B. TECH FOUR YEAR DEGREE COURSE
DEPARTMENT OF CIVIL ENGINEERING

SR-21, ACADEMIC REGULATIONS,

COURSE STRUCTURE &

SYLLABUS

(Applicable for the batches admitted from 2021-22)

SRINIVASA INSTITUTE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous Institution**)**

Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada
Accredited by NAAC with 'A' grade, Recognised by UGC under sections 2(f) & 12(B)
Cheyyeru (V), Amalapuram, East Godavari District – 533216
Andhra Pradesh, India

VISION

To develop the institution into a world class destination for technological education and research

MISSION

- To impart high quality, industry relevant, career oriented , engineering education to rural students , to translate our vision into a reality
- To provide the best of instructional and institutional infrastructure facilities
- To have strategic linkages with industry and other institutions
- To mould students to meet the challenges of life with ethics , courage and conviction

DEPARTMENT OF CIVIL ENGINEERING

VISION

To impart knowledge and excellence in civil engineering and technology with global perspectives and make students ethically strong engineers, capable of doing research to build our nation.

MISSION

- To promote quality education, technical skills and consultancy for industrial and societal needs.
- To produce civil engineers of high caliber, capable of doing research with ethical values to serve the society and nation.
- To make the department a centre of excellence in the field of civil engineering and allied research.

1. PRELIMINARY DEFINITIONS AND NOMENCLATURES

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of the instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two semesters i.e., (one odd + one even).

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University Kakinada, Kakinada) and State Government.

Backlog Course: A course is considered to be a backlog course if the student has obtained a failure grade (F) in that course.

Basic Sciences: The courses offered in the areas of Mathematics, Physics, Chemistry, English etc., are considered to be foundational in nature.

Betterment: Betterment is a way that contributes towards improvement of the student's grade in any course(s). It can be done by either (a) re-appearing or (b) re-registering for the course.

Board of Studies (BoS): BoS is an authority as defined in UGC regulations, constituted by Head of the Department for all the departments separately. They are responsible for curriculum design and updation of all the programs offered by the department.

Branch: Means specialization in a program like B.Tech degree program in Mechanical Engineering, B.Tech degree program in Computer Science and Engineering etc.

Choice Based Credit System: The credit based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

CoE: Controller of Examinations

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Continuous Internal Assessment (CIA): It is an examination conducted towards internal assessment.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives a weightage to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of

a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities and extra-curricular activities involving both teaching and non-teaching staff and other resources in the process of study for a degree.

Dropping of the Semester: A student who doesn't want to register for any semester, can apply in writing in the prescribed format before commencement of that semester.

Core Courses: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective or Open Elective.

Massive Open Online Course (MOOC): MOOC courses inculcate the habit of self learning. MOOC courses would be additional choices in all the elective group courses.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal assessment and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means SRINIVASA INSTITUTE OF ENGINEERING AND TECHNOLOGY, Cheyyeru, East Godavari Dist, Andhra Pradesh unless indicated otherwise by the context.

Pre-requisite: A course, the knowledge of which is required for registration into higher level course.

Program: Means, Bachelor of Technology (B.Tech) degree program PG degree program: Master of Technology (M.Tech)

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project work: It is a design or research based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit based course and is to be planned carefully by the student.

Re-Appearing: A student can reappear only in the semester end examination for the theory component of a course, subject to the regulations contained herein.

Registration: Process of enrolling into a set of courses in a semester of a Program.

Regulations: The regulations, common to all B.Tech programs offered by Institute are designated as "SR21 Academic Regulations" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 15 to 18 weeks of academic work equivalent to normally 90 working days. The odd Semester usually starts in July and even semester in December month.

Semester End Examinations (SEE): It is an examination conducted for all the courses offered in a semester after completion of that semester class work.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

University: Means the Jawaharlal Nehru Technological University Kakinada, Kakinada.

2. ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Programme (For the batches admitted from the academic year 2021-22) & (B.Tech. Lateral Entry Scheme For the batches admitted from the academic year 2022 – 23)

For pursuing four year undergraduate Bachelor Degree Programme of study in Engineering (B.Tech) offered by SRINIVASA INSTITUTE OF ENGINEERING AND TECHNOLOGY under autonomous status and herein after referred to as SIET

3. CHOICE BASED CREDIT SYSTEM

The Indian Higher Education Institutions (HEI's) are changing from the conventional course structure to Choice Based Credit System (CBCS) along with introduction to semester system at first year itself. The semester system helps in accelerating the teaching-learning process and enables vertical and horizontal mobility in learning.

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

Choice Based Credit System (CBCS) is a flexible system of learning and provides choice

for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of lectures / tutorials / laboratory work / field work / project work / comprehensive Examination / seminars / assignments / alternative assessment tools / presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

- Choose electives from a wide range of elective courses offered by the departments.
- Undergo additional courses of interest.

- Adopt an interdisciplinary approach in learning.
- Make the best use of expertise of the available faculty.

4. ELIGIBILITY FOR ADMISSION

Admission to the B. Tech Programme shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University from time to time. Admissions shall be made either on the basis of the merit rank obtained by the student in the common entrance examination conducted by the A.P. Government/University or on the basis of any other order of merit approved by the A.P. Government/University, subject to reservations as prescribed by the Government/University from time to time.

The total seats available as per the approved intake are grouped into two categories viz. category A and Category B with a ratio of 70:30 as per the state government guidelines vide G.O No.52.

- The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.
- Under Category A: 70% of the seats are filled through EAPCET counseling.
- Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE.

Admission eligibility-Under Lateral Entry Scheme Students with diploma qualification have an option of direct admission into II year B. Tech. (Lateral entry scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three year B.Tech later entry Programme will be through ECET. The maximum period to complete B. Tech. under lateral entry scheme is six consecutive academic years from the date of joining.

5. DURATION OF PROGRAMME

The course duration for the award of the Degree in **Bachelor of Technology** will be four academic years, with two semesters in each year. However, if a student is unable to complete the course within 4 academic years, student can do so by giving more attempts but within 8 consecutive academic years from the date of admission.

Academic Calendar

For all the eight semesters a common academic calendar shall be followed in each semester by having an average of sixteen weeks of instruction, one week for the conduct of practical exams and with three weeks for theory examinations and evaluation. Dates for registration, sessional and end semester examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the planner.

6. MEDIUM OF INSTRUCTION

The medium of instruction shall be English for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.

7. BRANCHES OF STUDY

- Civil Engineering (CE)
- Electrical & Electronics Engineering (EEE)
- Mechanical Engineering (ME)
- Electronics & Communication Engineering (ECE)
- Computer Science & Engineering (CSE)
- Artificial Intelligence and Machine Learning (AI&ML)

8. TYPES OF COURSES

a. Basic Science Course:

Basic Science courses are the courses based upon the content leads to enhancement of skill and knowledge as well as value based and are aimed at man making education. Skill subjects are those areas in which one needs to develop a set of skills to learn anything at all levels. They are basics to learning any subject.

b. Professional Core Course:

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

c. Professional Elective Course:

Professional Electives provide breadth of experience in respective branch and application areas. Professional Elective course is a course which can be chosen from a pool of courses. It may be:

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

An elective may be discipline centric (Professional Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an unrelated discipline called as "Open Elective". There are four professional elective groups; students can choose not more than two courses from each group. Overall, students can opt for four professional elective courses which suit their project work in consultation with the faculty advisor/mentor. Nevertheless, one course from each of the two open electives is to be selected.

d. Open Elective Course:

Open elective course by other department students will have learning awareness and job-oriented benefits. Students require the opportunity to choose any open elective course from different departments to acquire knowledge in that field of course. Learning and employment benefits are not only through their own course subjects but also through open elective courses.

e. Mandatory Course:

For mandatory courses like Induction Training, Environmental Sciences, Indian Constitution, Essence of Indian Traditional Knowledge, a student has to secure 25 marks out of 50 marks (i.e 50% of the marks allotted) in the end examination for passing the subject/course. For **Mandatory** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

No marks or letter grade shall be allotted for all mandatory/non-credit courses.

f. NCC / NSS Activities:

NSS/NCC training is optional to the Undergraduate students. The activities shall be beyond class hours. The student participation shall be for a minimum period of 45 hours for certification in case of NSS.

9. SEMESTER STRUCTURE

Each academic year is divided into two semesters, TWO being MAIN SEMESTERS (one odd + one even). Main Semesters are for regular class work. However, the following cases are exempted:

a. Students admitted on transfer from JNTUK affiliated institutes, Universities and other institutes in the subjects in which they are required to earn credits so as to be on par with regular students as prescribed by concerned 'Board of Studies'.
b. Each semester shall be of 21 weeks (Table 1) duration and this period includes time for registration of courses, course work, examination preparation and conduct of examinations.
c. Each semester shall have a minimum of 90 working days, out of which number of contact days for theory / practical are 75 and 15 days for conduct of examinations and preparation.
d. The academic calendar shown in **Table 1** is declared at the beginning of the academic year.

Table 1: Academic Calendar

FIRST SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation and Practical Examinations	1 week	
	Semester End Examinations		2 weeks
Semester Break and Supplementary Examinations			2 weeks
SECOND SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation & Practical Examinations	1 week	
	Semester End Examinations		2 weeks
Summer Vacation/Summer Internship			10 weeks

10. REGISTRATION

Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses in time. The registration will be organized department wise under the supervision of the Head of the Department.

IN ABSENTIA registration will not be permitted under any circumstances.

At the time of registration, students should have cleared all the dues of Institute and Hostel in the previous semesters, paid the prescribed fee for the current semester and not been debarred from the institute for a specified period on disciplinary or any other ground.

11. UNIQUE COURSE IDENTIFICATION CODE

Every course of the B.Tech program will be placed in one of the four groups of courses as listed in the Table 2. The various courses and their two-letter codes are given below;

Table 2: Courses and their codes

S. No	Branch	Code
1	Civil Engineering	01
2	Electrical & Electronics Engineering	02
2	Mechanical Engineering	03
3	Electronics & Communication Engineering	04
4	Computer Science & Engineering	05
5	Artificial Intelligence & Machine Learning	61

12. CURRICULUM AND COURSE STRUCTURE

The curriculum shall comprise Foundation/ Skill Courses, Core Courses, Elective Courses, Open Electives, Laboratory Courses, Technical Seminar, Communication Skills Practice, Soft Skills Practice, Professional Society Activities, Community Service Project, Summer Internship and Major Project. The list of elective courses may include subjects from allied disciplines also.

Contact Periods: Depending on the complexity and content of the course, the number of contact periods per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours/weeks as follows:

- Contact classes (Theory / Tutorial): 1credit per lecture hour per week.
- Laboratory Hours (Practical): 0.5 credit for 1 Practical hour per week.
- Summer Internship:2 credits
- Project Work and Full Semester Summer Internship (6 Months): 12 Credits
- MOOCS: 2 Credits per course
- Comprehensive Viva Voce: 1 Credit
- Mandatory Courses (MC):**Non-Credit**
- Induction Program: **Non-Credit**

Credit distribution for courses offered is shown in Table 3.

Table 3: Credit distribution

S. No	Course	Hours	Credits
1	Theory Course (Core/Foundation/Elective)	3	3
2	Professional Core Courses	3	3
3	Professional Elective Courses	3	3
4	Open Elective Courses	3	3
5	Engineering Science courses (Engineering Graphics/Engineering Workshop)	1L+4P	3
6	Engineering Science courses	3	3
7	Laboratory Courses	3	1.5
8	MOOC Courses	0	2
9	Skill Oriented Course / Certification Course	1L+2P	2
10	Skill Advanced Course / Certification Course	1L+2P	2
11	Soft Skill Course / Certification Course	1L+2P	2
12	Summer Internship (8 Weeks)	-	2
13	Community Service Project	-	4
13	Seminar	-	1
14	Project Work	-	10
15	Mandatory Courses	2	0
16	Minor Degree Courses	4	4

Course Structure

Every program of study shall be designed to have **36** theory courses, **5** Skill Oriented / Certification Courses, Summer Internship, Community Service Project, **5** Mandatory Courses and **17** laboratory courses. Every course of the B.Tech program will be placed in one of the 10 categories with minimum credits as listed in the **Table 4**. In addition, a student has to carry out a Project Work.

