems, Internet enabled systems, Wi-Fi, Li-Fi, GPS and Tracking systems

UNIT I:**Consumer Electronics Fundamentals** - History of Electronic Devices- Vacuum Tubes, Transistors, Integrated Circuits- Moorse Law, Semiconductor Devices, Diodes, Rectifiers, Transistors, Logic Gates, Combinational Circuits, ADC, DAC and Microprocessors, Microprocessor Vs Microcontrollers, Microcontrollers in consumer electronics, Energy management, Intelligent Building Perspective.

UNIT II: Entertainment Electronics - Audio systems: Construction and working principle of : Microphone, Loud speaker, AM and FM receiver, stereo, 2.1 home theatre, 5.1 home theatre . Display systems: CRT, LCD, LED and Graphics displays Video Players : DVD and Blue RAY. Recording Systems: Digital Cameras and Camcorders.

UNIT III: Smart Home - Technology involved in Smart home, Home Virtual Assistants- Alexa and Google Home. Home Security Systems - Intruder Detection, Automated blinds, Motion Sensors, Thermal Sensors and Image Sensors, PIR, IR and Water Level Sensors.

UNIT IV: **Home Appliances** - Home Enablement Systems: RFID Home, Lighting control, Automatic Cleaning Robots, Washing Machines, Kitchen Electronics- Microwave, Dishwasher, Induction Stoves, Smart Refrigerators, Smart alarms, Smart toilet, Smart floor, Smart locks.

UNIT V: **Communication Systems** - Cordless Telephones, Fax Machines, PDAs- Tablets, Smart Phones and Smart Watches. Introduction to Smart OS- Android and iOS. Video Conferencing Systems- Web/IP Camera, Video security, Internet Enabled Systems, Wi-Fi, IoT, Li-Fi, GPS and Tracking Systems.

TEXT BOOKS:

1. Thomas L Floyd "Electronic Devices" 10th Edition Pearson Education Asia 2018.
2. Philp Hoff "Consumer Electronics for Engineers" - Cambridge University Press.1998.
3. Jordan Frith, " Smartphones as Locative Media ", Wiley. 2014.
4. Dennis C Brewer, " Home Automation", Que Publishing 2013.
5. Thomas M. Coughlin, "Digital Storage in Consumer Electronics", Elsevier and Newness 2012.

Course Outcomes:

C325.1. summarize the consumer electronics fundamentals and explain about microprocessors and microcontrollers, energy management and intelligent building perspective (K2-Understand)

C325.2. Demonstrate Audio systems, Display systems, video systems and recording systems (K3-Apply)

C325.3. Describe the smart Home, Home Virtual Assistants, Home security systems and Different types of sensors (K2-Understand)

C325.4. Outline the home enablement systems like RFID Home, kitchen electronics and smart alarms, smart toilet, smart floor and smart locks. (K4-Analyse)

C325.5. Discuss cordless telephones, Fax machines PDA's TABLETs Smart phones and Smart watches.

C325.6. Compare and explain Android and iOS and demonstrate Video conferencing systems, Internet enabled systems, Wi-Fi, Li-Fi, GPS and Tracking systems. (K5-Evaluate)

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester **OPEN ELECTIVE- I**

L	T	P	C
3	0	0	3

(R20EEE3274) Electrical Estimation & Costing

Unit I: Electrical Symbols and Diagrams: (i) Need of symbols; List of symbols for electrical equipment and accessories used in electrical works. Light, fan and power circuits, alarm and indicating circuit, contactor control circuits as per I.S.S. (ii) Type of diagrams - Wiring diagrams (multiple and single line representation) and schematic diagrams as per I.S.S. (* One Drawing Sheet for at least - 50 symbols).

Wiring materials and accessories: (1) Brief description, general specifications (as per I.S.S.) and approximate cost of different types of wires, cables, switches, distribution board, switch board, boxes, batten and its accessories, conduit and its accessories, lamp holders, socket out lets, plug ceiling roses. Fuse and energy meter used in domestic and power wiring installations.

Unit II: Light and Fan Circuits: Schematic and wiring diagrams (multiline and single line both) using junction boxes and looping systems for the following types of circuits:- (i) Light and fan controlled by necessary switches and regulators. (ii) Stair case wiring (iii) Corridor lighting (iv) One lamp controlled by three or more switches.

Unit III: Principles of Estimating and Costing: Purpose of estimating and costing, essentials of estimating and costing-market survey, price list and net prices, preparation of list of materials, calculation of material and labor cost, contingencies, overhead charges, profit and total cost. Estimation of Domestic Internal Wiring Circuits: (i) Description of various wiring systems and methods. (ii) Need of earthing and point to be earthed in internal wiring system as per IE rules. (iii) I.S. specifications, calculation of No. of points (light, fan, socket outlet), calculation of total load including domestic power, determination of no. of circuits, size of wires and cables, switches and main switch, distribution board and switch board, batten conduit and other wiring accessories.

Unit IV: Estimation of Power Wiring: I.S. specifications and I.E. rules, calculation of current for single and three phase motors. Determination of sizes of cables, conductors distribution board, main switches and starters for power circuits. Cost of equipment and accessories and schedule of materials. Estimation and cost of material and work for motors up to 20 H.P., pump sets and small workshops.

Unit V: Estimation of Overhead and Underground Distribution Lines: Main components of overhead lines-line supports, cross-arm, clamps, conductors and stay sets, lightening arrestors, danger plates, ant climbing devices, bird guards, jumpers etc., concreting of poles, earthing of transmission line, formation of lines, specification of materials for O.H. lines, I.S. specification and I.E. rules. Cost of material and work for overhead and underground lines upto 11 KV only.

Estimation of Small Sub-Station: Main equipment and auxiliaries installed on the substation. Estimation of materials required for a small distribution substation (indoor and outdoor type platform and pole mounted). Costing of material and work of above substations.

Text Books:

1. S.K Bhattacharya, “Electrical Engineering Drawing & Design Estimating”.Wiley Eastern Ltd. New Delhi.
2. Surjeet Singh, “Electrical Eesign& Drawing” S.K.Kataria& Sons New Delhi.

Reference Books:

1. O. P. Soni,” Electrical Engg. Design & Drawing” SatyaPrakashan Delhi.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester	OPEN ELECTIVE- I	L	T	P	C
		3	0	0	3

(R20INF3275) Information Technology Essentials

COURSE OBJECTIVES:

- To introduce the principles required for building web applications.
- To provide working knowledge of the technologies needed for web application development
- To know about scripting languages.
- To understand principles of database access and storage.
- To understand various applications related to Information Technology.

COURSE OUTCOMES: Student will be able to

- Design and deploy web-sites
- Design and deploy simple web-applications
- Create simple database applications
- Develop an information system
- Describe the basics of networking

UNIT I: Web Essentials - Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server – HTML basics – HTML tags and their use

UNIT II: Scripting Essentials - Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and HTML - Cookies – Sessions - Authentication – Introduction to JavaScript

UNIT III: Database Essentials - Database management - Database terms - MySQL - commands – Data types – Indexes – Functions – Accessing MySQL using PHP.

UNIT IV: Networking Essentials - Fundamental computer network concepts - Types of computer networks - - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi - Network Routing - Switching - Network components

UNIT V: Application Essentials - Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications

TEXT BOOKS:

1. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.
2. James F. Kurose, “Computer Networking: A Top-Down Approach”, Sixth Edition, Pearson, 2012.

REFERENCES:

1. GottapuSasibhushanaRao, "Mobile Cellular Communication", Pearson, 2012.
2. R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014. 3. it-ebooks.org

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester	OPEN ELECTIVE- I	L	T	P	C
		3	0	0	3

(R20MED3276) Introduction to Robotics

COURSE OBJECTIVE:To impart knowledge about the basics of robot components and applications.

COURSE OUTCOMES:

1. Basics of Robot anatomy
2. Working of end effectors and drive systems
3. Kinematics and transformation analysis of robot
4. Various types of robot sensors
5. Robot cell design and applications of robot

UNIT I: Robot Basics - Robot-Basic concepts, Need, Law, History, Anatomy, specification. Robot configurations-Cartesian, cylinder, polar and articulate.Robot wrist mechanism, Precision and accuracy of robot-simple problems.

UNIT II: Robot Elements - End effectors-Classification, Types of Mechanical actuation, Gripper force analysis, Gripper design, Robot drive system-Types, Position and velocity feedback devices-Robot joints and links-Types, Motion interpolation.