Table 4: Category Wise Distribution of Credits

S. No	Category	Subject Area and % of Credits	Average No. of Credits
1	Humanities and Social Sciences (HS), including Management.	HS (05% to 10%)	**10**
2	Basic Sciences (BSC) including Mathematics, Physics and Chemistry.	BSC (10% to 15%)	**21**
3	Engineering Sciences (ESC), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.	ESC (10% to 15%)	**24**
4	Professional – Core Courses (PCC), relevant to the chosen specialization/ branch.	PCC (30% to 40%)	**51**
5	Professional Electives Courses (PEC), relevant to the chosen specialization/ branch.	PE (5% to 10%)	**15**
6	Open Electives Subjects / MOOCs -(OEC), from other technical and/or emerging subject areas.	OEC (5% to 10%)	**12**
7	Project Work through full Semester Summer Internship and Summer Internships (PW)	PW 5% to 10%	**17**
8	Skill Oriented Courses/Certification Courses project	SC (5% to 7%)	**10**
9	Mandatory Courses(Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge, Social Values and Professional Ethics)	MC (0%)	**0**
TOTAL CREDITS			**160**

For Four-Year Regular Programme:

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
B.Tech I Semester	2 Basic Science+ 1 Humanities and Social Science + 2 Engineering Science	1 Humanities and Social Science Lab + 1 Basic Science Lab + 1 Engineering Science Lab + Induction Training	19.5
B.Tech II Semester	2 Basic Science + 3 Engineering Sciences	2 Engineering Science Lab + 1 Basic Science Lab+ Environmental Science (MC)	19.5
B.Tech III Semester	1 Basic Science + 4 Professional Core subjects	3 Professional Core Lab + Skill Oriented Course + Essence of Indian Traditional Knowledge (MC)	21.5
B.Tech IV Semester	1 Basic Science + 2 Professional Core + 1 Engineering Science / Professional Core (Interdisciplinary) + Humanities and Social Science	Engineering Science / Professional Core (Interdisciplinary) Lab + 2 Professional Core Lab + Skill Oriented Course+ Basics of Indian Constitution (MC)	21.5
B.Tech V Semester	3 Professional Core + 1 Open Elective/ Job Oriented Elective - I+ Professional Elective – I	2 Professional Core Lab + 1 Skill Advanced Course / Soft Skill Course + Summer Summer Internship 2 Months after Second Year (To be Evaluated during V Semester) + Professional Ethics and Human Values (MC)	24
B.Tech VI Semester	3 Professional Core+ Professional Elective - II+ Open Elective/ Job Oriented Elective – II	3 Professional Core Lab + 1 Skill Advanced Course / Soft Skill Course +IPR & Patents (MC)	21.5
B.Tech VII Semester	3 Professional Elective-III,IV&V + Open Elective/ Job Oriented Elective –III, IV+ Humanities and Social Science Elective	Industry Oriented Mini Project+ Comprehensive Viva Voce+ 1 Skill Advanced Course / Soft Skill Course.	21.5
B.Tech VIII Semester	Project Work Seminar		11

Total	6 Basic Science + 3 Humanities and Social Sciences + 5 Engineering Science + 12 Professional Core + 1 Professional Interdisciplinary Core+ 5 Professional Electives + 4 Open Electives / Job Oriented Electives + Project Work	1 Humanities and Social Sciences Lab + 2 Basic Science Lab + 3 Engineering Science Lab + 1 Engineering Science / Professional Core(Interdisciplinary) Lab + 10 Professional Core Lab + 2 Professional Elective Lab + 2 Skill Oriented Course + 3 Skill Advanced Course / Soft Skill Course + Summer Internship + +Community Service Project + Mandatory Courses (Non-Credit)	160

For Three year lateral entry programme :

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
B.Tech III Semester	1 Basic Science + 4 Professional Core subjects	3 Professional Core Lab + Skill Oriented Course + Essence of Indian Traditional Knowledge (MC)	21.5
B.Tech IV Semester	1 Basic Science + 2 Professional Core + 1 Engineering Science / Professional Core (Interdisciplinary) + Humanities and Social Science	Engineering Science / Professional Core (Interdisciplinary) Lab + 2 Professional Core Lab + Skill Oriented Course+ Basics of Indian Constitution (MC)	21.5
B.Tech V Semester	3 Professional Core + 1 Open Elective/ Job Oriented Elective - I+ Professional Elective – I	2 Professional Core Lab + 1 Skill Advanced Course / Soft Skill Course + Summer Internship 2 Months after Second Year (To be Evaluated during V Semester) + Professional Ethics and Human Values (MC)	21.5
B.Tech VI Semester	3 Professional Core+ Professional Elective - II+ Open Elective/ Job Oriented Elective – II	3 Professional Core Lab + 1 Skill Advanced Course / Soft Skill Course +IPR & Patents (MC)	24
B.Tech VII Semester	3 Professional Elective-III,IV&V + Open Elective/ Job Oriented Elective –III, IV+ Humanities and Social Science Elective	Industry Oriented Mini Project+ Comprehensive Viva Voce+ 1 Skill Advanced Course / Soft Skill Course.	21.5
B.Tech VIII Semester	Project Work Seminar		11

Total	2 Basic Science + 2 Humanities and Social Sciences + 12 Professional Core + 1 Professional Core (Interdisciplinary)+ 5 Professional Electives + 4 Open Electives / Job Oriented Electives + Project Work through Summer Internship (6 Months)	1 Engineering Science / Professional Core (Interdisciplinary) Lab + 10 Professional Core Lab + 2 Professional Elective Lab + 2 Skill Oriented Course + 3 Skill Advanced Course / Soft Skill Course + Summer Internship +Industry Oriented Mini Project+ Comprehensive Viva Voce + Basics of Indian Constitution (MC) + Professional Ethics and Human Values (MC) + Essence of Indian Traditional Knowledge (MC) +IPR & Patents (MC)	121

Course wise break-up for Regular Program:

Total Theory Courses - 36 (6 Basic Science + 3 Humanities and Social Sciences + 5 Engineering Science + 12 Professional Core + 1 Professional Core(Interdisciplinary) + 5 Professional Electives + 4 Open Electives / Job Oriented Electives)	36@3credits each	108
Laboratory Courses –17 (2 Basic Science Lab +1 Humanity Science Lab+ 3 Engineering Science Lab + 1 Engineering Science / Professional Core(Interdisciplinary) Lab + 10 Professional Core Lab	17 @ 1.5 credits each	25.5
Summer Internship	1@1.5credit	1.5
Community Service Project	1 @4 credit	04
Seminar	1 @ 1 credit	01
Skill Oriented Courses / Certification Courses-2	2 @2credits each	04
Skill Advanced Courses / Soft Skill Courses / Certification Courses-3	3 @2 credit	06
Project Work	1 @10credits	10
Mandatory Courses	5 @ 0 credits	0
Total Credits		**160**

Course wise break-up for three years lateral entry program:

Total Theory Courses - 26 (2 Basic Science +2 Humanities and Social Sciences + 12 Professional Core + 1 Professional Core(Interdisciplinary) + 5 Professional Electives + 4 Open Electives / Job Oriented Electives)	26 @3credits each	78
Laboratory Courses –11 (1 Engineering Science / Professional Core(Interdisciplinary) Lab + 10 Professional Core Lab)	11 @ 1.5 credits each	16.5
Summer Internship	1 @1.5 credit	1.5
Community Service Project	1 @4 credit	04
Seminar	1 @ 1 credit	01
Skill Oriented Courses / Certification Courses - 2	2 @2credits each	04
Skill Advanced Courses / Soft Skill Courses / Certification Courses – 3	3 @2 credit	06
Project Work	1 @10credits	10
Mandatory Course	4 @ 0 credits	0
Total Credits		**121**

13. EVALUATION METHODOLOGY

The performance of a student in each semester shall be evaluated through Continuous Internal Assessment (CIA) and /or Semester End Examination (SEE) conducted semester wise.

S. No	Course	Marks	Examination and Evaluation		Scheme of Examination
1	Theory	70	Semester end examination of 3 hours duration (External Evaluation)		Shall be evaluated as given in 13.2
		30	Internal Examination		Shall be evaluated as given in 13.3
2	Laboratory	35	Semester end Laboratory Examination for 3 hours duration (External Evaluation)		Shall be evaluated as given in 13.5
		15	10	Day to Day Evaluation for performance in Laboratory experiments	Shall be evaluated as given in 13.6
			05	Practical Test (Internal Evaluation)	
3	i. Summer Internship ii. Community Service Project	100 100	Internal Evaluation Internal Evaluation		The evaluation shall be done by the Department Evaluation Committee (DEC) as given in 13.7
4	Skill Oriented Courses/ Skill Advanced Courses / Soft Skill Courses	30	Internal Evaluation		Shall be evaluated as given in 13.8
		70	End Semester Evaluation		
5	MOOCs	100	Semester End Evaluation		Shall be evaluated as given in 13.9
6	Project Work	60	Internal Evaluation		Continuous evaluation shall be done by the Project Evaluation Committee (PEC) as given in 13.10
		140	Semester End Evaluation		Project Work Viva-Voce Examination shall be conducted by a Committee at the end of the semester as given in 13.11
7	Mandatory Course	-	-		Shall be evaluated as given in 13.12

Theory Course:

The performance of a student in every theory course shall be evaluated for total of 100 marks each, of which the relative weightage for Continuous Internal Assessment and Semester End Examination shall be 30 marks and 70 marks respectively.

External Evaluation for Theory Course - Semester End Examination:

The Semester End Examination (SEE) in each theory subject shall be conducted for 3 hours duration at the end of the semester for 70 marks.

Pattern of the Semester End Examination question paper is as follows:

The semester end examinations will be conducted institute examination section for 70

marks consists of five questions carrying 14 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.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept
30 %	To test the analytical skill of the concept
20 %	To test the application skill of the concept

Internal Evaluation for Theory Course:

a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of

(i) One objective examination (20 multiple choice questions) for 10 marks for a duration of 20 minutes

(ii) One descriptive examination (3 full questions for 10 marks each) which will be reduced to 15 marks for a duration of 90 minutes and

(iii) One assignment for 5 marks.

(iv) All the internal exams shall be conducted as per institute norms from 50% of the syllabi.

b) The total marks secured by the student in each mid-term examination are evaluated for 30 marks. Which consists of marks of objective examination, descriptive examination and assignment shall be submitted to the Institute examination section within one week after completion of the mid-term examinations.

c) Internal marks can be calculated with 80% weightage for better of the two mids and 20% Weightage for other mid exam.

Example:

Mid-1 marks = Marks secured in (objective examination-1+descriptive examination-1 +one assignment-1)

Mid-2 marks = Marks secured in (objective examination-2+descriptive examination-2 +one assignment-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8 + Least of (Mid- 1/Mid-2) marks x 0.2)

If a student scores 23 marks and 24 marks in the first and second mid-term examinations respectively, then Weighted Average Marks = 24 x 0.8 + 23 x 0.2
= 23.8, rounded to 24 Marks.

a) With the above criteria, institute examination section shall be displayed in the concerned college notice boards. If any discrepancy found, it shall be brought to the notice of institute examination section through proper channel within one week with all proofs. Discrepancies brought after the given deadline will not be entertained under any circumstances.

Laboratory Course:

The performance of a student in every practical course shall be evaluated for total of 50 marks each, of which the relative weightage for Continuous Internal Assessment and Semester End Examination shall be 15 marks and 35 marks respectively.

External Evaluation for Practical Course:

Out of **35** marks **30** marks are allocated for experiment (procedure for conducting the

experiment carries 15 marks. Readings, calculations & results-10 marks and Records – 5 marks) and **5** marks for viva-voce examination.

Each Semester External Lab Examination shall be evaluated by an Internal Examiner along with an External Examiner appointed by the Principal.

A student has to secure not less than a minimum of 35% of marks (17 marks) exclusively at the Semester End Examinations in each of the practical subjects in which the candidate had appeared.A candidate shall be declared to have passed in individual lab course if he secures a minimum of 40% aggregate marks (20 marks out of 50 marks) (Internal & Semester External Examination marks put together).

Internal Evaluation for Laboratory Course:

For practical subjects there shall be a Continuous Internal Evaluation during the semester for 15 internal marks. Out of the 15 marks for internal evaluation, day-to-day assessment in the laboratory shall be evaluated for 10 marks and internal practical examination shall be evaluated for 05 marks conducted by the laboratory teacher concerned.

Summer Internship and Community Service Project

Summer Internship each of 8 weeks / 2 Months duration at the end of II B.Tech (i.e., IV Semester) are Mandatory with 1.5 credits.

The Summer Internship after II year shall be in the form of community service project as mentioned below,

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.
- Community Service Project involves students in community development and service
- activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Objective:

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On Job Training, whenever there is an exigency when students cannot pursue their Summer Internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them.
- To help students to realize the stark realities of the society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability.
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.

- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project:

- Every student should put in a minimum of **180 hours** for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. Of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc.
- A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.
- The log book has to be countersigned by the concerned mentor/faculty in-charge.
- Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programmes of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project report should be submitted by each student. An internal Viva shall also be
- conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Summer Internship/apprentice/ on the job training.

Procedure:

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one–First; the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers; rather, it could b e another primary source of data.
- Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
- Agriculture, Health, Marketing and Cooperation, Animal Husbandry, Horticulture, Fisheries, Sericulture, Revenue and Survey, Natural Disaster Management, Irrigation, Law & Order, Excise and Prohibition, Mines and Geology, Energy, Internet, Free Electricity, Drinking Water

Suggestive List of Programmes under Community Service Project:

The following the recommended list of projects for engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The

mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

For Engineering Students

- Water facilities and drinking water availability
- Health and hygiene
- Stress levels and coping mechanisms
- Health intervention programmes
- Horticulture
- Herbal plants
- Botanical survey
- 8Zoological survey
- Marine products
- Aqua culture
- Inland fisheries
- Animals and species
- Nutrition
- Traditional health care methods
- Food habits
- Air pollution
- Water pollution
- Plantation
- Soil protection
- Renewable energy
- Plant diseases
- Yoga awareness and practice
- Health care awareness programmes and their impact
- Use of chemicals on fruits and vegetables
- Organic farming
- Crop rotation
- Floury culture
- Access to safe drinking water
- Geological survey
- Sericulture
- Study of species
- Food adulteration
- Incidence of Diabetes and other chronic diseases
- Human genetics
- Blood groups and blood levels
- Internet Usage in Villages

- Android Phone usage by different people
- Utilisation of free electricity to farmers and related issues
- Gender ration in schooling level- observation.

Complimenting the community service project, the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programmes are;

Programmes for School Children:

1. Reading Skill Programme (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Programme on Socially relevant themes.

Programmes for Women Empowerment:

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps:

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programmes on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days.

Programmes for Youth Empowerment:

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programmes:

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programmes in consonance with the Govt. Departments like

Agriculture, Health, Marketing and Cooperation, Animal Husbandry, Horticulture, Fisheries, Sericulture, Revenue and Survey, Natural Disaster Management, Irrigation, Law & Order, Excise and Prohibition, Mines and Geology, Energy, Natural Disaster Management, Irrigation

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also with the Governmental Departments. If the programme is rolled out, the
- District Administration could be roped in for the successful deployment of the programme.
- An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity Duration: 8 weeks

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns (Two Weeks)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Four Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks work to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher- mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily log-book need to be maintained by the student's batch, which should be countersigned by the governmental agency representative and the teacher mentor, who is required to periodically visit the students and guide them.

Evaluation of Summer Internship

Evaluation of the Summer Internship / Community Service Project shall be through the departmental committee. A student will be required to submit a detailed project report to the concerned department and appear for an oral presentation before the departmental committee.

- Day to day assessment log book - 20 Marks
- Summer Internship / Project Report - 40Marks
- Presentation and Viva-Voce - 40 Marks

A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

Skill Oriented / Skill Advanced / Soft Skill Courses:

- For skill oriented/skill advanced /Soft skill Courses, one theory and 2 practical hours may be allotted or two theory hours may be adopted as per the decision of concerned BoS.
- From the five skill courses two shall be skill-oriented programs related to the domain and shall be completed in 2nd year. The remaining 3 skill courses, one shall be necessarily a soft skill course and the remaining 2 skill-advanced courses can be in the same domain or Job oriented skills which can be inter disciplinary.

Skill, Job Oriented Tracks for Mechanical Engineering

1. **Design/Analysis/Simulation**- CAD, UGNX, Solid Works, ANSYS, FEA, CATIA, CREO etc
2. **Production/Manufacturing-** CAM, Piping, A/QC, CNC
3. **Thermal/Computational-** Computational Fluid Dynamics, MATLAB etc
4. **Service Sector-** Industrial Safety and Management, Operation Research, Oil & Gas safety.

Skill, Job Oriented Tracks for Civil Engineering

1. **Structural Design**- AutoCAD 2D 3D, ANSYS Civil, ETABS, PRO Steel, etc.
2. **Building Design-** Revit Architecture, ANSYS Civil, STAAD.PRO, AECOsim etc.
3. **Land survey and Transportation Design-** Surveying, 2D Drafting, 3D Modeling, Analysis, Road & Transport Design etc.

Skill, Job Oriented Tracks for Computer Science &Engineering

1. **Animation course**- VFX, CARTOONING, ANIMATION DESIGN etc
2. **Mobile app development-** App design for IOS and Android etc.
3. **Data Science-** Natural language processing, sentiment analysis, fore casting, regression models etc
4. **Python programming-** Deep learning, IOT natural language processing, Game Graphics Programming etc..

- A pool of interdisciplinary job-oriented skill courses shall be prepared byjoint Board of studies and the syllabus along with the pre requisites shall be prepared for each of the requirements of laboratory infrastructure. The list of such courses shall be included in the curriculum of each branch of Engineering, so as to enable the student to choose from the list.
- The student shall be given an option to choose between the skill advanced courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies.

- The Board of studies of the concerned discipline of Engineering shall review the skill advanced courses being offered by eligible external agencies and prepare a fresh list every
- year incorporating latest skills based on industrial demand.
- The credits assigned to the skill advanced course shall be awarded to the student upon producing the certificate of skill from the agency/professional bodies as approved by the Board of studies.
- If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the concerned board of studies, the student is deemed to have fulfilled the attendance requirement of the course and acquire the credits assigned to the course.

Evaluation Procedure

Evaluation of the Skill oriented / Skill advanced / Soft skills / Certificate course shall be through the departmental committee. A student will be registered for the courses being offered by the department or interdisciplinary. The evaluation procedure is,

Internal Examination - 30 Marks (CIA Mode) External Examination - 70 Marks (SEE Mode)

A student will be registered for the course being offered by industries / Professional bodies / APSSDC or any other accredited bodies. The Merit / Pass certificate obtained from the course are considered for **2** credits.

Massive Open Online Courses (MOOCs):

Meeting with the global requirements, to inculcate the habit of self learning and incompliance with UGC guidelines, MOOCs (Massive Open Online Courses) have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list of courses from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD.
- The details of MOOCs shall be displayed in Grade card of a student, provided student submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than **8**weeks.

Two credits will be awarded upon successful completion of each MOOC courses having

minimum of 8 weeks duration.

Internal Evaluation for Design/ Drawing Courses:

For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, production drawing and building drawing) the internal marks distribution shall be 15 marks for day-to-day performance and 15 marks for Mid-Term Examinations.

External Evaluation for Design/ Drawing Courses:

The Semester End Examination in Design / Drawing Course shall be conducted for 3 hours duration at the end of the semester for 70 marks.

Pattern of the Semester End Examination question paper is as follows:

- A total of two Sections (Section-I & Section-II)
- Section-I contains five two mark questions. One question from each unit and a student has to be answered all the five questions compulsory (5x2=10 Marks)
- Section-II contains ten questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total five units. (5x12=60 Marks)

A student has to secure not less than a minimum of 40% of marks (24 marks) exclusively at the Semester End Examinations in each of the theory subjects in which the candidate has appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

Project Work

Internal Evaluation for Project Work and Full Semester Summer Internship at Industry:

The object of Project Work and Summer Internship is to enable the student to take up investigative study in the broad field of his branch of Engineering/Interdisciplinary, either fully theoretical/practical or involving both theoretical and practical work to be assigned by the department on an individual basis or three/four students in a group under the guidance of a supervisor/ guide. This is expected to provide a good initiation for the student(s) in R&D work.

The total internal weightage for Project work, Summer Internship course is 60 marks and will be evaluated as follows,

- Submission of Abstract (Identification of Problem & Literature Survey)Profile and Abstract –Student has to submit the industry profile and abstract of the project within four weeks from date of commencement of Summer Internship through mail or post – 15 Marks
- Review-1 – at 6th week from date of commencement of Summer Internship - 10Marks
- Review-2 – at 12th week from date of commencement of Summer Internship - 15 Marks
- Review-3 – at 18th week from date of commencement of Summer Internship - 20 Marks

External Evaluation for Project Work and Full Semester Summer Internship at Industry:

The external evaluation based on the report submitted and viva-voce exam for 140 marks shall be conducted by a Project Review Committee (PRC). The committee comprises of an External Examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor. The evaluation of project work shall be based on the report submitted and a viva-voce exam for 140 marks by a committee comprising the Head of the

Department, the project supervisor and an external examiner. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

Project Work through full Semester Summer Internship in the Industry carry 12 credits. During Full semester Summer Internship, student has to spend one full semester (6 Months) in an identified industry /firm / organization and has to carry out the Summer Internship as per the stipulated guidelines of that industry / firm / organization and the institute.

Distribution of Project Work &Full Semester Summer Internship Marks

Summer Internship Certificate is Mandatory

Project Report	- 30 Marks
Seminar on Summer Internship	- 50 Marks
Project Viva Voce	- 60 Marks

Mandatory Courses:

Mandatory courses carry **"ZERO"** credits. There shall be **NO Semester-end** examination. However, ATTENDANCE in Mandatory courses shall be considered while calculating aggregate attendance in a semester. The internal examination shall be conducted and evaluated similar to the THEORY courses for 50 Marks. The student shall be declared to have passed the mandatory courses only when Student secures **40% marks in the internal examination.** If the student FAILS, a re-examination shall be conducted for FAILED candidates in the Consecutive semester. The performance of the student shall be indicated in the grade sheets **"COMPLETED" (or) "NOT COMPLETED"** as given in 12.1. The student should pass all the mandatory courses, for the award of B.Tech degree.

For the Mandatory Courses, if the student obtained 40% or more marks, then his performance shall be indicated as COMPLETED, otherwise the performance shall be indicated as NOT COMPLETED in the grade sheet.

14. GRADING PROCEDURE

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	A+ (Outstanding)	10
80 and less than 90%	A (Excellent)	9
70 and less than 80%	B (Very Good)	8
60 and less than 70%	C (Good)	7
50 and less than 60%	D (Fair)	6
40 and less than 50%	E (Pass)	5
Absent	AB	0
For Mandatory & Audit Courses		
Greater than or equal to 40%	Completed	-
Below 40%	Not Completed	-

Grades will be awarded to indicate the performance of students in each theory subject, laboratory / practical's, Skill oriented Course / Skill Advanced course / Soft Skill course, Summer Internships, Project Work and Full Semester Summer Internship in Industry (6 Months). Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 11 above, a

corresponding letter grade shall be given.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 for theory & practical shall be followed as mentioned in the table.

A student who has 'failed' in any subject 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.

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

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.

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

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

- A student to obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered.
- For Mandatory courses "Completed" or "Not Completed shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA. **Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):**

i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \sum_{i=1}^{n}(C_i\, G_i)/\sum_{i=1}^{n} C_i$$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

ii. The Cumulative Grade Point Average (CGPA) will be computed in the manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \Sigma\,(C_{ui} \times S_i)/\,\Sigma\, C_{ui}$$

Where, "S_i" is the SGPA of the i^{th} semester and C_{ui} is the total number of credits in that semester.

iii. Both SGPA and CGPA shall be rounded off to two decimal points and reported in the transcripts.

iv. While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters A+, A, B, C, D and E.

Example: Computation of SGPA and CGPA Illustration for SGPA

Course	Credit (C_i)	Grade Letter	Grade Point(G_i)	Credit Point ($C_i x G_i$)
Course-I	3	A+	10	3x10=30
Course-II	3	A	9	3x9=27
Course-III	3	B	8	3x8=24
Course-IV	3	D	6	3x6=18
Course-V	2	B	8	2x8=16
Course-VI	1	C	7	1x7=7
	15			122

Thus SGPA = $\frac{122}{15}$ **=8.13**

Illustration for CGPA

I Semester	II Semester	III Semester	IV Semester
Credit: 19 SGPA: 8.13	Credit: 19.5 SGPA: 6.9	Credit: 21.5 SGPA: 7.3	Credit: 21.5 SGPA: 6.8
V Semester	**VISemester**	**VII Semester**	**VIII Semester**
Credit: 22 SGPA: 8.2	Credit: 21.5 SGPA: 7.4	Credit: 21 SGPA: 7.2	Credit: 14 SGPA: 7.8

Thus, CGPA = $\frac{(19\times8.13)+(19.5\times6.9)+(21.5\times7.3)+(21.5\times6.8)+(22\times8.2)+(21.5\times7.4)+(21\times7.2)+(14.\times7.8)}{160}$ **=7.45**

15. AWARD OF CLASS

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

CGPA ≥ 7.5	CGPA ≥ 6.5 and < 7.5	CGPA ≥ 5.0 and < 6.5	CGPA ≥ 4.0 and < 5.0	CGPA < 4.0
First Class with Distinction	**First Class**	**Second Class**	**Pass Class**	**Fail**

A student with final CGPA is < 4.00 will not be eligible for the Award of the Degree.

16. CONDUCT OF SEMESTER END EXAMINATIONS AND EVALUATION

Semester end examination shall be conducted by the Controller of Examinations (CoE) by inviting Question Papers from the External Examiners

Question papers may be moderated for the coverage of syllabus, pattern of questions by a Semester End Examination Committee chaired by CoE and senior subject expert before the commencement of semester end examinations. Internal Examiner shall prepare a detailed scheme of valuation.

The answer papers of semester end examination should be evaluated by the examiner immediately after the completion of exam and the award sheet should be submitted to CoE in a sealed cover.

CoE shall invite required number of external examiners to evaluate all the end-semester

answer scripts on a prescribed date(s). Practical laboratory exams are conducted involving external examiners.

Examinations Control Committee shall consolidate the marks awarded by the examiners and award grades.

17. SUPPLEMENTARY EXAMINATIONS

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such

students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.

18. ATTENDANCE REQUIREMENTS AND DETENTION POLICY

A candidate shall put in a minimum required attendance of 75 % in that semester. Otherwise, The student shall be declared detained and has to repeat semester. For cases of medical issues, deficiency of attendance in a semester to the extent of 10% may be condoned by the College Academic Committee (CAC) on the recommendation of Head of the department if their attendance is between 75% and 65% in a semester, subjected to submission of medical certificates and other needful documents to the concerned departments. The condonation is permitted maximum of two times during the entire course of study.

A prescribed fee shall be payable towards condonation of shortage of attendance. A student shall not be promoted to the next semester unless student satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, student shall not be eligible for readmission into the same class.

Any student against whom any disciplinary action by the institute is pending shall not be permitted to attend any SEE in that semester.

19. PROMOTION POLICIES

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned for promotion to higher classes

a) A student shall be promoted from first year to second year if he fulfills the minimum attendance requirement as per University norm.
b) A student will be promoted from II to III year if he fulfills the academic requirement of 40% of credits up to either II year I-Semester or II year II-Semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in II year II semester.
c) A student shall be promoted from III year to IV year if he fulfills the academic requirements of 40% of the credits up to either III year I semester or III year II semester from all the examinations, whether or not the candidate takes the examinations and secures prescribed minimum attendance in III year II semester.

A student shall register and put-up minimum attendance in all 160 credits and earns all 160 credits. Marks obtained in all160 credits shall be considered for the calculation of aggregate percentage of marks obtained. In the course structure within eight academic

years from the year of their admission. Coure and their admission shall stand cancelled A lateral entry student shall register and put-up minimum attendance in all 121credits and earn all the 121credits. Marks obtained in all 121credits shall be considered for the calculation of aggregate percentage of marks obtained. If the student did not complete the

course within six academic years from the year of admission, their seat shall surrender in B.Tech. Course and their admission shall stands cancelled.