UNIT III: **Robot Kinematics** - Robot kinematics – Direct and inverse kinematics – 2 and 3 DOF of kinematics analysis-Robot trajectories – Control of robot manipulators – Point to point, Contouring motion- 2D and 3D Transformation-Scaling, Rotation, Translation, Homogeneous coordinates, multiple transformation-Simple problems.

UNIT IV: Robot Sensors - Sensors in robot – Touch sensors-Tactile sensor – Proximity and range sensors – Robotic vision sensor-Force sensor-Light sensors, Pressure sensors

UNIT V: **Robot Cell Design And Applications** - Robot work cell design and control – Safety measures in Robot – Robot cell layouts – Multiple robots and machine interference – Robot cycle time analysis – Industrial applications of robots, Nanorobots, Robot programming-Basic program.

TEXT BOOKS:

1. Deb.S.R, "Robotics Technology and Flexible Automation", Tata McGraw – Hill Publishing Company Limited, 2010.
2. Mikell. P. Groover, 'Industrial Robotics Technology', Programming and Applications, McGraw Hill Co, 2008.

REFERENCES:

1. Klafter.R.D, Chmielewski.T.A, and Noggin's., "Robot Engineering : An Integrated Approac"', Prentice Hall of India Pvt. Ltd.,1994.
2. Fu.K.S, Gonzalez.R.C&Lee.C.S.G, "Robotics control, sensing, vision and intelligence", McGraw Hill Book co, 1987
3. Craig.J.J, "Introduction to Robotics mechanics and control", AddisonWesley, 1999.
4. Ray Asfahl.C, "Robots and Manufacturing Automation", John Wiley & Sons Inc., 1985.
5. Kozyrey, Yu. "Industrial Robotics", MIR Publishers Moscow, 1985.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester	OPEN ELECTIVE- I	L	T	P	C
		3	0	0	3

(R20HMS3277) Fundamentals of Entrepreneurship

COURSE OBJECTIVES: To create awareness on entrepreneurship among engineering students and stimulating self-motivation to start up enterprise

COURSE OUTCOMES:

1. To provide awareness about entrepreneurship
2. To develop idea generation, creative and innovative skills
3. To self-motivate the students by making aware of different opportunities and successful growth stories
4. To learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
5. To understand entrepreneurial process by way of studying different case studies and find exceptions to the process model of entrepreneurship.
6. To run a small enterprise with small capital for a short period and experience the science and art of doing business.

UNIT I: **Introduction to Entrepreneurship** - Understanding the Meaning of Entrepreneur; Characteristics and Qualities of an Entrepreneur; Entrepreneurs VsIntrapreneurs and Managers; Classification of Entrepreneurs; Factors Influencing Entrepreneurship; Entrepreneurial Environment; Entrepreneurial Growth; Problems and Challenges of Entrepreneurs; Entrepreneurial Scenario in India.

UNIT II: **Micro, Small and Medium Enterprises** (MSMEs) - MSMEs – Definition and Significance in Indian Economy; MSME Schemes, Challenges and Difficulties in availing MSME Schemes, Forms of Business; Women Entrepreneurship; Rural Entrepreneurship; Family Business and First Generation Entrepreneurs.

UNIT III: Idea Generation and Feasibility Analysis - Idea Generation; Creativity and Innovation; Identification of Business Opportunities; Market Entry Strategies; Marketing Feasibility; Financial Feasibilities; Political Feasibilities; Economic Feasibility; Social and Legal Feasibilities; Technical Feasibilities; Managerial Feasibility, Location and Other Utilities Feasibilities.

UNIT IV: **Business Model and Plan in Respective Industry** - Business model – Meaning, designing, analyzing and improvising; Business Plan – Meaning, Scope and Need; Financial, Marketing, Human Resource and Production/Service Plan; Business plan Formats; Project report preparation and presentation; Why some Business Plan fails?

UNIT V: **Financing and How to Start up Business?** - Financial opportunity identification; Banking sources; Non-banking Institutions and Agencies; Venture Capital – Meaning and Role in Entrepreneurship; Government Schemes for funding business; Pre launch, Launch and Post launch requirements; Procedure for getting License and Registration; Challenges and Difficulties in Starting an Enterprise.

TEXT BOOKS :

1. Jayshree Suresh, “Entrepreneurial Development”, Margham Publishers, Chennai, 2011.
2. Poornima M Charantimath, “Entrepreneurship development small business enterprises”, Pearson, 2013.

REFERENCES:

1. Raj Shankar, “Entrepreneurship: Theory And Practice”, Vijay Nicole imprints ltd in

collaboration with Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2012
2. Robert D. Hisrich, Mathew J. Manimala, Michael P Peters and Dean A. Shepherd, "Entrepreneurship", 8th Edition, Tata Mc-graw Hill Publishing Co.ltd.-new Delhi, 2012
3. Martin Roger, "The Design of Business", Harvard Business Publishing, 2009
4. Roy Rajiv, "Entrepreneurship", Oxford University Press, 2011
5. Drucker.F, Peter, "Innovation and Entrepreneurship", Harper business, 2006.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester	OPEN ELECTIVE - I	L	T	P	C
		3	0	0	3

(R20HMS3278) Day to Day Biology

COURSE OBJECTIVE: The purpose of this study is to know and understand the involvement of biology in day-to-day life. This would give insight into his or herown biological system, the diseases and disorders, antibiotics, and importance of environment in human life. This also provides application of biology in day to day life.

COURSE OBJECTIVES:

1. The student can understand the biology of human system and health.
2. This provides student with a scope for selection of healthy food and sustain environment.

UNIT I: Biology of Human Diseases and Disorders - Diabetes mellitus, communicable diseases, genetic disorders, vector borne diseases, antibiotics - mode of action.

UNIT II: **Biology for Human** - Blood pressure, immune system and immunity, cardiac infarction, in vitro fertilization, cord blood bank, stem cells.

UNIT III: **Biology of Cosmetics and Detergents** - Biology of complexion and texture, bioactive natural products in industrial use, bio surfactants, antioxidants.

UNIT IV: **Biology and Nutrition** - Dietary index, carbohydrates, proteins and fats, HDL and LDL, dairy products and application, herbal plants and home remedies.

UNIT V: **Biology and Environment** - Water pollution, air pollution, bioremediation, species biodiversity, global warming and greenhouse effect.

TEXT BOOKS:

1. Gareth J. Price, Biology: An Illustrated Guide to Science, Diagram Group, Infobase Publishing, 2006.
2. Pam Dodman, Real-Life Science Biology, Walch Publishing, 2008.

REFERENCES:

1. Biology:TheScience of Life, Stephen Nowicki, http://www.thegreatcourses.com/tgc/courses.
2. Neil Schlager, Science of everyday things: Real-Life Biology, Gale Publishing 2002.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester	OPEN ELECTIVE - I	L	T	P	C
		3	0	0	3

(R20CIV3272) Building Architecture

Objective:

1. To provide an insight into the architecture of Classical antiquity & early Medieval period. Social, religious, political and architectural character, construction methods, building materials and settlement planning shall be explained with suitable examples.
2. To provide an understanding of the evolution of Classical architecture in the west, Indian Architecture in its various stylistic modes characterized by technology, ornamentation and planning practices. Combined influence of geology, geography, climate, beliefs, religion and culture on the architecture must be highlighted so as to appreciate how architecture is embedded in place-specific context.
3. The study must enable students to do a comparative evaluation of developments in a chronological manner along the timeline and across different geographies. Also, students must be enabled to appreciate tangible and intangible aspects of heritage associated with history.

Unit-I

Classical Architecture - Building types viz., Temples, Sanctuaries, Thermae, Amphitheatres, Circus, Aqueducts etc. Study of planning principles adopted, Agora, Forum and their effect on settlement planning. Types of Architecture such as Greek Architecture, Roman Architecture, Christian Architecture, Buddist Archtecture and Dravidian architecture. Study of principles of design, proportion, Optical corrections and Classical Orders.

Unit-II

Early Christian Architecture Study of Architectural character, evolution of Church form, building typologies, and building elements, polymath architecture, Baptisteries, early Basilican churches; settlement planning, and fortification systems.