20. MAJOR DEGREE WITH A MINOR:

1. Students, who are desirous of pursuing their special interest areas other than the chosen discipline of Engineering, may opt for additional courses in minor specialization groups offered by a department other than their parent department. For example, If Mechanical Engineering student selects subjects from Civil Engineering under this scheme; student will get Major degree of Mechanical Engineering with minor degree of Civil Engineering. Student can opt the Industry relevant tracks of any branch to obtain the Major degree with Minor, for example, a B.Tech Mechanical Engineering student can opt for the industry relevant tracks like Data Mining track, IOT track, Machine learning track etc.
2. A student shall be permitted to register for Minors program at the beginning of 4^{th} semester provided that the student must have acquired 7.5 SGPA (Semester Grade point average) upto the end of 2^{nd} semester without any history of backlogs. It is expected that the 3^{rd}semester results may be announced after the commencement of the 4^{th}semester, if a student fails to acquire 7.5 SGPA upto 3^{rd}semester or failed in any course, his registration for Minors program shall stand cancelled. An SGPA of 7.5 has to be maintained in the subsequent semesters without any backlog in order to keep the Minor registration active.
3. Minor degree will cumulatively require additional **20** credits in the specified area in addition to the credits essential for obtaining the undergraduate degree in Major discipline (i.e., 160 credits).
4. The BoS concerned shall identify as many tracks as possible in the areas of emerging technologies and industrial relevance / Demand, for example the minor tracks can be the fundamental courses in CSE, CSE(AI), CSE(DS), ECE, EEE, CE, ME etc. or industry tracks such as Artificial Intelligence (AI), Machine Learning (ML), Data Science (DS), Robotics, Electric vehicles, VLSI etc. The list of disciplines/ branches eligible to opt for an industry relevant minor specialisation shall be clearly mentioned in the respective BOS.
5. Student must complete 4 courses each of 4 credits by choosing from six courses mentioned in the course structure of the department.
6. In addition to acquiring 16 credits from courses, students shall have to pursue at least 2 courses for two credits each through MOOCS/NPTEL. The concerned BOS shall list the MOOCS/NPTEL courses to be pursued by the student. Attendance will not be monitored for this MOOCS course. A student has to acquire a certificate of MOOCS/NPTEL course from the agencies approved by the BOS in order to earn the required credits, and that should be evaluated by Department committee for the credits.

7. Student can opt the Industry relevant minor specializations as approved by the concerned departmental BoS or student can opt the courses from skill development corporation (APSSDC) or student can opt the courses from an external agency recommended and approved by concerned BOS and should produce course completion certificate. The Board of studies of the concerned discipline of Engineering shall review such courses being offered by eligible external agencies and prepare a fresh list every year incorporating latest skill based on industrial demand.
8. A committee should be formed at the level of College/Universities/department to evaluate the grades/ marks given by external agencies to a student which are approved by concerned BoS. Upon completion of courses the departmental committee should convert the obtained grades/marks to the maximum marks assigned to that course. The controller of examinations can take a decision on such conversions and may give appropriate grades.
9. If a student prefers to take test from an external agency, student must take a comprehensive viva-voce conducted at University level and the marks assigned for the Viva-voce will be assigned to that course. However, if students wish to take the courses from the department, student should take examination conducted by the University only. Also, if a student completes courses from external agency without taking test are also eligible to get minor degree after fulfilling all the formalities assigned by the departmental committee.
10. It is the responsibility of the student to acquire prerequisite knowledge of the minor program domain before taking the course. The University/Institution BoS concerned shall prepare the list of subjects and pre requisites for each minor track.
11. If a student drops (or terminated) from the Minor program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or "Pass (P)" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Minors will be shown in the transcript. None of the courses done under the dropped Minor will be shown in the transcript.
12. In case a student fails to meet the CGPA requirement for B.Tech Degree with Minor at any point after registration, student will be dropped from the list of students eligible for Degree with Minors and they will receive B. Tech Degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

21. HONORS PROGRAM:

1. Students from same department are eligible for Honour program.
2. A student shall be permitted to register for Honours program at the beginning of 4th semester provided that the student must have acquired 7.5 SGPA upto the end of 2nd semester without any history of backlogs. It is expected that the 3rd semester results may be announced after the commencement of the 4th semester, if a student fails to acquire 7.5 SGPA upto 3rdsemester or failed in any course, his/her registration for Honours program shall stand cancelled.
3. Students can select advanced subjects from their respective branch in which they are

pursuing the degree. E.g. If Mechanical Engineering student completes the selected advanced subjects from the same branch under this scheme, student will be awarded B.Tech (Honours) in Mechanical Engineering.

4. Student must complete 4 courses @ 4 credits from each pool and 2 MOOC/NPTEL courses @ 2 credits (Total 20 credits)
5. The student who has registered for Honours shall choose one course from each pool. There shall be 4 pools with 5 courses each as mentioned in course structure of Honours program. The board of studies concerned will decide the courses under each pool for Honours programs.
6. For Honours program, all the courses offered in each pool shall be domain specific courses and advanced courses.
7. In addition to the 4 courses chosen, one from each pool, students shall have to pursue at least 2 courses through MOOCS/NPTEL. The concerned BoS shall list the MOOCS/NPTEL courses to be pursued by the student. Attendance will not be monitored for this MOOCS course. Student has to acquire a certificate of MOOCS/NPTEL course from the agencies approved by the BoS in order to earn 2 credits. BoS concerned shall prepare the list of advanced courses for each pool taking into consideration the core courses offered in the curriculum. If a course comes with a lab component, that component has to be cleared separately. The concerned BoS shall provide pre requisites to take the specific course by the student. It is the responsibility of the student to acquire/complete prerequisite before taking the course.
8. If a student drops (or terminated) from the Honours program, they cannot convert the earned credits into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or "Pass" grade and also choose to omit the mention of the course as for the following: All the courses done under the dropped Honours will be shown in the transcript. None of the courses done under the dropped Honours will be shown in the transcript.
9. In case a student fails to meet the CGPA requirement for Degree with Honours at any point after registration, student will be dropped from the list of students eligible for Degree with Honours and they will receive B.Tech Degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

22. GRADUATION REQUIREMENTS

The following academic requirements shall be met for the award of the B.Tech degree.

- Student shall register and acquire minimum attendance in all courses and secure 160 credits for regular program and 121 credits for lateral entry program.
- A student of a regular program, who fails to earn 160 credits within eight consecutive academic years from the year of their admission with a minimum CGPA of 4.0, is not eligible to get degree.
- A student of a lateral entry program, who fails to earn 121 credits within six consecutive academic years from the year of their admission with a minimum CGPA of 4.0, shall not get their degree and the admission stands cancelled.

23. REVALUATION

A student, who seeks the re-evaluation of the answer script, is directed to apply for the photocopy of their semester examination answer paper(s) in the theory course(s), within 5 working days from the declaration of results in the prescribed format with prescribed fee to the Controller of Examinations through the Head of the department. On receiving the photocopy, the student can consult with a competent member of faculty and seek the opinion for revaluation. Based on the recommendations, the student can register for the revaluation with prescribed fee. The Controller of Examinations shall arrange for the revaluation and declare the results. If COE found the difference between the evaluation and reevaluation is more than 10 marks, then the COE shall arrange another evaluation. Revaluation is not permitted to the courses other than theory courses.

24. TERMINATION FROM THE PROGRAMME

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

- The student fails to satisfy the requirements of the program within the stipulated maximum period for that program.
- A student shall not be permitted to study any semester more than three times during the entire Program of study.
- The student fails to satisfy the norms of discipline specified by the institute from time to time.

25. WITH-HOLDING OF RESULTS

If the candidate has any dues not paid to the institute or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld and student will not be allowed/ promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

26. TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

A candidate is normally not permitted to break the study. However, if a candidate intends to temporarily discontinue the program in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the program after the break from the commencement of the respective semester as and when it is offered , she/he shall apply to the Principal in advance. Such application shall be submitted before the of the semester in question commencement and forwarded through the Head documents and endorsement of his / her parent / guardian.

a) The institute shall examine such type of applications, and if it finds the case to be genuine, it may permit the student to rejoin. Such permissions are accorded only to those who do not have any outstanding dues like tuition fee etc.

b) The total period for completion of the program reckoned from the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period of 8 years for regular and 6 years for lateral entry students. The maximum period includes the break period.

27. STUDENT TRANSFERS

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh, University and Institute from time to time.

28. GRADUATION DAY

The institute shall have its own annual Graduation Day for the award of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

29. CONDUCT AND DISCIPLINE

- Students shall have a good conduct within and outside the premises of the Institute in a decent and dignified manner befitting the students of Srinivasa Institute of Engineering & Technology.
- As per the order of the Honorable Supreme Court of India, ragging in any form is considered a criminal offence and is totally banned. Any form of ragging will be severely dealt with the following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.

(i) Lack of courtesy and decorum, indecent behavior anywhere within or outside the college campus.

(ii) Damage of college property or Possession, consumption and distribution of Alcoholic drinks or any kind of narcotics to fellow students / citizens.

- Mutilation or unauthorized possession of library books.
- Noisy and unruly behavior, disturbing studies of fellow students.
- Hacking in computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber crime etc.
- Usage of camera /cell phones in the campus.
- Plagiarism of any nature.
- Any other act of gross indiscipline as decided by the college academic council from time to time.
- Commensurate with the severity of offense, the punishment may be reprimand, fine, expulsion from the institute/ hostel, debarring from examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.
- For an offence committed in (i) the hostel (ii) department or in a class room and (iii) Else where, the chief Warden, the concern Head of the Department and the Principal respectively, shall have the authority to reprimand or impose fine.
- Cases of adoption of unfair means and/ or any malpractice in an examination shall be reported to the principal for taking appropriate corrective action.
- All cases of serious offence, possibly requiring punishment other than reprimand,

shall be reported to the Academic council of the college.

- The Institute Level Standing Disciplinary Action Committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.
- The Principal shall deal with any problem, which is not covered under these rules and regulations.

30. GRIEVANCE REDRESSAL COMMITTEE

Grievance and Redressal Committee constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. All the students must abide by the code and conduct rules prescribed by the college from time to time.

31. TRANSITORY REGULATIONS

Required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such courses in the earlier semesters she/he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

c) Four Year B.Tech Regular course:

A student who is under Jawaharlal Nehru Technological University Kakinada (JNTUK) curriculum and detained due to shortage of attendance at the end of the first semester shall join the autonomous batch of first semester. Such students shall study all the courses prescribed for the batch in which the student joined and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations. A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

d) Three Year B.Tech program under Lateral Entry Scheme:

A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of third semester. Such students shall study all the courses prescribed for the batch in

which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

e) Transfer candidates (from non-autonomous college affiliated to JNTUK):

A student who is following JNTUK curriculum, transferred from other college to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in their place as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

f) Transfer candidates (from an autonomous college affiliated to JNTUK):

A student who has secured the required credits up to previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this institute. A student who is transferred from the other autonomous colleges to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after

transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

32. REVISION OF REGULATIONS AND CURRICULUM

The Institute from time to time may revise, amend or change the regulations, scheme of examinations and syllabi if found necessary and on approval by the Academic Council and the Governing Body shall come into force and shall be binding on the students, faculty, staff, all authorities of the Institute and others concerned.

33. B.TECH - PROGRAM OUTCOMES (POS)

PO-1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems (**Engineering Knowledge**).

PO-2 : Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences **(Problem Analysis).**

PO-3 : 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 **(Design/Development of Solutions).**

PO-4 : 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 **(Conduct Investigations of Complex Problems).**

PO-5 : 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 **(Modern Tool Usage).**

PO-6 : 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 **(The Engineer and Society).**

PO-7 : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development **(Environment and Sustainability).**

PO-8 : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice **(Ethics).**

PO-9 : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings **(Individual and Team Work).**

PO-10 : 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 **(Communication).**

PO-11 : Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work,

as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12 : 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 **(Life-long learning).**

34. 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 but only after concurrence from the respective state Government as well as UGC. The State Government has its own powers to grant autonomy directly to Govt. and Govt. aided Colleges.

2 Shall Srinivasa Institute of Engineering & Technology award its own Degree?

No. Degree will be awarded by Jawaharlal Nehru Technological University Kakinada, with a mention of the name Srinivasa Institute of Engineering & Technology on the Degree Certificate.

3 What is the difference between a Deemed to be University and an Autonomy College? A Deemed to be University is fully autonomous to the extent of awarding its own Degree. A Deemed to be 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. The Govt. of Andhra Pradesh mentions autonomous status during the First Year admission procedure. Foreign Universities and Indian Industries will know our status through our 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 our continued past efforts on academic performances, our 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, which will keep a watch on the academics and keep its reports and recommendations every year. In addition the highest academic council also supervises the academic matters. 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 Srinivasa Institute of Engineering & Technology as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No. Srinivasa Institute of Engineering & Technology has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural on co-curricular organized by the University the students shall qualify.

8 Can Srinivasa Institute of Engineering & Technology have its own Convocation?

No. Since the University awards the Degree the Convocation will be that of the University, but there will be Graduation Day at Srinivasa Institute of Engineering & Technology.

9 Can Srinivasa Institute of Engineering& Technology give a provisional degree certificate?

Since the examinations are conducted by Srinivasa Institute of Engineering & Technology and the results are also declared Srinivasa Institute of Engineering & Technology, the college sends a list of successful candidates with their final Grades and Grade Point Averages including CGPA 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. Also the autonomous status is more responsive to the needs of the industry. As a result therefore, 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 60 % external and 40% internal. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12 Is it possible to have complete Internal Assessment for Theory or Practicals?

Yes indeed. We define our own system. We have the freedom to keep the proportion of external and internal assessment component to choose.

13 Why Credit based Grade System?

The credit based grade system is an accepted standard of academic performance the world over in all Universities. The acceptability of our graduates in the world market shall improve.

14 What exactly is a Credit based Grade System?

The credit based grade system defines a much better statistical way of judging the academic performance. One Lecture Hour per week of Teaching Learning process is assigned One Credit. One hour of laboratory work is assigned half credit. Letter Grades like S,A+,A, B+,B,C,F etc. are assigned for a Range of Marks. (e.g. 90% and above is

S, 80 to 89 % could be A+ etc.) in Absolute Grading System while grades are awarded by statistical analysis in relative grading system. We thus dispense with sharp numerical boundaries. Secondly, the grades are associated with defined Grade Points in the scale of 1 to 10. Weighted Average of Grade Points is also defined Grade Points are weighted by Credits and averaged over total credits in a Semester. This process is repeated for all Semesters and a CGPA defines the Final Academic Performance

15 What are the norms for the number of Credits per Semester and total number of Credits for UG/PG programme?

These norms are usually defined by UGC or AICTE. Usually around 28 Credits per semester is the accepted norm.

16 What is a Semester Grade Point Average (SGPA)?

The performance of a student in a semester is indicated by a number called SGPA. The SGPA is the weighted average of the grade points obtained in all the courses registered by the student during the semester.

$$SGPA = \sum_{n}(C_i\, G_i)/\sum_{n} C_i$$

Where, C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course and"i "represent the course number in which a student registered in the concerned semester. SGPA is rounded to two decimal places.