Unit-III

Buddhist Architecture in India Study of religious philosophy, resultant evolution of building typologies, building elements and associated forms during Hinayana and Mahayana phases. Types of structures and elements developed eg: Stupas, Viharas, Chaityas, Stambhas, Toranas, sacred railing etc. in India. Study of form variations across various countries.

Unit-IV

Indo Aryan Architecture Development of fortification, walled towns, settlement patterns and the causative factors. Role of Shilpasasthras and Arthashasthra in settlement planning. Study of worshipping places in Indo Aryan / Nagara style, design of buttressed shikharas, rock-cut and structural examples of temples.

Unit-V

Dravidian Architecture Development of fortification, walled towns, settlement patterns and the causative factors. Role of Shilpasasthras in settlement planning. Study of worshipping places in Dravidian style (Chola, Chalukya, Pallava, Satavahana, Hoysala, Vijayanagara etc.), design of Gopuram and Shikhara, Hindu, Buddhist and Jain cave and rock-cut temple architecture.

Text Books

1. Brown, P. (2010). Indian Architecture: Buddhist and Hindu period. Mumbai : D. B. Taraporevala Sons and Co.
2. Bubbar, D. K. (2005). The Spirit of Indian Architecture. New Delhi : Rupa & Co.
3. Copplestone, T. and Lloyd, S. (1971). World Architecture: An Illustrated History. London : Verona Printed.
4. Crouch, P. D. (1985). History of Architecture: Stonehenge to Skyscrapers. London :McGraw-Hill.
5. Costof, S. (2012). A History of Architecture: Settings and Rituals. New York : Oxford University Press.

References

1. Dutt, B. B. (2009). Town Planning in Ancient India. Delhi : Isha Books.
2. Kimball, F. and Edgell, G. H. (2012). A History of Architecture. Amazon : Ulan Press.
3. Fletcher, B. (1996). A History of Architecture on the Comparative Method. 20th Ed. London : B.T. Batsford Ltd.
4. Grover, S. (2003). Buddhist and Hindu Architecture in India. 2nd Ed. New Delhi :CBS Publishers.
5. Hamlin, T. F. 1953. Architecture through the Ages. New York : Putnam Adult.
6. Harris, M. C. (1977). Illustrated Dictionary of Historic Architecture. New York : M. Courier Dover Publications .
7. Ingersoll, R. and Kostof, S. (2013). World architecture: a cross-cultural history. Oxford : Oxford University Press.
8. Pramar, V. S. (2005). A social history of Indian architecture. New Delhi : Oxford University Press India.
9. Roth, M. L. (2006). Understanding Architecture: Its Elements, History, and Meaning. Columbia : West-view Press.
10. Sengupta, B. K., Sen, J. and Banerji, H. (2010). Reading material on Human Settlements. Institute of Town Planners of India, New Delhi.
11. Singh, U. (2009). A history of ancient and early medieval India: from the Stone age to the 12th C. Delhi : Pearson India.
12. Watkin, D. (2005). A History of Western Architecture. 4th Ed. London :Laurence King Publishing.

Open Elective –II

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV4181	Green Building Engineering	3	0	0	3
2	R20CSE4182	Cyber Security Fundamentals				
3	R20ECE4183	Principles of Modern Communication Systems				
4	R20EEE4184	Illumination Engineering				
5	R20INF4185	E-Commerce				
6	R20MED4186	Industrial Design & Ergonomics				
7	R20HMS4187	Creative Writing				
8	R20HMS4188	Design Thinking				
9.	R20CIV4182	Pre Fabricated Structures				
10		MOOCs – III				

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - II	L	T	P	C
		3	0	0	3

(R20CIV4181) Green Building Engineering

Course Outcomes: On successful completion of this course the student will be able to:

1. Describe the concepts of Green building
2. Adopt Renewable energy for buildings.
3. Implement Automation techniques in buildings.
4. Describe Actuator techniques for Automation
5. Choose appropriate materials for Green buildings

UNIT 1 Concept of Green Buildings : Green building initiatives, its origin, characteristics of a green building, green buildings in India, certification of green buildings.Criteria for rating – sustainability. Depleting natural resources of building materials; renewable and recyclable resources; energy efficient materials; green cement, biodegradable materials, smart materials, engineering evaluation of these materials. Case study.

UNIT 2 Sources of Energy Renewable and non-renewable sources of energy ; coal, petroleum, nuclear, wind, solar, hydro, geothermal sources; potential of these sources, hazards, pollution; global scenario with reference to demand and supply in India. Energy arises. Carbon Emission: Forecasting, control of carbon emission, air quality and its monitoring carbon foot print; environmental issues, minimizing carbon emission.

UNIT 3 - **Intelligent Buildings** Intelligent buildings-Building automation-Smart buildings- Building services in high rise buildings-Green buildings-Energy efficient buildings for various zones-Case studies of residence, office buildings and other buildings in each zones. Case Study.

UNIT 4 Actuator Techniques Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magneto structure Material – Shape Memory Alloys – Electrorheological Fluids– Electromagnetic actuation – Role of actuators and Actuator Materials.

UNIT 5 Materials For "Green" Systems Green materials, including biomaterials, biopolymers, bioplastics, and composites Nanotech Materials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Paints, Roofs, Walls, and Cooling.Multifunctional Gas Sensors, Biomimetic Sensors, Optical Interference Sensors Thermo-, light-, and stimulus-responsive smart materials.

TEXT BOOKS

1. Sustainable Construction , Charles J. Kibert.,Third Edition
2. Green Building A to Z, Jerry Yudelson.

REFERENCE BOOKS

1 Advanced Technology for Smart buildings,James Sinopoli

E BOOKS https://www.springer.com/in/book/9789811010002

https://www.elsevier.com/books/smart-buildings/casini/978-0-08-100635-1

MOOChttps://www.mooc-list.com/tags/green-building

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - II	L	T	P	C
		3	0	0	3

(R20CSE4182) Cyber Security Fundamentals

Course Objectives:

1. Understand the need for Cyber security and its related threats and attacks
2. Learn methods to become secure in the cyber world and securely communicate in the cyber world
3. Become knowledgeable about the best practices related to cyber security, regulations and laws associated with the same.

Course Outcomes:

The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context

UNIT I: Need for Cyber Security - Introduction to security- CIA triad-Case studies- security attacks-issues related to social networking - Guidelines

UNIT II: **Methods to Secureyourself in the Cyber World** - Why and What of Reversible and Irreversible Cryptographic mechanisms? Applications of Digital Signature - Good password practices

UNIT III: E-Commerce: Secure Transactions - What is E-commerce? – Online banking security-Online shopping fraudGuidelines and Recommendations

UNIT IV: EVERYDAY SECURITY - Connecting your laptop, mobile devices, PDAs to Internet-Managing your browser-Facebook Security-E-mail security – Safe guarding from Viruses: Antiviruses– Best practices and guidelines

UNIT V: CYBER SECURITY LAWS AND COMPETENT AUTHORITIES - Indian IT Act, 2008 - What is Cyber Forensics? – Functions of cybercrime cell – Responding to a cyber-attack

REFERENCES:

1. "Information Security Awareness Handbook, ISEA, Department of Electronics and Information Technology", Government of India, 2010
2. deity.gov.in/sites/upload_files/dit/.../itact2000/it_amendment_act2008.pdf
3. www.schneier.com/blog/archives/2013/03/browser_securit.html
4. www.dhses.ny.gov/ocs/awareness-training-events/news/2010-03.cfm
5. https://www.watsonhall.com/e-commerce-security/

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester **OPEN ELECTIVE - II**

L	T	P	C
3	0	0	3

(R20ECE4183) Principles of Modern Communication Systems

Course Objectives:

This course aims at:

- Establishing a firm foundation for the understanding of telecommunication systems, and the relationship among various technical factors when such systems are designed and operated
- To provide the student with an understanding of the mobile Cellular communications and their evolution.
- To equip the students with various kinds of wireless networks and its operations.
- To provide students with solid foundation in orbital mechanics and launches for the satellite communication
- Radar fundamentals and analysis of the radar signals

UNIT I: The evolution of electronic communication: From smoke signals to smart phones - History of communications: Theoretical Foundations, Development & Applications - Frequencies for communication - Frequency regulations - Overview of communication transmitter and receiver.

UNIT II: Mobile Cellular Communications: Evolution to cellular networks – Cellular systems generations and standards: 1G, 2G, 3G, 4G - Cellular network components - Components of a mobile phone - setting up a call process - Making a call process - Receiving a call process - Spectrum allocation: Policies and strategies, Role of TRAI.