17 What is a Cumulative Grade Point Average (CGPA)?

An up-to-date assessment of overall performance of a student from the time of his first registration is obtained by calculating a number called CGPA, which is weighted average of the grade points obtained in all the courses registered by the students since he entered the Institute.

$$CGPA = \Sigma\,(C_{ui} \times S_i)/\,\Sigma\, C_{ui}$$

Where, S_i is the SGPA of the i^{th} semester and C_{ui} is the total number of credits upto the that semester CGPA is rounded to two decimal places.

18 Is there any Software available for calculating Grade point averages and converting the same into Grades?

Yes, the institute has its own MIS software for calculation of SGPA, CGPA, etc.

19 Will the teacher be required to do the job of calculating SGPAs etc. and convert the same into Grades?

No. The teacher has to give marks obtained out of whatever maximum marks as it is. Rest is all done by the computer.

20 Will there be any Revaluation or Re-Examination System?

No. There will double valuation of answer scripts. There will be a makeup Examination after a reasonable preparation time after the End Semester Examination for specific cases mentioned in the Rules and Regulations. In addition to this, there shall be a 'summer term' (compressed term) followed by the End Semester Exam, to save the precious time of students.

21 How fast Syllabi can be and should be changed?

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

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

No. The CGPA will reflect the average performance of all the semester taken together.

23 What are Statutory Academic Bodies?

Governing Body, Academic Council, Examination Committee and Board of Studies are the different statutory bodies. The participation of external members in everybody is compulsory. The institute has nominated professors from IIT, NIT, University (the officers of the rank of Pro-vice Chancellor, Deans and Controller of Examinations) and also the reputed industrialist and industry experts on these bodies.

24 Who takes Decisions on Academic matters?

The Governing Body of institute is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like Boards of Studies. Decisions taken at the Board of Studies level are to be ratified at the Academic Council and Governing Body.

25 What is the role of Examination committee?

The Examinations Committee is responsible for the smooth conduct of internal, End Semester and makeup Examinations. All matters involving the conduct of examinations, spot valuations, tabulations, preparation of Grade Cards etc, fall within the duties of the Examination Committee.

26 Is there any mechanism for Grievance Redressal?

The institute has grievance redressal committee, headed by Dean - Student affairs and Dean - IQAC.

27 How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulation

28 Who declares the result?

The result declaration process is also defined. After tabulation work wherein the SGPA, CGPA and final Grades are ready, 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 Examinations and Result Committee for its approval. The result is then declared on the institute notice boards as well put on the web site and Students Corner. It is eventually sent to the University.

29 Who will keep the Student Academic Records, University or Srinivasa Instituteof Engineering& Technology?

It is the responsibility of the Dean, Academics of the Autonomous College to keep and preserve all the records.

30 What is our relationship with the JNT University?

We remain an affiliated college of the JNT University. The University has the right to nominate its members on the academic bodies of the college.

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

Yes, the approval from the university is required.

32 Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes also enjoying autonomous status.

35. MALPRACTICES RULES

DISCIPLINARY ACTION FOR MISCONDUCT IN DURING EXAMINATIONS

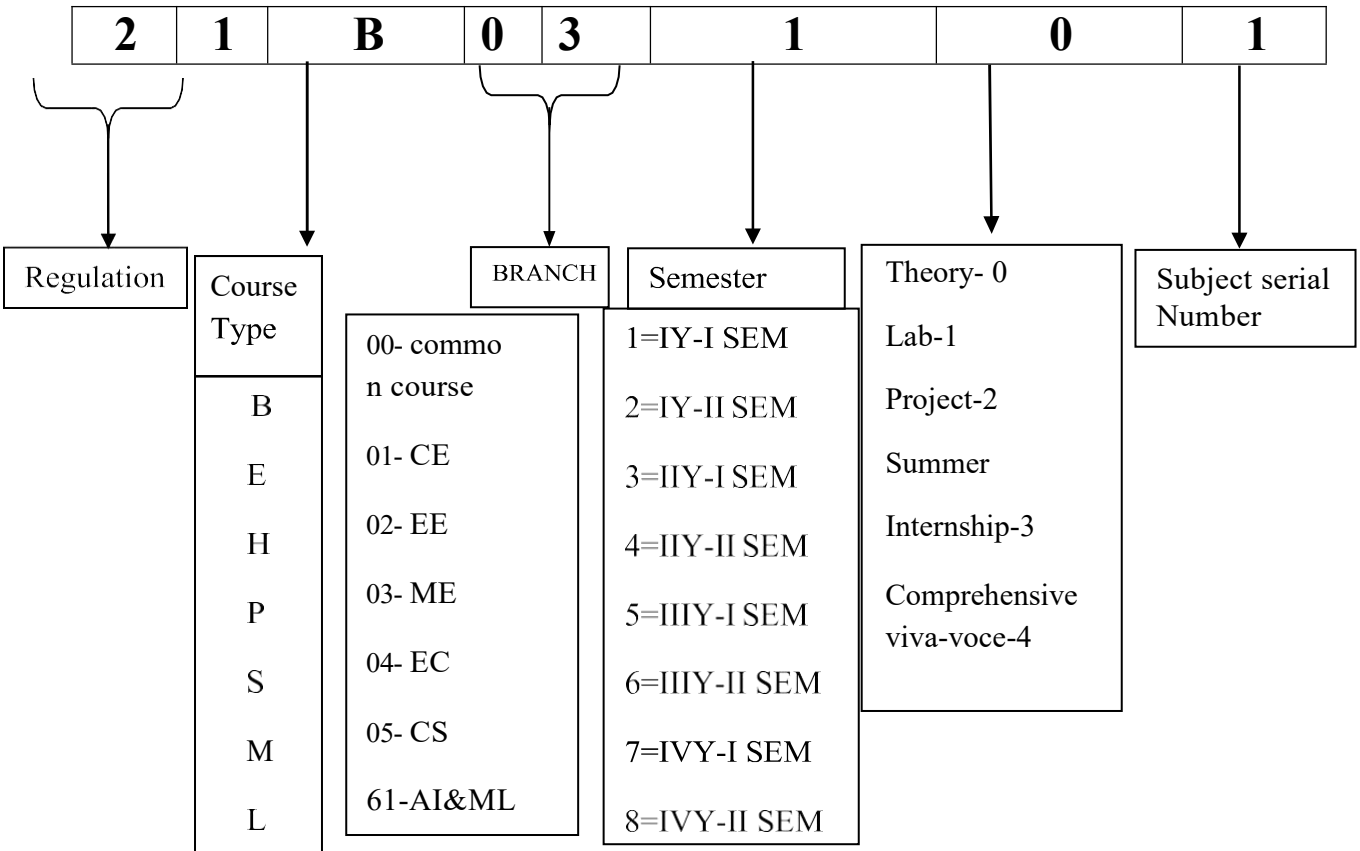
S.No	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (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 Controller of Examinations.

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. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's 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 semester end 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 semester end 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 Controller of Examinations /Additional Controller of Examinations/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 COE 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 COE 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 toor destruction of property in the examination hall or any part of the Institute premises 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.	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 give up 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 semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that 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 gives up 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 gives up 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	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 Director/Principal for further action toawards suitable punishment.	

COURSE CODING STRACTURE



B	BASIC SCIENCES
E	ENGNEERING SCIENCES
H	HUMANITIES & SOCIAL SCIENCES
P	PROFFESSIONAL CORE
S	SKILL ORIENTED COURSE
M	MANDATARY COURSE
L	PROFESSIONAL ELECTIVE
N	OPEN ELECTIVE
U	HONOUR
R	MINOR

COURSE STRUCTURE

DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE
B.Tech 2021-2022

I B.Tech I Semester – Civil Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	21B00101	Mathematics-I	4	1	0	30	70	100	3
2	21B00102	Engineering Chemistry	3	0	0	30	70	100	3
3	21H00101	Communicative English	3	0	0	30	70	100	3
4	21E01101	Building Materials and Construction	3	1	0	30	70	100	3
5	21E03101	Engineering Drawing	1	0	3	30	70	100	3
6	21H00111	Communicative English Laboratory	0	0	3	15	35	50	1.5
7	21B00112	Engineering Chemistry Laboratory	0	0	3	15	35	50	1.5
8	21E01111	Basics of Civil Engineering Workshop Laboratory	0	0	3	15	35	50	1.5
		Total	**14**	**2**	**12**	**195**	**455**	**650**	**19.5**

I B.Tech II Semester – Civil Engineering

S.No	Course Code	Course Title	Hours per Week			Marks			Credits
			L	T	P	IM	EM	T	
1	21B00201	Mathematics-II	4	1	0	30	70	100	3
2	21B00202	Engineering Physics	3	0	0	30	70	100	3
3	21E02201	Basic Electrical and Electronics Engineering	3	1	0	30	70	100	3
4	21E03202	Engineering Mechanics	3	1	0	30	70	100	3
5	21E05201	Programming in C	3	1	0	30	70	100	3
6	21B00212	Engineering Physics Laboratory	0	0	3	15	35	50	1.5
7	21E01211	Building Planning and Computer Aided Building Drawing	0	0	3	15	35	50	1.5
8	21E05211	Programming in C Laboratory	0	0	3	15	35	50	1.5
9	21M00201	Environmental Science	2	0	0	50	0	50	0
		Total	**18**	**4**	**9**	**245**	**455**	**700**	**19.5**

DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE
B.Tech 2021-2022

II B.Tech I Semester – Civil Engineering

S.No.	Code	Course Title	Hours per week			Marks			Credits
			L	T	P	IM	EM	T	C
1	21B00301	Mathematics-III	4	1	0	30	70	100	3
2	21P01301	Surveying & Geomatics	3	0	0	30	70	100	3
3	21P01302	Concrete Technology	3	0	0	30	70	100	3
4	21P01303	Strength of Materials	3	1	0	30	70	100	3
5	21P01304	Mechanics of Fluids	3	1	0	30	70	100	3
6	21P01311	Strength of Materials Laboratory	0	0	3	15	35	50	1.5
7	21P01312	Surveying Field - Work Laboratory	0	0	3	15	35	50	1.5
8	21P01313	Concrete Technology Laboratory	0	0	3	15	35	50	1.5
9	21S01301	Computer Aided Drafting of Buildings	1	0	2	30	70	100	2
Total			**17**	**3**	**11**	**225**	**525**	**750**	**21.5**

II B.Tech II Semester – Civil Engineering

S.No.	Code	Course Title	Hours per week			Marks			Credits
			L	T	P	IM	EM	T	C
1	21E01401	Engineering Geology	3	0	0	30	70	100	3
2	21B00402	Probability & Statistics	3	1	0	30	70	100	3
3	21P01401	Hydraulics & Hydraulic Machinery	3	1	0	30	70	100	3
4	21P01402	Structural Analysis	3	1	0	30	70	100	3
5	21H01401	Managerial Economics for Engineers	3	0	0	30	70	100	3
6	21E01411	Engineering Geology Laboratory	0	0	3	15	35	50	1.5
7	21P01411	Fluid Mechanics & Hydraulic Machinery Laboratory	0	0	3	15	35	50	1.5
8	21P01412	Geographic Information SystemLaboratory	0	0	3	15	35	50	1.5
9	21S01401	Advanced Field Surveying	1	0	2	30	70	100	2
10	21M00401	Basics of Indian Constitution	2	0	0	50	0	50	0
Total			**18**	**3**	**11**	**275**	**525**	**800**	**21.5**

DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE
B.Tech 2021-2022

III YEAR B.Tech., I semester

S.No.	Code	Course Title	Hours per week			Marks			Credits
			L	T	P	IM	EM	T	C
1	21P01501	Design & Detailing of Reinforced Concrete Structures	3	1	0	30	70	100	3
2	21P01502	Geotechnical Engineering	3	1	0	30	70	100	3
3	21P01503	Highway Engineering	3	0	0	30	70	100	3
Professional Elective - I									
4	21L01501	Repair & Rehabilitation of Buildings	3	0	0	30	70	100	3
	21L01502	Environmental Impact Assessment							
	21L01503	Construction Technology & Management							
5	**Open Elective - I**		3	0	0	30	70	100	3
6	21P01511	Geotechnical Engineering Laboratory	0	0	3	15	35	50	1.5
7	21P01512	Transportation Engineering Laboratory	0	0	3	15	35	50	1.5
8	21S01511	Employability Skills-I	1	0	2	30	70	100	2
9	21P01513	Community Service Project	0	0	0	100	0	100	4
10	21M00501	Professional Ethics and Human Values (Mandatory Course)	2	0	0	50	0	50	0
Total Credits			**18**	**2**	**8**	**360**	**490**	**850**	**24**

III YEAR B.Tech., II semester

S.No.	Code	Course Title	Hours per week			Marks			Credits
			L	T	P	IM	EM	T	C
1	21P01601	Design & Detailing of Steel Structures	3	1	0	30	70	100	3
2	21P01602	Water Resource Engineering	3	1	0	30	70	100	3
3	21P01603	Environmental Engineering	3	0	0	30	70	100	3
Professional Elective - II									
4	21L01601	Pre-stressed Concrete	3	0	0	30	70	100	3
	21L01602	Watershed Management							
	21L01603	Advanced Foundation Engineering							
5	**Open Elective -II**		3	0	0	30	70	100	3
6	21P01611	Estimation, Costing and Contracts Laboratory	1	0	3	15	35	50	1.5
7	21P01612	Environmental Engineering Laboratory	0	0	3	15	35	50	1.5
8	21P01613	Computer Aided Design Laboratory	0	0	3	15	35	50	1.5
9	21S01611	Employability Skills-II	1	0	2	30	70	100	2
10	21M00601	IPR & Patents (Mandatory Course)	2	0	0	50	0	50	0
	Total Credits		**18**	**2**	**11**	**275**	**525**	**800**	**21.5**