UNIT III: Wireless Communication: Introduction - Bluetooth - Infrared communication - IEEE Wireless LANs (Wi-Fi) - IEEE 802.16 (WiMaX) - Future mobile and wireless networks: Introduction to 5G- device to device communication- IoT.

UNIT IV: Satellite: History of Satellite communication, Basics of Satellites, Types of Satellites, Capacity Allocation - Launch Vehicles and Orbits: Introduction to launching vehicles, Important Orbits, working of rocket, Three Pioneers of Rocketry - Basics of Global Positioning System (GPS) - Applications of GPS.

UNIT V:RADAR& NAVIGATION: Introduction, Radar Block diagram and Operation, Radar Frequencies, Applications of Radar. Navigation Systems: Introduction & methods of navigation, Instrument Landing System, Microwave landing system- Modern Navigation systems.

REFERENCES:

1. S.Haykin, ―Communication Systems, 4/e, John Wiley 2007
2. B.P.Lathi, ―Modern Digital and Analog Communication Systems, 3/e, Oxford University Press,2007
3. Rappaport Theodore S - Wireless Communications: Principles and Practice, 2/E, Pearson
4. Education India, 2010 5. Vijay. K. Garg, ―Wireless Communication and Networking, Morgan Kaufmann Publishers, 2007.
5. T.Pratt, C. Bostian and J.Allnutt; ―Satellite Communications, John Wiley and Sons, Second Edition., 2003
6. M. I .Skolnik ―Introduction to Radar Systems, Tata McGraw Hill 2006.
7. Myron Kyton and W.R.Fried ―Avionics Navigation Systems, John Wiley & Sons 1997.

Course outcomes

After completion of the course, students will be able to:

C415.1. Differentiate various elements, processes, and parameters in communication systems, and describe their functions, effects, and interrelationship (K2-Understand).

C415.2. Interpret the mobile cellular concepts, standards and all generations of cellular systems. (K2-understand)

C415.3. Describe the existing and emerging wireless standards and Compare various wireless networks and their specifications. (K5-Evaluate)

C415.4. Demonstrate the history of Satellite communication, applications and orbit concepts, Placement of a Satellite in a Geo-Stationary orbit and GPS concept (K3- Apply)

C415.5 Summarize the radar fundamentals and analysis of the radar signals. (K4- Analyze)

C415.6 Explain the Navigation systems (K2-Understand).

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester **OPEN ELECTIVE - II**

L	T	P	C
3	0	0	3

(R20EEE4184) Illumination Engineering

COURSE OBJECTIVES:

- To provide an introduction to the fundamentals of illumination engineering and architectural lighting design.
- To impart lighting fundamentals, measurement, and technology and their application in the analysis and design of architectural lighting systems

COURSE OUTCOME: The students will be able to:

i. Identify the criteria for the selection of lamps and lighting systems for an indoor or outdoor space
ii. Perform calculations on photometric performance of light sources and luminaires for lighting design
iii. Evaluate different types of lighting designs and applications

UNIT I: **Introduction of Light :** Types of illumination, Day lighting, Supplementary artificial lighting and total lighting, Quality of good lighting, Factors affecting the lighting-shadow, glare, reflection, Color rendering and stroboscopic effect, Methods of artificial lighting, Lighting systems-direct, indirect, semi direct, semi indirect, Lighting scheme, General and localized.

UNIT II: Measurement of Light: Definition of luminous flux, Luminous intensity, Lumen, Candle power, Illumination, M.H.C.P, M.S.C.P, M.H.S.C.P, Lamp efficiency, Brightness or luminance, Laws of illumination, Inverse square law and Lambert's Cosine law, Illumination at horizontal and vertical plane from point source, Concept of polar curve, Calculation of luminance and illumination in case of linear source, round source and flat source.

UNIT III: Design of Interior Lighting : Definitions of maintenance factor, Uniformity ratio, Direct ratio, Coefficients of utilization and factors affecting it, Illumination required for various work planes, Space to mounting height ratio, Types of fixtures and relative terms used for interior illumination such as DLOR and ULOR, Selection of lamp and luminance, Selection of utilization factor, reflection factor and maintenance factor Determination of Lamp Lumen output taking into account voltage and temperature variations, Calculation of wattage of each lamp and no of lamps needed, Layout of lamp luminaire, Calculation of space to mounting height ratio, Indian standard recommendation and standard practices for illumination levels in various areas, Special feature for entrance, staircase, Corridor lighting and industrial building.

UNIT IV: Design of Outdoor Lighting: Street Lighting : Types of street and their level of illumination required, Terms related to street and street lighting, Types of fixtures used and their suitable application, Various arrangements in street lighting, Requirements of good street lighting, Selection of lamp and luminaire, Calculation of their wattage, Number and arrangement, Calculation of space to mounting height ratio, Calculation of illumination level available on road.

UNIT V:Design of Outdoor Lighting: Flood Lighting: Terms related to flood lighting, Types of fixtures and their suitable applications, Selection of lamp and projector, Calculation of their wattage and number and their arrangement, Calculation of space to mounting height ratio, recommended method for aiming of lamp.
Special Features of Aesthetic Lighting: Monument and statue lighting, Sports lighting, Hospital lighting, Auditorium lighting.

Text Books:

1. D.C. Pritchard Lighting, Routledge, 2016
2. Jack L. Lindsey, Applied Illumination Engineering, PHI, 1991
3. John Matthews Introduction to the Design and Analysis of Building Electrical Systems, Springer, 1993
4. M.A. Cayless, Lamps and Lighting, Routledge, 1996

References:

1. IS CODE 3646
2. IS CODE 6665

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester **OPEN ELECTIVE - II**

L	T	P	C
3	0	0	3

(R20INF4185) E – COMMERCE

COURSE OUTCOMES: At the end of the course, the students will be able to :

1. Understand the E – commerce strategies and value chains
2. Understand the E-commerce services
3. Understand E - commerce infrastructure, its applications and Supply Chain Management.
4. Know the availability of latest technology and applications of E-Payment Mechanism.
5. Apply E-Commerce in business-to-business application.

UNIT 1: **Electronic Commerce:** Overview, Definition, Advantages & Disadvantages of E-Commerce, Threats of E-Commerce, Managerial Prospective, Rules & Regulation for Controlling Commerce, Relationship Between E-Commerce & Networking, Different Types of Networking for E-Commerce, internet, Intranet, EDI Systems, Wireless Application Protocol: Definition, Hand Held Devices, Mobility & Commerce Model, Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement for E-Commerce, Business Model of E-Commerce; Model Based on Transaction Type, Model Based on Transaction Party- B2B, B2C, C2B, C2C, E-Governance.

UNIT 2: **E-Strategy:** Overview, Strategic Methods for developing E-Commerce. Four C's (Convergence, Collaborative, Computing, Content Management & Call Center). Convergence: Technological Advances in Convergence - Types, Convergence and its implications, Convergence & Electronic Commerce. Collaborative Computing: Collaborative Product Development, contract as per CAD, Simulations Collaboration, Security. Content Management: Definition of Content, Authoring Tools and Content Management, Content Management, Content - partnership, repositories, convergence, providers, Web Traffic.

UNIT 3: **Traffic Management:** Content Marketing Call Center: Definition, Need, Tasks Handled, Mode of Operation, Equipment, Strength & Weakness of Call Center, Customer Premises Equipment (CPE).

Supply Chain Management: E-logistics, Supply Chain Portal, Supply Chain Planning Tools (SCP Tools), Supply Chain Execution(SCE), SCEFramework, Internet's Effect on Supply Chain Power.

UNIT 4: **E-Payment Mechanism:** Payment through card system, E-Cheque, E-Cash, E-Payment, Threats& Protections.

E-Marketing: Home - Shopping, E-Marketing, Tele- Marketing

UNIT 5: **Electronic Data Interchange (EDI):** Meaning, Benefits, Concepts, Application, EDI Model, Protocols (UN EDI, FACT/ GTDI), ANSIX-12, Data Encryption (DES/RSA)

Risks of E-Commerce: Overview, Security for E-Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital Certificates, Digital Signatures.