*** Internship 2 Months during summer vacation (to be evaluated in IV B.Tech-I sem)**

DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE
B.Tech 2021-2022

IV YEAR B.Tech., I Semester

S.No.	Code	Course Title	Hours per week			Marks			Credits
			L	T	P	IM	EM	T	C
Professional Elective - III									
1	21L01701	Bridge Engineering	3	0	0	30	70	100	3
	21L01702	Industrial Waste Water Treatment							
	21L01703	Earth & Rock-fill Dams							
Professional Elective - IV									
2	21L01704	Finite Element Methods	3	0	0	30	70	100	3
	21L01705	Ground water development							
	21L01706	Road Safety Engineering							
Professional Elective - V									
3	21L01707	Advanced Structural Analysis	3	0	0	30	70	100	3
	21L01708	Ground Improvement Techniques							
	21L01709	Low-cost Housing							
4	**Open Elective - III**		3	0	0	30	70	100	3
5	**Open Elective - IV**		3	0	0	30	70	100	3
	Humanities & Social Sciences Elective								
6	21H01701	Social & Elements of Indian History for Engineers	3	0	0	30	70	100	3
		Law for Engineers							
		Business communication & presentation skills							
7	21P01731	Summer Internship	0	0	0	100	0	100	1.5
8	21S01701	Project Planning and Town Planning	1	0	2	30	70	100	2
	Total Credits		**19**	**0**	**5**	**290**	**560**	**850**	**21.5**

IV YEAR B.Tech., II semester

S. No.	Code	Course Title	Hours per week			Marks			Credits
			L	T	P	IM	EM	T	
1	21P01831	Seminar	0	0	0	100	0	100	1
2	21P01821	Project work	0	0	18	60	140	200	10
	Total Credits		**0**	**0**	**18**	**160**	**140**	**300**	**11**

DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE
B.Tech 2021-2022

Open Electives

S.No.	Course Title	Hours per week			Marks			Credits
		L	T	P	IM	EM	T	C
Open Elective -I								
1	Fundamentals of Utilization of Electrical Energy	3	0	0	30	70	100	3
2	Introduction to Additive Manufacturing							
3	Principles of Communication							
4	Operating Systems							
Open Elective -II								
1	Fundamentals of Electrical Machines	3	0	0	30	70	100	3
2	Fundamentals of Manufacturing Processes							
3	IC Applications							
4	Data Science							
Open Elective -III								
1	Fundamentals of Power System Engineering	3	0	0	30	70	100	3
2	Fundamentals of Automobile Engineering							
3	Fundamentals of Microprocessors and Microcontrollers							
4	Machine Learning							
Open Elective -IV								
1	Electrical Measurements and Instrumentation	3	0	0	30	70	100	3
2	Non-Conventional Energy Resources							
3	Electronic Measurements and Instrumentation							
4	Cyber Security							

DEPARTMENT OF CIVIL ENGINEERING

Minor Degree Program Courses

LIST OF MINOR COURSES OF ELECTRICAL AND ELECTRONICS ENGINEERING

S.No	SUBJECT
1	Electrical Power Generation, Transmission & Economic Aspects
2	Electrical Safety Course
3	Principles of Electric Power Conversion
4	Renewable Energy Sources
5	Electric Vehicles
6	Power Systems for Data Centers

LIST OF MINOR COURSES OF MECHANICAL ENGINEERING

S. No	SUBJECT
1	Fundamentals of Manufacturing Processes
2	Fundamentals of Automobile Engineering
3	Non-Conventional Energy Resources
4	Introduction to Additive Manufacturing
5	Engineering Materials
6	Product Lifecycle Management

LIST OF MINOR COURSES OF ELECTRONICS AND COMMUNICATION ENGINEERING

S. No	SUBJECT
1	Fundamentals of signals and systems
2	Embedded systems and applications
3	Fundamentals of communication systems
4	Principles of electronic instrumentation
5	Fundamentals of digital signal processing
6	Digital system design

LIST OF MINOR COURSES OF COMPUTER SCIENCE AND ENGINEERING

S. No	SUBJECT
1	Cloud Computing
2	Mobile Computing
3	Software Engineering
4	Data Base Management Systems
5	Fundamentals of Artificial Intelligence and Machine Learning
6	Cyber security Forensics

I-B.TECH.-I SEMESTER SYLLABUS

MATHEMATICS – I
(Linear Algebra and Calculus)

	L	T	P	C
I-B.Tech-I-Sem				
Subject Code: 21B00101	**4**	**1**	**0**	**4**

Pre Requisite: Nil

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

1. develop the use of matrix algebra techniques that is needed by engineers for solving system of linear equations in practical applications
2. verify Cayley – Hamilton theorem and reduce quadratic forms to canonical form by orthogonal transformation
3. test the convergence of an infinite series and verify mean value theorems for a continuous function
4. apply the techniques of multi variable differential calculus to determine extrema and series expansions
5. apply double integration techniques in evaluating areas bounded by region and triple integration techniques in evaluating volumes of solids

Unit-I: Solving systems of linear equations, Eigen values and Eigen vectors **12 hours**

Rank of a matrix by echelon form and normal form – Solving system of homogeneous and non-homogeneous linear equations – Gauss Elimination method - Eigen values and Eigen vectors and problems on properties (without proofs) of Eigen values.

Unit-II: Cayley–Hamilton theorem and Quadratic forms **10 hours**

Cayley-Hamilton theorem (without proof) – Applications – Finding the inverse and power of a matrix by Cayley-Hamilton theorem – Reduction to Diagonal form – Quadratic forms - rank, index, signature and nature of the quadratic forms – Reduction of quadratic form to canonical forms by orthogonal transformation.

Unit-III:Sequences, Series and Meanvalue theorems **12 hours**

Sequences and Series: Convergence and divergence – Ratio test – Comparison test –Integral test – Cauchy's root test – Alternate series– Leibnitz's rule. Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem– Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders, Problems and applications on the above theorems.

Unit-IV: Partial differentiation **12 hours**

Introduction – Homogeneous function – Euler's theorem– Total derivative– Chain rule– Jacobian – Functional dependence –Taylor's and MacLaurin's series expansion of functions of two variables. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method of undetermined multiplier.

Unit-V: Multiple integrals **10 hours**

Double and Triple integrals – Change of order of integration in double integrals – Change of variables to polar, cylindrical and spherical coordinates. Applications: Finding Area andVolume.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. R. K. Jain and S. R. K. Iyengar Advanced Engineering Mathematics, Fifth Edition NarosaPublishing House.

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley & Sons, 2011
2. V. Ravindranath and P. Vijayalaxmi, Mathematical Methods, Himalaya Publishing House.
3. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press.
4. N.P.Bali & Manish Goyal, Engineering Mathematics, Lakshmi Publications.

ENGINEERING CHEMISTRY

I-B.Tech-I-Sem **L T P C**
Subject Code: 21B00102 **3 0 0 3**
Pre Requisite: Nil

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

1. Categorize plastics, elastomers and composite materials according to industrial applications.
2. Select appropriate materials for batteries and fuel cells.
3. Illustrate various engineering materials and their preparation.
4. Solve numerical problems of fuel technology.
5. Select appropriate technique for water treatment.

Unit-I: Polymerisation **8 hours**

Polymerisation: Introduction, methods of polymerization (emulsion and suspension), mechanical properties
Plastics: Thermo plastics & Thermosetting plastics, Compounding of plastics, Compounding, fabrication (compression, injection, extrusion and Transfer), preparation, properties and applications (PVC, Bakelite and polycarbonates), recycling of e-plastic waste (waste to wealth).
Elastomers: Natural rubber, Processing of natural rubber, Compounding, Vulcanization, preparation, properties and applications (Buna-S, thiokol and Poly urethanes).
Composite materials: Fiber reinforced plastics, conducting polymers, biodegradable polymers with examples

Unit-II: Electrochemical Cells and Corrosion **10 hours**

Galvanic cells, Single electrode potential, Concentration cells, electrochemical series and uses of series, standard hydrogen electrode, calom electrode
Batteries: Dry cell, Li- ion battery, Lead-acid battery
Fuel cells: Construction and working of H2-O2, CH3OH-O2
Corrosion: Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, pitting corrosion, galvanic series, factors influencing rate of corrosion,
Corrosion control methods: proper designing and cathodic protection, cathodic coatings, anodic coatings, electroplating and electroless plating, Paints (constituents and functions).

Unit-III: Chemistry of Engineering Materials **8 hours**

Nano materials: Introduction – Carbon nanotubes and fullerenes -Sol-gel method, BET and TEM methods
Carbon nanotubes and fullerenes: Types, preparation, properties and applications
Green synthesis: Principles, 2 methods of synthesis with examples
Cement: Constituents, Manufacture of Portland cement, Chemistry of setting and hardening of cement, Deterioration of cement concrete.
Refractories: Definition, classification, properties of refractories

Unit-IV: Fuel Technology **10 hours**

Fuels: Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula -Numerical problems,
Coal: Proximate and ultimate analysis – Significance
Petroleum: Refining – Cracking - synthetic petrol (Fischer Tropsch process)–Petrol knocking - Diesel knocking - Octane and Cetane ratings – Anti-knocking agents
Gaseous fuels: Natural gas-LPG and CNG– Flue gas analysis by Orsat apparatus

Unit-V: Water Technology **10 hours**

Hardness of water, determination of hardness by complexometric method, boiler troubles (priming and foaming, scale formation, boiler corrosion, caustic embrittlement), internal treatments, softening of hard water (zeolite process, ion exchange process), municipal water treatment, potable water and its specifications, Disinfection of water- chlorination, break point chlorination-desalination (reverse osmosis and electro dialysis)

Textbooks:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating &Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015edition

References:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition(second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Engineering Chemistry by M. Thirumala Chary; E. Laxminarayana, K. Shashikala Third Edition SCITECH.

COMMUNICATIVE ENGLISH

I-B.Tech-I-Sem **L T P C**
Subject Code: 21H00101 **3 0 0 3**
Pre Requisite: Nil

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

1. identify the context, topic, and pieces of specific information.
2. apply the concepts of communication in various channels to introduce one/other.
3. benchmark with standards to comprehend effective communication.
4. quantify expression by using adjectives, adverbs and antonyms.
5. write technical/academic proposals through appropriate glossary of words.

Unit-I: **10 hours**

Lesson-1: A Drawer full of happiness from "**Infotech English**", Maruthi Publications
Lesson-2: Deliverance by Premchand from "**The Individual Society",** Pearson Publications. (Non-detailed)
Listening: Listening to short audio texts and identifying the topic, Listening to prose, prose and conversation
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests. Self introductions and introducing others.
Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; linkers, sign posts and transition signals; mechanics of writing - punctuation, capital letters.
Vocabulary: Technical vocabulary from across technical branches (20)
GRE Vocabulary (20) (Antonyms and Synonyms, Word applications) Verbal reasoning and sequencing of words.
Grammar: Content words and function words; word forms: verbs, nouns, adjectives and adverbs;
Nouns: countable and uncountable; singular and plural basic sentence structures; simple question form - wh-questions; word order in sentences.

Unit-II: **10 hours**

Lesson-1: Nehru's letter to his daughter Indira on her birthday from "InfoTech English", Maruthi Publications
Lesson-2: Bosom Friend by Hira Bansode from "The Individual Society", Pearson Publications. (Non-detailed)
Listening: Answering a series of questions about main idea and supporting ideas after listening toaudio texts, both in speaking and writing.
Speaking: Discussion in pairs / small groups on specific topics followed by short structured talks. Functional English: Greetings and leave takings.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Reading: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.
Writing: preparing posters, slides and presentation papers.
Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary Analogies (20 words) (Antonyms and Synonyms, Word applications)
Grammar: Use of articles and zero article; prepositions.

Unit-III: **8 hours**

Lesson-1: Stephen Hawking-Positivity 'Benchmark' from "InfoTech English", Maruthi Publications.
Lesson-2: Shakespeare's Sister by Virginia Woolf from "The Individual Society",
Pearson Publications. (Non-detailed)
Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed.
Functional English: Complaining and Apologizing.
Reading: Reading a text in detail by making basic inferences - recognizing and interpreting **specific context clues;** strategies to use text clues for comprehension. Critical reading.
Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. Letter writing-types, format and principles of letter writing- mail etiquette, Writing CV's.
Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) (Antonyms and Synonyms, Word applications) Association, sequencing of words
Grammar: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Unit-IV: **10 hours**

Lesson-1: Liking a Tree, Unbowed: Wangari Maathai-biography from "InfoTech English", Maruthi Publications
Lesson-2: Telephone Conversation-Wole Soyinka from "The Individual Society", Pearson Publications. (Non-detailed)
Listening: Making predictions while listening to conversations/ transactional dialogues without video (only audio); listening to audio-visual texts.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Functional English: Permissions, Requesting, and Inviting.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.
Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. Writing SOP, writing for media.
Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20words) (Antonyms and Synonyms, Word applications) Cloze Encounters.
Grammar: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Unit-V: **8 hours**

Lesson-1: The Chief Software Architect from "English Encounters", Maruthi Publications
Lesson-2. Still I Rise by Maya Angelou from "The Individual Society", Pearson **Publications**.(Non-detailed)
Lesson-3: G.D.Naidu 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers
Listening: Identifying key terms, understanding concepts and interpreting the concepts both in speaking and writing.
Speaking: Formal oral presentations on topics from academic contexts - without the use of **PPT slides.** Functional English: Suggesting/Opinion giving.
Reading: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques.
Writing: Writing academic proposals- writing research articles: format and style.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20words) (Antonyms and Synonyms, Word applications) Coherence, matching emotions.
Grammar: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Textbooks:

1. "Infotech English", Maruthi Publications. (Detailed)
2. "The Individual Society", Pearson Publications. (Non-detailed)

References:

1. Text Book English Encounters", Maruthi Publications
2. Text Book: 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers
3. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
4. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.