Text Book:

1. Electronic Commerce - Technologies & Applications, Bhaskar Bharat, TMH

Reference Books:

1. E-commerce, MM Oka, EPH
2. Frontiers of Electronics Commerce, Kalakotia, Whinston, Pearson Education
3. Electronic Commerce, Loshinpete, Murphy P. A., Jaico Publishing Housing
4. E-Commerce, Murthy, Himalaya Publishing.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - II	L	T	P	C
		3	0	0	3

(R20MED4186) Industrial Engineering & Ergonomics

UNIT 1: Introduction: An approach to industrial design -elements of design structure for industrial design in engineering application in modern manufacturing systems. Ergonomics and Industrial Design: Introduction -general approach to the man- machine relationship- workstation design-working position.

UNIT 2: Control and Displays: Shapes and sizes of various controls and displays-multiple, displays and control situations - design of major controls in automobiles, machine tools etc Ergonomics and Production: ergonomics and product design -ergonomics in automated systems- expert systems for ergonomic design. Anthropometric data and its applications in ergonomic, design- limitations of anthropometric data- use of computerized database.

UNIT 3: Visual Effects of Line and Form: The mechanics of seeing- psychology of seeing general influences of line and form. Color: Color and light -color and objects- color and the eye -color consistency- color terms- reactions to color and color continuation -color on engineering equipment.

UNIT 4: Aesthetic Concepts: Concept of unity- concept of order with variety -concept of purpose style and environment- Aesthetic expressions. Style-components of style- house style, observation style in capital goods, case study.

UNIT 5: Industrial Design in Practice: General Design -specifying design equipment- rating the importance of industrial design -industrial design in the design process.

REFERENCE BOOKS:

1. Industrial Design for Engineers - Mayall W.H. - London Hiffee books Ltd.-1988.
2. Applied Ergonomics Hand Book - Brain Shakel (Edited) - Butterworth scientific. London
3. Introduction to Ergonomics - R. C. Bridger - McGraw Hill Publications -1995.
4. Human Factor Engineering - Sanders & McCormick - McGraw Hill Publications – 6th edition,2002.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester **OPEN ELECTIVE - II**

L	T	P	C
3	0	0	3

(R20HMS4187) Creative Writing

COURSE OBJECTIVE: This course introduces students to the practice of creative writing in the genres of poetry and fiction. In addition to honing their skills as creative writers, students will develop a critical vocabulary that will aid them in discussing poems and fiction produced by their peers. This course allows for experimentation with writing poetry, short fiction, and creative nonfiction in a writing workshop setting. Far from undertaking the task of making student a professional writer, this class has its goal to familiarize the learner with the dynamics of imaginative literature, the synergy of form and content, and with what makes a particular work effective.

COURSE OBJECTIVES:

1. Discuss with some confidence many of the rhetorical devices, from metaphor to enjambment associated with creative writing.
2. Appreciate the complexity of Poetry, Short Fiction, and Creative Nonfiction.
3. Understand the importance of Creative Writing as a means of self-expression.
4. Read and discuss with enhanced understanding Poetry, Short Fiction, and Creative Nonfiction
5. Show improvement in writing and analytical skills.

UNIT I: **Introduction to Literary Forms** - Elements of Poetry - Rhythm and Meter Poetic Forms – Ballad, Lyrics, Elegy, Odes, Haiku, Sonnets Literary Genres- Short Fiction, Drama, and Non-Fiction

UNIT II: Poetry Writing - Appreciation of the form and content of poem Techniques - figurative language - (structure - rhythm – imagery – tone – style point of view, voice - read and discuss numerous poems)

Ballad - The Ballad of the Landlord by Langston Hughes; Lyrics - Kubla Khan by Samuel Taylor Coleridge Elegy - Elegy Written in a Country's Churchyard by Thomas Gray Odes – Ode to a Nightingale by John Keats; Haik u- This Other World by Richard Wright Sonnet - On His Blindness by John Milton Students Creative Assignment – Students will write three poems.

UNIT III: **Short Fiction / Novel** - Elements of Fiction - Character – Plot- Setting – Theme - Style; Narrator - Point of view - Tone – Suspension of Disbelief. Genres - Adventure, Comic, Fantasy, Gothic, Romance, Historical, Horror, Supernatural, Thriller, Science Fiction - Gooseberries by Anton Chekhov Short Story - My Lost Dollar by Stephen Leacock Students Creative Assignment – Students will write one Short Story

UNIT IV: **Drama** - Elements of Drama - Character Plot, Theme, Dialogue, Convention, Genre, Audience, Stagecraft, Design, ConversionsDrama – The King of the Dark Chamber by Rabindranath Tagore Students Creative Assignment- Students will write a review of the drama read in the class.

UNIT V: Non Fiction - Prose, Biography, Memoirs, and Personal Essays Walden or Life in the Woods by Henry David Thoreau Students Creative Assignment - Students will write one or two essays

REFERENCES

1. Candace H. Schaefer, Rick Diamond. 1998. The Creative Writing Guide: A Path to Poetry, Nonfiction, and Drama, Longman, New York, USA
2. Shelly Clark and MarjoneSaisa, 2009. Road Trip: Conversations with Writers, The Backwaters Press, Nebraska, USA
3. Nikki Moustaki (ed.), 1998. Writing Fiction: The Practical Guide from New York's Acclaimed Creative Writing School, Publisher: Bloomsbury, ISBN: 0156005743.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - II	L	T	P	C
		3	0	0	3

(R20HMS4188) Design Thinking

Course Objectives:

- To create awareness of design among students of engineering
- To motivate students to think of design before implementing an engineering project
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To instill a sense of significance towards applying creativity to product and service design

Course Outcomes: Upon completion of this course, the student shall be

1. Learn to identify design principles from an engineering perspective
2. Cultivate sensitivity towards design aspects in objects made by engineers and non-engineers, which are typically used in daily life
3. Understand and create visual design elements to communicate more effectively
4. Construct clear problem statements, understand the importance of validation, and design services creatively
5. Develop fundamental team skills: working in teams and managing teams, strategizing tasks, and streamlining activities pertaining to a project

Students' Responsibilities:

1. Students will form teams of 3–5 members each, while working collaboratively throughout the semester.
2. Students will present and report the tasks to the class and to the concerned faculty members and design experts, using their oral and written communication skills as well as creativity and team skills.
3. Students must proactively engage in observing the objects and processes which are part of their daily life and society from a design perspective and discuss with peers to learn collaboratively.

UNIT 1: Design Overview and Motivation History and Context of birth of Design; Design thinking: Introduction and Motivation; Various definitions and interpretations of design, Design Vocabulary; Design in Indian Context; Art and Design: Art in Design, Design beyond Art; Design in Creative Industries

UNIT 2: Design Sensitization for Engineers- Design Engineering vs. Engineering Design, Examples of Engineering Design and Design Engineering in various engineering domains, Examples of design failures leading to bad products and services, Real-world examples of bad design that caused engineering and technological disasters, Domain-specific Engineering Design examples

UNIT 3: Design Thinking Foundations The Design Double Diamond: Discover-Define-Develop-Deliver User-centric design approaches: Importance of user-centricity for design, Empathisation, Empathy Maps, Data collection from users and for users, Data Validation Responsible Innovation and Ethical Design: Ethics as foundation for design, Concern for environment and sustainability

UNIT 4: Communication Skills for Design, Culture and Art Communication Media to express an idea: Visuals, Text, Voice and Audio, Info graphics General guidelines for a good Presentation: Target audience, slideshow templates, appropriate visual elements, presentation styles, guidelines General guidelines for a good Report: Documentation classification, standards, styles, and templates Modes of communication: Reports and documents, Presentation, poster, graphic, blog or website. Understanding Art in Design: Need for creativity, Elements of Visual Design Aesthetics: Influences and impressions of Colors, Shapes, Layouts, Patterns, and Fonts as Design Elements

UNIT 5: Applied Creativity and Design for Services Methods to brainstorm solutions for user issues; Combining solutions to workable solution concepts; Identifying the user needs in a service-driven economy; Process Flows and Customer Experience considerations for designing and improving services; 5 Why's; Service Delivery Pathways. Doing Design Looking for a problem, Ideation and Rules of Ideation, Framing and stating the problem; Basic considerations of Prototyping/ Model Building, Basics of Testing and Validation, Incorporating feedback

TEXT BOOKS:

1. Daniel Ling, "Complete Design Thinking Guide for Successful Professionals", CreateSpace Independent Publishing, 2015 (ISBN: 978-1514202739)
2. Tim Brown, "Change by Design", Harper Business, 2012 (ISBN: 978-0062337382)
3. Jimmy Jain, "Design Thinking for Startups: A Handbook for Readers and Workbook for Practitioners", Notion Press, 2018 (ISBN: 978-1642495034)
4. Beverly Rudkin Ingle, "Design Thinking for Entrepreneurs and Small Businesses: Putting the Power of Design to Work", APress, 2013 (ISBN: 978-1430261810)

REFERENCES:

1. Donald A. Norman, "The Design of Everyday Things", MIT Press, 2013 (ISBN: 978-0262525671)
2. Bruno Munari, "Design As Art", Penguin UK, 2009 (ISBN: 978-0141035819)
3. Tom Kelly, Jonathan Littman, "The Art of Innovation", HarperCollins Business, 2002 (ISBN: 978-0007102938)
4. Thomas Lockwood, "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value", Allworth Press, 2009 (ISBN: 978-158115)

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY					
(An Autonomous Institution under UGC, New Delhi)					
B.Tech. - IV Year – I Semester	OPEN ELECTIVE - II	L	T	P	C
		3	0	0	3
(R20CIV4182) Pre Fabricated Structures					

Open Elective –III

S. No.	Course Code	Course Title	L	T	P	Credits
1	R20CIV4291	Spatial Technology Concepts	3	0	0	3
2	R20CSE4292	Fundamentals of Soft Computing				
3	R20ECE4293	Audio & Video Engineering				
4	R20EEE4294	Non Conventional Energy Resources				
5	R20INF4295	Information Security Fundamentals				
6	R20MED4296	Total Engineering Quality Management				
7	R20HMS4297	Human Values & Professional Ethics for Engineers				
8	R20HMS4298	Science Fiction				
9	R20CIV4292	Building Infrastructure Auditing				
10		MOOCs - IV				

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester **OPEN ELECTIVE - III**

L	T	P	C
3	0	0	3

(R20CIV4291) Spatial Technology Concepts

COURSE OBJECTIVES: To introduce the concepts of remote sensing processes and its components. To expose the various remote sensing platforms and sensors and to introduce the elements of data interpretation

COURSEOUTCOMES:

1. At the end of the course the student will be able to understand
2. The characteristics of electromagnetic radiation and its interaction with earth features
3. The types and configuration of various satellites and sensors
4. The elements of data interpretation

UNIT I:Remote Sensing and Electromagnetic Spectrum- Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum – wave theory, particle theory, Stefan – Boltzmann Law and Wien's Law – visible and non-visible spectrum – Radiation sources: active & passive; Radiation Quantities

UNIT II:EMR Interaction with Atmosphere- Standard atmospheric profile – main atmospheric regions and its characteristics – interaction of radiation with atmosphere - Scattering (Rayleigh, Mie, non-selective scattering) absorption and refraction – Atmospheric effects on visible, infrared, thermal and microwave spectrum – Atmospheric windows.

UNIT III: EMR Interaction with Earth- Energy balance equation – Specular and diffuse reflectors – Spectral reflectance &emittance – Spectro radiometer / Spectrophotometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water body – Factors affecting spectral reflectance of vegetation, soil and water body.

UNIT IV: Platforms and Sensors- Ground based platforms –Airborne platforms – Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites – Resolution concepts – Scanners - Along and across track scanners – Orbital and sensor characteristics of different satellites – Airborne and Space borne TIR sensors – Calibration – S/N ratio – Passive/Active microwave sensing – Airborne and satellite borne RADAR –SAR –LIDAR , UAV – High Resolution Sensors

UNIT V: Data Products and Visual Interpretation- Photographic (film and paper) and digital products – quick look products - High Resolution data products data - ordering – interpretation – basic characteristics of image elements – interpretation keys (selective and elimination) – visual interpretation of natural resources.

TEXT BOOKS:

1. Richards, Remote sensing digital Image Analysis-An Introduction Springer - Verlag 1993.
2. Lillesand, T.M. and Kiefer R.W. Remote Sensing and Image interpretation, John Wiley and Sons, Inc, New York, 2002.

REFERENCES:

1. Janza, F.Z., Blue H.M. and Johnson,J.E. Manual of Remote Sensing. Vol.I, American Society of Photogrametry, Virginia, USA, 2002.
2. Verbyla, David, Satellite Remote Sensing of Natural Resources. CRC Press, 1995
3. Paul Curran P.J. Principles of Remote Sensing. Longman, RLBS, 2003.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - III	L	T	P	C
		3	0	0	3

(R20CSE4292) Fundamentals of Soft Computing

COURSE OBJECTIVES: The main objective of the Soft Computing Techniques to Improve Data Analysis Solutions is to strengthen the dialogue between the statistics and soft computing research communities in order to cross-pollinate both fields and generate mutual improvement activities.

UNIT I: **Introduction:** What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.
Neural Networks: What is Neural Network, Learning rules and various activation functions, Single layer Perceptrons, Back Propagation networks, Architecture of Back propagation(BP) Networks, Backpropagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications.

UNIT II:**Fuzzy Systems:** Fuzzy Set theory, Fuzzy versus Crisp set, Fuzzy Relation, Fuzzification, Minmax Composition, Defuzzification Method, Fuzzy Logic, Fuzzy Rule based systems, Predicate logic, Fuzzy Decision Making, Fuzzy Control Systems, Fuzzy Classification.

UNIT III: **Genetic Algorithm:** History of Genetic Algorithms (GA), Working Principle, Various Encoding methods, Fitness function, GA Operators- Reproduction, Crossover, Mutation, Convergence of GA, Bit wise operation in GA, Multi-level Optimization.

UNIT 4: **Hybrid Systems:** Sequential Hybrid Systems, Auxiliary Hybrid Systems, Embedded Hybrid Systems, Neuro-Fuzzy Hybrid Systems, Neuro-Genetic Hybrid Systems, Fuzzy-Genetic Hybrid Systems.

UNIT V: **GA based Backpropagation Networks:**
GA based Weight Determination, K - factor determination in Columns.
Fuzzy Backpropagation Networks: LR type Fuzzy numbers, Fuzzy Neuron, Fuzzy BP Architecture, Learning in Fuzzy BP, Application of Fuzzy BP Networks

TEXT BOOKS:

1. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran, G. A. Vijayalakshami, PHI.
2. Genetic Algorithms: Search and Optimization, E. Goldberg.
3. Neuro-Fuzzy Systems, Chin Teng Lin, C. S. George Lee, PHI.
4. Build_Neural_Network_With_MS_Excel_sample by Joe choong.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester **OPEN ELECTIVE - III**

L	T	P	C
3	0	0	3

(R20ECE4293) Audio and Video Engineering

Course Objectives:

- Student are able understand different amplifiers, graphic equalizer and Dolby NR recording systems TV fundamentals like concept of aspect ratio ,image continuity etc Color theory
- Student are able to discuss composite video signal ad CCIR B standard for color signal Transmission and reception, monochrome TV transmitter and receivers, Color TV transmitter and compare TV camera tubes, Color picture tube
- Student are able Illustrate of color TV receivers(PAL-D) and Differentiate between NTSC PAL and SCAM systems cable Television, MATV, CATV, CCTV, Cable TV network and DTH

UNIT I: Hi Fi Audio Amplifier - Introduction to Amplifiers: Mono, Stereo, Public Address; Difference between stereo amplifier and Mono amplifier; Block diagram of Hi Fi amplifier and explanation; Graphic equalizer concept, circuit diagram and operation. (5 Point Circuit diagram); Dolby NR recording system; Types of speaker woofer, Midrange and Tweeter; Cross over network circuit and its function.

UNIT II: TV Fundamentals - Concept of Aspect ratio, image continuity, interlace scanning, scanning periods, horizontal and vertical, vertical resolution, horizontal resolution; Vestigial sideband transmission, bandwidth for Colour signal, picture tube, brightness, contrast, viewing distance luminance, hue, saturation, compatibility; Colour theory, primary colors and secondary colors, additive Colour mixing subtractive Colour mixing; Composite Video Signal, Pedestal height, Blanking pulse, Colour burst, Horizontal sync pulse details, Vertical sync pulse details, Equalizing pulses, CCIR B standards for Colour signal transmission and reception.