BUILDING MATERIALS AND CONSTRUCTION

I-B.Tech-I-Sem **L T P C**
Subject Code: 21E01101 **3 1 0 3**
Pre Requisite: Nil

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

1. identify different building materials and their importance in building construction.
2. differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
3. learn the importance of building components and finishings.
4. know the classification of aggregates, sieve analysis and moisture content usually required in building construction.
5. know the techniques of formwork and scaffolding.

Unit-I: Stones, Bricks and Tiles **10 hours**

Introduction - Properties of building stones - relation to their structural requirements - classification of stones - stone quarrying - precautions in blasting - dressing of stone - composition of good brick earth - various methods of manufacturing of bricks - Characteristics of good tile - manufacturing methods - types of tiles - Uses of materials like Aluminium - Gypsum - Glass - Bituminous materials.

Unit-II: Masonry, Timber and Other Materials **9 hours**

Types of masonry - English and Flemish bonds, Rubble and Ashlar Masonry - Cavity and partition walls. Structure and Properties of Timber - Seasoning of timber - Classification of various types of woods used in buildings - Defects in timber - Alternative materials for wood - Galvanized Iron - Fiber Reinforced Plastics - Steel - Aluminium.

Unit-III: Lime and Cement **9 hours**

Various ingredients of lime - Constituents of lime stone - classification of lime – various methods of manufacture of lime. Portland cement - Chemical Composition - Hydration - setting and fineness of cement - Various types of cement and their properties - Various field and laboratory tests for Cement.

Unit-IV: Building Components **10 hours**

Lintels, arches, vaults, stair cases - types. Different types of floors - Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs - King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

Unit-V: Finishing **10 hours**

Damp Proofing and water proofing materials and uses - Plastering Pointing, white washing and distempering. Paints: Constituents of paint - Types of paints - Painting of new/old wood- Varnish. Form Works and Scaffoldings.

Textbooks:

1. Shetty, M.S., Concrete Technology (Theory and Practice), S Chand and company Ltd, 2015.
2. Varghese. P.C, Building Construction, Second Edition PHI Learning ltd., 2016.

References:

1. Peurifoy R.L., Schexnayder, C.J., Shapira A., Schmitt. R., Construction Planning
2. Arora, S.P and Bindra S.P Building construction, Dhanpat Rai and sons, 1997.
3. Neville A.M Properties of concrete, fourth edition, Pearson education ltd.2012.
4. Punmia, B.C Building construction, Laxmi publication (p) Ltd., 2008.

ENGINEERING DRAWING

I-B.Tech-I-Sem **L T P C**
Subject Code: 21E03101 **1 0 3 3**
Pre Requisite: Nil

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

1. construct polygons, conics, cycloids and involutes
2. draw the projections of points and lines
3. draw the projections of planes and solids
4. draw the projections of sections ofsolids and development of surfaces
5. draw the isometric projections and conversion from pictorial views into orthographic views and Vice-versa

Unit-I: Construction of Polygons & Engineering Curves **10 hours**

General: Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering.

Polygons: Constructing regular polygons by general methods, inscribing and circumscribing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general methods only. cycloids, involutes, tangents & normals for the curves.

Unit-II: Orthographic Projections of Points & Lines **10 hours**

Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants,

Projections of lines: line parallel to both the planes, line parallel to one plane and inclined to other plane. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

Unit-III: Projections of Planes & Solids **10 hours**

Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

Projections of Solids: Prisms, Pyramids, Cones and Cylinders with the axis inclined to both the reference planes.

Unit-IV: Sections of Solids & its surface developments **10 hours**

Sections of Solids: Sections of Prisms, Pyramids, cylinders and Cones. True shapes of sections, (Limited to the cutting plane perpendicular to one of the principal plane)

Development of surfaces: Development of surfaces of Right Regular Solids-Prism, Pyramid, Cylinder and Cone.

Unit-V: Isometric views and Conversions **10 hours**

Principles of Isometric projection- Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids.

Orthographic Projections: Conversion of pictorial views into Orthographic views and Vice-Versa. (Treatment is limited to simple MODELS).

Textbooks:

1. Engineering Drawing by BhattN.D., Charotar Publishing House Pvt Ltd; FIFTY THIRD EDITION 2014); Charotar Publishing House Pvt Ltd.
2. Engineering Drawing by KLNarayana, P.Kannaiah, 3rdEdition,ScitechPublications

References:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill,2009.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
3. K. Venugopal, Engineering Drawing and Graphics, 6/e, New Age Publishers, 2011.
4. K.C. John, Engineering Graphics, 2/e, PHI, 2013.

COMMUNICATIVE ENGLISH LABORATORY

	L	T	P	C
I-B.Tech-I-Sem				
Subject Code: 21H00111	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Demonstrate nuances of language through audio-visual experience and Group activities.
2. Identify accent for intelligibility.
3. Demonstrate in conversation, jams and public speaking.Make use of the concepts to communicate confidently and competently in English Language in all spheres.

LIST OF EXPERIMENTS

PRACTICE 1: Greeting, Introducing, and taking leave ---Pure Vowel

PRACTICE 2: Giving Information and Asking for Information –Diphthongs

PRACTICE 3: Inviting, Accepting and Declining Invitations –Consonants

PRACTICE 4: Commands, Instructions and Requests--Accent and Rhythm

PRACTICE 5: Suggestions and Opinions --Intonation

ENGINEERING CHEMISTRY LABORATORY

	L	T	P	C
I-B.Tech-I-Sem				
Subject Code: 21B00112	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. execute instrumental methods of chemical analysis and measuring,
2. demonstrate operating and testing of chemical instruments for determining chemical attributes
3. demonstrate complexometric and other techniques to determine the presence of ingredients

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. Determination of Mg+2 present in Antacid.
2. Determination of HCl using standard Na2CO3 solution.
3. Estimation of KMnO4 by Oxalic acid.
4. Estimation of Ferrous Iron by $K_2Cr_2O_7$.
5. Determination of total hardness of water by EDTA method.
6. Determination of Alkalinity of water sample.
7. Determination of Chlorides present in water sample.
8. Determination of pH of water and soil samples.
9. Conductometric titration of strong acid Vs strong base.
10. Conductometric titration of strong acid Vs Weak base.
11. Potentiometric titration of strong acid Vs strong base.
12. Potentiometric titration of strong acid Vs weak base.
13. Preparation of Phenol formaldehyde resin.
14. Preparation of Urea formaldehyde resin.
15. Determination of Zinc by complexometric method.

BASICS OF CIVIL ENGINEERING WORKSHOP LABORATORY

I-B.Tech-I-Sem	**L**	**T**	**P**	**C**
Subject Code: 21E01111	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Determine distances and irregular areas using conventional survey instruments like chain, tape, cross-staff and compass.
2. Identify various building materials and give lump-sum estimate.
3. Demonstrate simple sanitary filling like Tap, T-joint, Elbow, bend, threading etc.

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. Demonstration on usage of chain.
2. Ranging - offsets - chainage.
3. To find the area of an irregular polygon using chain by using horizontal measurements.
4. Determination of bearings and included angles with prismatic compass.
5. Demonstration on various Building materials used in construction.
6. Estimation of quantity of bricks, concrete, wood, paint for the given single room building.
7. Masonry work hands - on practice work different types of bonds in brick masonry.
8. Identification of quality of brick through physical tests.
9. Identification of soil based on their physical properties.
10. Setting out of building: The student is required to set out a building (Single room only) as per the given building plan using tape and cross staff.
11. Demonstration on Installation of simple sanitary fittings and fixtures like Tap, T-joint, Elbow, bend, threading etc.
12. Welding (arc welding and gas welding).
13. Carpentry (Demonstration).
14. Identify different types of roads in the campus and write the physical characteristics of layers.
15. Demonstration on making of cement mortar/concrete for the given nominal mix.

ADDITIONAL EXPERIMENTS

16. Demonstration on testing of materials like Mild steel / HYSD bars, Concrete cube, mortar cube, bricks and their properties
17. Identify different types of beams, supports in the campus and draw the free body diagram.
18. Identification of rocks based on their properties.

I-B.TECH.-II SEMESTER SYLLABUS

MATHEMATICS-II

I-B.Tech-II-Sem **L T P C**
Subject Code: 21B00201 **4 1 0 3**
Pre Requisite: Nil

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

1. solve the differential equations related to various engineering fields
2. apply the concept of differential equations in L-C-R circuits and L-C circuits
3. evaluate the approximate roots of polynomial and transcendental equations by different algorithms
4. apply Newton's forward & backward interpolation for equal intervals and Lagrange's formulae for unequal intervals
5. apply numerical integral techniques to different Engineering problems and apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations

Unit-I: Differential equations of first order and first degree **10 hours**

Linear differential equations– Bernoulli's equations –Exact equations and equations reducible toexact form. Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories

Unit-II: Linear differential equations of Higher order **10 hours**

Homogeneous and Non-homogeneous differential equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, Sin ax, Cos ax , polynomials in x, $e^{ax}V(x)$ and x^m V(x) – Method of Variation of parameters. Applications: L-C-R circuits and L-C circuits

Unit-III: Iterative methods **10 hours**

Introduction– Bisection method– Method of false position– Iteration method – Newton-Raphson method (One variable) for finding solutions of algebraic and transcendental equations– Gauss Jacobi and Gauss-Seidel methods for solving system of equations numerically.

Unit-IV: Interpolation and Numerical differentiation **10 hours**

Introduction– Errors in polynomial interpolation – Finite differences– Forward differences– Backward differences –Central differences – Relations between operators – Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula – Numerical differentiation using interpolating polynomial

Unit-V: Numerical Integration and Numerical Solution of ordinary differential equations with initial conditions **10 hours**

Numerical Integration by Trapezoidal rule– Simpson's 1/3rd and 3/8th rule - Numerical Solution of initial value problems by Taylor's series– Picard's method of successive approximations– Euler's method –Modified Euler's method – Runge - Kutta method (fourth order).

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. R. K. Jain and S. R. K. Iyengar Advanced Engineering Mathematics, Fifth Edition Narosa Publishing House

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley & Sons, 2011
2. V. Ravindranath and P. Vijayalaxmi, Mathematical Methods, Himalaya Publishing House.
3. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
4. Engineering Mathematics, Dr.T.K.V. Iyengar, S. Chand publications

ENGINEERING PHYSICS

I-B.Tech-II-Sem **L T P C**
Subject Code: 21B00202 **3 0 0 3**
Pre Requisite: Nil

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

1. apply using the concepts of Interference and diffraction and polarization.
2. illustrate Laser Mechanism and fiber optics for the communications systems.
3. categorize the basics of crystal structures
4. analyze X ray diffraction technique for investigations on material.
5. determine magnetic properties and use them in possible application

Unit-I: Wave Optics **10 hours**

Interference: Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffraction - Fraunhofer diffraction due to single slit, double slit - N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction-Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

Unit-II: Lasers and Fiber Optics **10 hours**

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping mechanisms – Ruby laser – He-Ne laser - Applications of lasers.

Fiber optics: Introduction –Principle of optical fiber- Acceptance Angle - Numerical Aperture - Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Applications.

Unit-III: Crystallography and X-ray Diffraction **10 hours**

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattice – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods.

Unit-IV: Acoustics and Ultrasonics **10 hours**

Acoustics: Introduction requirements of acoustically good hall Reverberation Reverberation time - Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination Factors affecting acoustics of buildings and their remedial measures.

Ultrasonics: Introduction - Properties - Production by magnetostriction and piezoelectric methods Detection - Acoustic grating - Non Destructive Testing pulse echo system through transmission and reflection modes - Applications.

Unit-V: Dielectric and Magnetic Materials **10 hours**

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field- Clausius-Mossotti equation- Piezoelectricity.

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Origin of permanent magnetic moment - Classification of magnetic materials: Dia, para, Ferro, antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials- Engineering applications.

Textbooks:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering Physics by P.K.Palanisamy SciTech publications.

References:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
2. Engineering Physics – M.R.Srinivasan, New Age Publications
3. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press
4. Ch. Srinivas, Ch. Seshubabu, Engineering Physics, Cengage learning publications

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

I-B.Tech-II-Sem **L T P C**
Subject Code: 21B02201 **3 1 0 3**
Pre Requisite: Nil

Course Outcomes: At the end of the course, the students will be able to
1. Solve various methods of electrical networks.
2. Analyze the theory of operation of DC Machines and working of 3-point starter
3. Analyze the performance of transformer and the operation of 3-phase alternator and 3-phase induction motors
4. Determine operational characteristics of half wave, full wave rectifiers and OP-AMPs.
5. Explain the operation of transistors and amplifiers.

Unit-I: ELECTRICAL CIRCUITS **9 hours**

Basic definitions, Types of network elements, Ohm's Law, Kirchhoff's Laws, inductive networks, capacitive networks, series, parallel circuits and star-delta and delta-star transformations

Unit-II: DC MACHINES **9 hours**

Principle of operation of DC generator – emf equation – types of DC generators – DC motor types –torque equation – applications – three point starter, swinburn's Test, speed control methods.

Unit-III: AC MACHINES **9 hours**

TRANSFORMERS:
Principle of operation of single phase transformers – E.M.F equation – losses –efficiency and regulation
AC ROTATING MACHINES:
Principle of operation of alternators – regulation by synchronous impedance method –principle of operation of 3-Phase induction motor – slip-torque characteristics - efficiency – applications

Unit-IV: RECTIFIERS & LINEAR ICs **9 hours**

PN junction diodes, diode applications (Half wave and bridge rectifiers), Characteristics of operation amplifiers (OP-AMP) – application of OP-AMPs (inverting, non inverting, integrator and differentiator).

Unit-V: TRANSISTORS **9 hours**

PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

Textbooks:

1. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.
2. Electrical Technology by Surinder Pal Bali, Pearson Publications.