UNIT III: TV Transmitters and Receiver - Audio and Video signal transmission; Positive and Negative modulation; Merits and Demerits of Negative modulation; Introduction to television camera tube (a) Vidicon; (b) Plumbicon; (c) Solid State camera based on CCD; Color Picture tube (a) PIL, (b) Delta gun picture tube; Block diagram of monochrome TV transmitter; Block diagram of Colour TV transmitter; Block diagram of monochrome TV Receiver.

UNIT IV: Colour TV - Block Diagram and operation of color TV receiver (PAL D type); Explain – YagiUda Antenna; Explain block diagram of PAL-D decoder with circuit diagram of chroma signal amplifier, Burst pulse blanking, Colour killer control, Basic Circuit for Separation of U and V signals. AGC Amplifier.Colour signal matrixing, RGB drive amplifiers; EHT generation: circuit explanation for line output stage using transistor or IC in Colour TV; Comparisons between NTSC, PAL and SCAM Systems.

UNIT V: Cable Television - Working principle and specification of following components : Dish antenna, LNBC, Multiplexer, Attenuators Connectors (two ways and three ways), Amplifier and cable; MATV,CATV and CCTV;Design concept for cable TV network; Block diagram of dB meter with working principle; Direct to Home System (DTH) Introduction and Block Diagram.

References :

1. Television & Radio Engineering (A.M. Dhake) Tata McGraw Hill.
2. Television Engg and Video System (R.G. Gupta) Tata McGraw Hill.
3. Audio Video Systems (R.G. Gupta) Tata McGraw Hill.
4. Modern TV Pratice (R.R. Gulati) New Age International.
5. Basic Radio and Television (S. Sharma) Tata McGraw Hill.
6. Colour Television Principles and Pratice (R.R. Gulati) New Age International.
7. Basic Television and Video System (Bernard Grob) Tata McGraw Hill.
8. Mono Chrome and Colour Television (R.R. Gulati0 New Age International.
9. Modern CD Player Servicing Manual (ManoharLotia) BPB Publication.

Course Outcomes:

After completion of the course, students will be able to:

C423.1. Explain and differ ate the different amplifiers, graphic equalizer and Dolby NR recording systems (K3-apply)

C423.2. Describe the TV fundamentals like concept of aspect ratio, image continuity etc Color theory (K2-Understand)

C423.3. Discuss about composite video signal ad CCIR B standard for color signal Transmission and reception (K2-Understand)

C423.4. Discuss monochrome TV transmitter and receivers, Color TV transmitter and compare TV camera tubes, Color picture tube (K5-Evaluate)

C423.5. Diagram Illustrate of color TV receivers (PAL-D) and Differentiate between NTSC PAL and SCAM systems (K4-Analyse)

C423.6. Explain about cable Television, MATV, CATV, CCTV, Cable TV network and DTH (K2-Understand)

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester **OPEN ELECTIVE - III**

L	T	P	C
3	0	0	3

(R20EEE4294) Non Conventional Energy Resources

This course helps the students to understand the importance, availability, conversion technologies of renewable energy resources and its applications

1. To emphasis the current energy status and role of non-conventional and renewable energy sources.
2. To familiarize various aspects of Solar energy and utilization
3. To familiarize various aspects of Wind energy and utilization
4. To familiarize various aspects of Biomass energy and utilization
5. To emphasize the significance of Green Energy Technologies.

UNIT I: SOLAR ENERGY - Solar radiation its measurements and prediction - Solar thermal collectors - Flat plate collectors, Concentrating collectors – Applications - Heating, Cooling, Desalination, Drying, Cooking, etc - Principle of photovoltaic conversion of solar energy - Types of solar cells and fabrication - Photovoltaic applications - Battery charging, Domestic lighting, Street lighting and water pumping.

UNIT II:WIND ENERGY - Wind energy - Energy chains - Application - Historical background, Merits and limitations - Nature of wind - Planetary and local day / night winds - Wind energy quantum - Power in wind- Turbine efficiency - Torque Thrust calculations Velocity at different heights - Site selection - Components of Wind Energy Conversion System (WECS).

UNIT III: BIOMASS ENERGY - Energy from Biomass - Biomass as Renewable Energy Source - Types of Bio mass Fuels - Solid, Liquid and Gas - Biomass Conversion Techniques- Wet Process, Dry Process-Photosynthesis - Biogas Generation - Factors affecting Biodigestion - Classification of bio gas plant - Continuous, Batch and Fixed Dome types - Advantages and Disadvantages.

UNIT IV: TIDAL, OTEC, HYDEL AND GEOTHERMAL ENERGY - Tidal energy: Tide – Spring tide, Neap tide – Tidal range – Tidal Power – Types of tidal power plant – Single and dual basin schemes – Requirements in tidal power plant - Ocean Thermal Energy Conversion (OTEC): Principle - Open and closed OTEC Cycles - Hydel Energy: Micro hydro - Geothermal Energy: Geothermal energy sources - Power plant and environmental issues.

UNIT V:NEW ENERGY SOURCES - Hydrogen as a renewable energy source - Sources of Hydrogen - Fuel for Vehicles - Hydrogen Production - Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production - Storage of Hydrogen - Gaseous, Cryogenic and Metal hydride - Fuel Cell – Principle of working, construction and applications.

TEXT BOOKS

1. Rai.G.D, “Non- conventional resources of energy”, Khanna publishers, Fourth edition, 2010.
2. Khan. B.H, “Non-Conventional Energy Resources”, The McGraw Hills, Second edition, 2009.

REFERENCES

1. Rao.S&Parulekar, “Energy Technology”, Khanna publishers, Fourth edition, 2005.
2. Pai.B.R and Ram Prasad.M.S, “Power Generation through Renewable Sources of Energy”, Tata McGraw Hill, New Delhi, 1991.

3. Bansal.N.K, Kleeman and Meliss, “Renewable energy sources and conversion Techniques”, Tata McGraw hill, 1990.
4. Godfrey Boyl “Renewable Energy: Power Sustainable Future”,Oxford University Press, Second edition, 2006.
5. Ryan O’Hayre, Suk-Won Cha and Whitney colella, “Fuel Cell Fundamentals”, Second edition, 2009.
6. John W Twidell and Anthony D Weir, “Renewable Energy Resources”, Taylor and Francis, 2006.
7. Freris.L.L, “Wind Energy Conversion systems”, Prentice Hall, UK, 1990.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - III	L	T	P	C
		3	0	0	3

(R20INF4295) Information Security Fundamentals

COURSE OBJECTIVES:

1. To provide impeccable knowledge on various technical aspects of Information Security & Computer Security principles
2. To provide foundation for understanding the key issues associated with protecting Computer Systems & Information Assets.
3. To provide competency in designing consistent & reasonable Information security system with appropriate Scanning & Enumeration mechanisms, determining the level of protection and Response to security incidents.

UNIT I:Introduction to Information Security - Introduction to Information Security, Need for Security - Threats to security & Attacks, Computer System Security and Access Controls - System access and data access.

UNIT II:Communication Security - Introduction to cryptography, cryptosystems, Encryption & Decryption Techniques - classical encryption techniques, communication channel used in cryptographic system, various types of ciphers, Cryptanalysis, Hash function and Data integrity, Security of Hashing function.

UNIT III: Network - Introduction to Network Security, Email Security, IP Security, Web Security, Kerberos, X.509 techniques.

UNIT IV: Scanning & Enumeration Technology - Malicious software, Firewalls, Honey pots, Intrusion Detection system, Intrusion Prevention system

UNIT V: Ethics In Information Security - Implementing Information Security, Legal Ethical & Professional issues in Information Security.

TEXT BOOKS:

1. Matt Bishop, "Computer Security: Art and Science", Addison-Wesley Professional, First Edition, 2003. ISBN: 0201440997.
2. William Stallings, "Cryptography and Network Security", Pearson Education, Fourth Edition, 2006. ISBN: 8177587749

REFERENCES:

1. Michael E. Whitman, Herbert J. Mattord ,"Principles of Information Security" Cengage Learning, Fourth Edition, 2010, ISBN: 1111138214
2. Charlie Kaufman, Radia Perlman, Mike Speciner, "Network security: private communication in a public world", Second Edition, ISBN: 0130460192.
3. Dieter Gollmann ,"Computer Security ", Third Edition, ISBN: 0470741155.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - III	L	T	P	C
		3	0	0	3

(R20MED4296) Total Engineering Quality Management

COURSE OBJECTIVE: To understand the Engineering and Management aspects of Planning, Designing, Controlling and Improving Quality in Manufactured products.

COURSE OUTCOMES:

1. To understand the fundamentals of quality
2. To understand the role of TQM tools and techniques in elimination of wastages and reduction of defects
3. To develop quality as a passion and habit

UNIT I: **Quality Gurus And TQM Kitemarks** - Evolution of TQM – Quality Guru's – Edward Deming – Joseph Juran – Philip Crosby – Genichi Taguchi – Walter Shewart – Criteria for Deming's PrizeUNIT II - PRODUCT DESIGN AND ANALYSIS (9 hours) Basic Design Concepts and TQM – Design Assurance – Design Validation – Failure Mode Effect Analysis – Fault Tree Analysis – Design for Robustness – Value Analysis

UNIT-III: **Process Improvement and Modern Production Management Tools** - Six Sigma Approach – Total Productive Maintenance – Just-In-Time – Lean Manufacturing Paradigms

UNIT IV: **Quality Improvement Tools and Continuous Improvement** - Q-7 Tools – New Q-7 Tools – Quality Function Deployment – Kaizen – 5S – PokaYoke

UNIT V: Quality Management Systems - Quality Management Systems – Introduction to ISO9000 – TS16949:2002 and EMS14001 certifications.

TEXT BOOKS

1. Total Engineering Quality Management, Sunil Sharma, 1st Edition, MacMillan India Limited.
2. Total Quality Management, Poornima M. Charantimath, 2nd Edition, Pearson Education.

REFERENCES

1. "Quality and Performance Excellence", James R Evans, Edition, 7th Edition, Cengage Learning.
2. "Quality Management", Howard S Gitlow, Alan J Oppenheim, Rosa Oppenheim, David M Levine,3rd Edition , Tata McGraw Hill Limited.
3. "Fundamentals of Quality Control & Improvement", AmitavaMitra, 3rd Edition, Wiley Publications, 2012.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - III	L	T	P	C
		3	0	0	3

(R20HMS4297) Human Values & Professional Ethics for Engineers

Course Objectives:

1. To know the different moral and ethical issues through various prominent theories.
2. To educate the code of ethics as well as the industrial standards and how they can be used for ensuring safety and reducing the risk.
3. To vocalize the Rights and Responsibilities of individuals.
4. To enable the students to imbibe and internalize the Values and Ethical Behavior in the personal and Professional lives.

Course Outcome: The students will understand the importance of Values and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT – I Introduction to Professional Ethics: Basic Concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skills, Emotional Intelligence, Thoughts of Ethics, Value Education, Dimensions of Ethics, Profession and professionalism, Professional Associations, Professional Risks, Professional Accountabilities, Professional Success, Ethics and Profession.

UNIT – II Basic Theories: Basic Ethical Principles, Moral Developments, Deontology, Utilitarianism, Virtue Theory, Rights Theory, Casuist Theory, Moral Absolution, Moral Rationalism, Moral Pluralism, Ethical Egoism, Feminist Consequentialism, Moral Issues, Moral Dilemmas, Moral Autonomy.

UNIT – III Professional Practices in Engineering: Professions and Norms of Professional Conduct, Norms of Professional Conduct vs. Profession; Responsibilities, Obligations and Moral Values in Professional Ethics, Professional codes of ethics, the limits of predictability and responsibilities of the engineering profession. Central Responsibilities of Engineers – The Centrality of Responsibilities of Professional Ethics; lessons from 1979 American Airlines DC-10 Crash and Kansas City Hyatt Regency Walk away Collapse.

UNIT – IV Work Place Rights & Responsibilities, Ethics in changing domains of Research, Engineers and Managers; Organizational Complaint Procedure, difference of Professional Judgment within the Nuclear Regulatory Commission (NRC), the Hanford Nuclear Reservation. Ethics in changing domains of research – The US government wide definition of research misconduct, research misconduct distinguished from mistakes and errors, recent history of attention to research misconduct, the emerging emphasis on understanding and fostering responsible conduct, responsible authorship, reviewing & editing.

UNIT – V Global issues in Professional Ethics: Introduction – Current Scenario, Technology Globalization of MNCs, International Trade, World Summits, Issues, Business Ethics and Corporate Governance, Sustainable Development Ecosystem, Energy Concerns, Ozone Deflection, Pollution, Ethics in Manufacturing and Marketing, Media Ethics; War Ethics; Bio Ethics, Intellectual Property Rights.

TEXT BOOKS:

1. Professional Ethics: R. Subramanian, Oxford University Press, 2015.
2. Ethics in Engineering Practice & Research, Caroline Whitbeck, 2e, Cambridge University Press 2015.

REFERENCES

1. Engineering Ethics, Concepts Cases: Charles E Harris Jr., Michael S Pritchard, Michael J Rabins, 4e ,Cengage learning, 2015.
2. Business Ethics concepts & Cases: Manuel G Velasquez, 6e, PHI, 2008.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

(An Autonomous Institution under UGC, New Delhi)

B.Tech. - IV Year – I Semester	OPEN ELECTIVE - III	L	T	P	C
		3	0	0	3

(R20HMS4298) Science Fiction

COURSE OBJECTIVES: To help learners understand the link between Science and Technology and Humanities, especially Fiction form in Literature, with a view to instilling in them a sensitivity to the current issues of the world and probable issues that will crop up in the future world and imbibe in them a fine sensibility to appreciate and handle with balance the borderline problems of interdisciplinary nature with integrity and responsibility.

COURSE OUTCOMES:

1. To enable the learners to appreciate the literary form of Science Fiction
2. To give them a firsthand linguistic experience of the various types of Science Fiction novels
3. To equip the learners with the discretion to distinguish between a successful/effective science fiction novel and the one not so
4. To enhance the learners' communication skills and to develop their potential for creative writing
5. To spark off the dormant researcher in the learner so that he/she will use it for the betterment of the world

UNIT I: Science Fiction – an Introduction - 1. What is science fiction? Characteristics. 2. Classification 3. Types 4. A Historical Overview

UNIT II: **Novels of other Worlds** - 1. Utopian Science Fiction Novels Huxley, Aldous. Island.1932; Harper Perennial Classics, 2002. 2. Dystopian Science Fiction Novels Huxley, Aldous. Brave New World.Chatto and Windus, 1962.

UNIT III: **Novels of other Beings** - 1. Robots and Science Fiction Asimov, Isaac.I Robot.Granada, 1950. 2. Aliens and Science Fiction Card, Orson Scott. Ender's Game. Starscape, 2002.

UNIT IV: **Novels of Time Travel** -1. Travel into future a. H. G. Well's Time Machine. 2. Travel into past a. Asimov, Isaac and Robert Silverberg. Child of Time.Tor, 1993.

UNIT V : Novels on Women's Issues - 1. Man Controlling Women a. Shelley, Mary. Frankenstein.1818; Barnes and Noble, 2009. 2. Varied Identities of Women b. RUSS, JOANNA. THE FEMALE MAN. BEACON PRESS, 2000

REFERENCES

1. Seed, David. "Science Fiction: A Very Short Introduction". OUP, 2011.
2. Roberts, Adam. "Science Fiction". 2 revised. Routledge, 2005.
3. Moylan, Tom and RaffaellaBaccolini. "Dark Horizons: Science Fiction and the Dystopian Imagination". Routledge, 2003.
4. Little, Judith.A. "Feminist philosophy and science fiction: utopias and dystopias", Prometheus Press, 2007.
5. Atwood, Margaret. "In Other Worlds".Anchor, 2012.
6. Reid, Robin.A. "Women in Science Fiction and Fantasy".Greenwood Press, 2009. 7. Schneider, Susan. "Science Fiction and Philosophy: From Time Travel to Superintelligence", Wiley Blackwell, 2009.
7. Drout, Michael D.C. From "Here to Infinity: An Exploration of Science Fiction Literature",. 7 CDs. Published in 2006 by Recorded Books.
8. Melzer, Patricia. "Alien Constructions: Science Fiction and Feminist Thought", University of Texas Press, 2006.

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY					
(An Autonomous Institution under UGC, New Delhi)					
B.Tech. - IV Year – I Semester	OPEN ELECTIVE - III	L	T	P	C
		3	0	0	3
(R20CIV4292) Building Infrastructure Auditing					