References:

1. Basic Electrical Engineering, M. S. Naidu and S. Kamakshiah, TMH Publications
2. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI Publications, 2nd edition
3. Basic Electrical Engineering, Nagsarkar, Sukhija, Oxford Publications,2nd edition
4. Industrial Electronics, G. K. Mittal, PHI

ENGINEERING MECHANICS

I-B.Tech-II-Sem **L T P C**
Subject Code: 21E03202 **3 1 0 3**
Pre Requisite: Nil

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

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

Unit-I: Forces and equilibrium **10 hours**

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: Analysis of perfect frames and friction **8 hours**

Analysis of perfect frames (Analytical Method) – Types of Frames – Assumptions for forces in members of a perfect frame, Method of joints, Method of sections, Force table, Cantilever Trusses, Structures with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads.

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack.

Unit-III: Centre of gravity and moment of inertia **8 hours**

Centre of Gravity& Centroid: determination of centre of gravity, Centroid for Plane geometrical figures, regular solids, composite areas, simple solids, areas & Volumes centroid methods.

MOMENT OF INERTIA: Area moment of Inertia, Radius of gyration, Parallel axis and perpendicular axis theorems, Moment of Inertia of Laminae of Different Shapes.

Mass Moment of Inertia: mass moment of inertia of Rectangular plate, Circular Plate, Right circular cone.

Unit-IV: Kinematics **8 hours**

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 **8 hours**

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

Textbooks:

1. Shames and Rao (2006) , Engineering Mechanics, Pearson Education
2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010) Publisher & year

References:

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition,1983.
2. Andrew Pytel, JaanKiusalaas, "Engineering Mechanics", Cengage Learning, 2014.
3. Beer F.P & Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.
4. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.

PROGRAMMING IN C

I-B.Tech-II-Sem **L T P C**
Subject Code: 21E05201 **3 1 0 3**
Pre Requisite: Nil

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

1. Write algorithms and to draw flowcharts for solving problems.
2. Use different operators, data types and write programs that use two-way/ multi way selection.
3. Select the best loop construct for a given problem.
4. Make use of Arrays in solving complex problems.
5. Solve problems using concept of structures, unions and File I/O operations.

Unit-I: **10 hours**

Introduction to Computers: Computer Systems, Computer software and hardware, Computing Environments, Computer Languages.

Introduction to the C Language: Algorithm and Flow chart, Structure of C Program, Creating and running programs, Identifiers, Types, Variables, Constants, Input / Output, Operators (Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associatively, Expression Evaluation, Type conversions.

Unit-II: **10 hours**

Control Structures: Selection Statements (making decisions) – Two Way Selection (if-else), Multi way Selection (nested if and switch) statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, Jump statements related to looping – break, continue, go to. Simple C Program examples.

Unit-III: **10 hours**

Arrays: Concepts, Using Array in C, Array Application, Two Dimensional Arrays, Multidimensional Arrays, Example Programs

Strings: String Concepts, C String, String Input / Output Functions, Arrays of Strings, String Manipulation Functions String, Example Programs.

Unit-IV: **10 hours**

Functions: Designing, Structured Programs, Function in C, User Defined Functions, Inter Function Communication, Standard Functions, Storage Classes, Scope and lifetime, Passing Array to Functions, Command Line Arguments and Recursion.

Pointers: Concept of pointer, declaring and initializing pointer variables, pointer expressions and address arithmetic, null pointers, generic pointers, pointers as function arguments, pointers and arrays, pointer and strings, pointer to pointer, dynamic memory allocation, dangling pointer.

Unit-V: **10 hours**

Structures &Union: The Type Definition (Type def), Enumerated Types, Structure, Unions, and Example Programs.

Data Files: Introduction to Files, Using files In C, Reading from Text Files, Writing to Text files, Random Access File.

Textbooks:

1. Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, CENGAGE.
2. Programming in C, Reema Thareja, and OXFORD University press.

References:

1. Computer Fundamentals and Programming, Sumithabha Das, McGraw Hill.
2. Programming in C, Ashok N. Kamthane, AmitKamthane, and Pearson.
3. C Programming – Balaguruswamy, McGraw Hill

ENGINEERING PHYSICS LABORATORY

I-B.Tech-II-Sem	**L**	**T**	**P**	**C**
Subject Code: 21B00212	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Demonstrate diffraction techniques, strain gauge methods for material investigations
2. Apply magnetism and optics for determining various physical characteristics.
3. Apply the techniques of physical instruments for thickness evaluation, laws of string and other parameters.

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. Laser: Determination of wavelength using diffraction grating.
2. Young's modulus of given material by Strain gauge method.
3. Study of variation of magnetic field along the axis of a current carrying circular coil by Stewart & Gee's method.
4. Determination of ultrasonic velocity in given liquid (Acoustic grating).
5. Determination of dielectric constant using charging and discharging method.
6. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).

7 Estimation of Planck's constant using photoelectric effect.

8. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum).
9. Determination of numerical aperture and acceptance angle of an optical fiber.
10. Determination of thickness of thin object by wedge method.
11. Determination of radius of curvature of given plano convex lens by Newton's rings.
12. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction gratin in normal incidence configuration.
13. Determination of dispersive power of the prism.
14. Sonometer: Verification of laws of string.
15. Determination of Moment of Inertia of a Fly Wheel.

BUILDING PLANNING AND COMPUTER AIDED BUILDING DRAWING

I-B.Tech-II-Sem	**L**	**T**	**P**	**C**
Subject Code: 21E01211	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Perform basic commands of any suitable CAD software to draw 2D drawings.
2. Interpret the conventions, signs and symbols from a given drawing.
3. Prepare line plans, elevation, section of residential and public buildings using principles of planning.

LIST OF EXPERIMENTS

1. Prepare a given line drawing in minimum three layers using CAD software.
2. Reading and interpreting readymade Architectural building drawing (To be procured from Architect, Planning Consultants, Planning Engineer).
3. Line plans for residential building of minimum three rooms including w/c, bath and staircase as per principles of planning.
4. Line plans for public building-school building, primary health centre, restaurant, bank, post office, hostel, Function Hall and Library.
5. Draw developed plan, elevation, section, site plan from the given line plan for a load bearing residential building (2BHK) with stair case.
6. Prepare submission drawing (including foundation plan) of the given load bearing residential building with stair case.
7. Draw developed plan, elevation, section, site plan from the given line plan for framed structure residential building including stair case (2BHK, G+1).
8. Prepare submission drawing (including foundation plan) of the given framed structure residential building with stair case.

PROGRAMMING IN C LABORATORY

	L	T	P	C
I-B.Tech-II-Sem				
Subject Code: 21E05211	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Design and develop solving skills through C.
2. Illustrate various concepts of C language and generate programs
3. Draw flowcharts and write algorithms.

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

Exercise - 1 Basics I

a) Write a simple program using printf ( ), scanf ( )

b) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers

Exercise - 2 Basics II

a) Write a C Program to Simulate 3 Laws at Motion (v=u+at,s=ut+1/2at 2 , v2-u 2=2as)

b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I

a) Write a C Program to Find Whether the Given Year is a Leap Year or not.

b) Write a C Program to Add Digits & Multiplication of a number

Exercise - 4 Control Flow - II

a) i) Write a C Program to Find Whether the Given Number is Prime Number or Not

ii) Write a C Program to Find Whether the Given Number is Armstrong Number or not

b) Write a C program to print Floyd Triangle

Exercise - 5 Control Flow - III

a) Write a C Program to print Pascal Triangle

b) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using Switch-case statement.

b) Implementation of string manipulation operations without library function. i) copy ii)

Exercise – 6 Arrays

a) Write a program in C for multiplication of two square Matrices.

b) Write a program in C to find transpose of a given matrix.

Exercise – 7 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.

b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 8 Functions

a) Write a program in C to add numbers using call by reference.

b) Write a program in C to swap elements using call by reference

Exercise – 9 Arrays and Pointers

a) Write a C Program to Access Elements of an Array Using Pointer

b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 10Strings

a) Implementation of string manipulation operations with library function.

i) copy ii) concatenate iii) length iv) compare

concatenate iii) length iv) compare

Exercise – 11 Structures

a) Write a C program to find sum of n elements entered by user. To perform this program, Allocate memory dynamically using malloc () function

b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function

Exercise -12 Files

a) Write a C programming code to open a file and to print it contents on screen.

b) Write a C program to copy files.

ENVIRONMENTAL SCIENCE

I-B.Tech-II-Sem **L T P C**
Subject Code: 21M00201 **2 0 0 0**
Pre Requisite: Nil
Course Outcomes: At the end of the course, the students will be able to

1. articulate the interconnected and interdisciplinary nature of environmental studies.
2. demonstrate an integrative approach to environmental issues with a focus on sustainability.
3. use critical thinking, problem-solving, and the methodological approaches of the social sciences, natural sciences, and humanities in environmental problem solving.
4. adopt sustainability as a practice in life, society and industry through rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5. outline the effect of value education and welfare programmes.

Unit-I: Multidisciplinary nature ofenvironmental studies **10 hours**

Multidisciplinary nature of Environmental Studies – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources.

Unit-II: Ecosystems & Biodiversity and Its Conservation **10 hours**

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem
Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation :Introduction, Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega- diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources: Land as a resource, land degradation,

Unit-III: Environmental pollution & solid waste management **10 hours**

Environmental Pollution: Definition, Cause, effects and control measures of a Air Pollution.
b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Unit-IV: Social Issues and the Environment **10 hours**

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – **Environmental ethics:** Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion,

nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness. .

Unit-V: Human population and the environment **10 hours**

Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Textbooks:

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education.

References:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited

II-B.TECH.-I SEMESTER SYLLABUS

MATHEMATICS – III
(Integral Transforms, Vector Calculus and PDE)

	L	T	P	C
II-B.Tech-I-Sem				
Subject Code: 21B00301	**4**	**1**	**0**	**3**

Pre Requisite: Nil

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

1. Apply the Laplace transform for solving ordinary differential equations
2. Find the Fourier series of periodic signals and apply integral expressions for the forward and inverse Fourier transform toarange of non-periodic waveforms
3. Interpret different operators such as gradient, curl and divergence., estimate the work done against a field, circulation and flux using vector calculus.
4. Solve the first order partial differential equations related to various engineering fields.
5. Identify the methods for solving higher order partial differential equations in different physicalprocesses.

Unit-I: Laplace Transforms **12 hours**

Laplace transforms – Definition and Laplace transforms of some certain functions– Shifting theorems – Transforms of derivatives and integrals – Unit step function –Multiplied by t and divided by t – Dirac's delta function – Periodic function – Inverse Laplace transforms – Partial fractions – Convolution theorem (without proof). Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Unit-II: Fourier series and Fourier Transforms **12 hours**

Fourier Series: Introduction– Periodic functions – Fourier series of periodic functions – Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series. – Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals – Sine and cosine transforms– inverse transforms – Finite Fourier transforms.

Unit-III: Vector calculus **12 hours**

Vector Differentiation: Gradient– Directional derivative – Divergence– Curl– Scalar Potential
Vector Integration: Line integral – Work done – Area– Surface and volume integrals – Vector integral theorems: Problems on Greens, Stokes and Gauss Divergence theorems (without proof)

Unit-IV: Partial Differential Equations of first order **12 hours**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations

Unit-V: Second order Partial Differential Equations and Applications **12 hours**

Second order PDE: Solutions of linear partial differential equations with constant coefficients –- homogeneous - terms of the type $e^{ax\ by}$, $\sin(ax\ \ by)$, $\cos(ax\ \ by)$, $x^m y^n$
Applications of PDE: Method of separation of Variables– Solution of one-dimensional Wave, Heat and two - dimensional heat equation (Cartesian form).

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. R. K. Jain and S. R. K. Iyengar Advanced Engineering Mathematics, Fifth Edition Narosa Publishing House.

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley & Sons, 2011
2. Engineering Mathematics, Dr.T.K.V. Iyengar, S. Chand publications
3. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.
4. N.P.Bali & Manish Goyal, Engineering Mathematics, Lakshmi Publications.

SURVEYING AND GEOMATICS

II-B.Tech-I-Sem | **L T P C**
Subject Code: 21P01301 | **3 0 0 3**
Pre Requisite: Nil

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

1. Explain basic surveying instruments and techniques.
2. Apply the knowledge of levelling in different operations in civil engineering projects.
3. Use theodolite for measuring horizontal and vertical angles.
4. Choose the setting out of curve by linear and angular methods.
5. Apply optimal insights into land surveying using total station and gps.

Unit-I: Introduction and Basic Concepts **9 hours**

Introduction - Objectives - classification and principles of surveying - Scales–Errors in surveying - surveying accessories - overview of plane surveying (chain, compass and plane table)
Measurement of Distances and Directions:
Linear Measurements: Direct Method – Tape corrections.
Prismatic Compass: Bearings and Angles– Types in compass – Magnetic Declination–Local Attraction.

Unit-II: Levelling **9 hours**

Definitions - methods of levelling - types of levels - levelling staff - temporary adjustments of a level - Booking and Determination of levels - Curvature and Refraction.
Contouring: Characteristics - Methods of Contouring– Interpolation of contours– uses – methods of determining areas
Volumes: Volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

Unit-III: Theodolite Surveying **9 hours**

Types of Theodolites - Fundamental Lines - temporary adjustments–Measurement of Horizontal angle - Measurement of Vertical Angle - trigonometrical levelling base is accessible and inaccessible.
Traversing: Methods - computations - adjustments - Omitted measurements.

Unit-IV: Tacheometric Surveying **9 hours**

Principles of Tacheometry – stadia and tangential methods of Tacheometry
Curves: Types - necessity - elements of simple curve - setting out of simple Curves - Introduction to compound curves

Unit-V: Modern Surveying Methods **9 hours**

Total Station - Basic Principles - Classifications - Applications - Comparison with conventional surveying– EDM
GPS - Working principal - Components of GPS - Reference Systems - Satellite Orbits - GPS Observations – Applications.

Textbooks:

1. Duggal, S.K., Surveying (Vol - 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
2. Punmia, P.C., Ashok Kumar Jain, et., Surveying (Vol - 1, 2 & 3), Laxmi Publications (P) Ltd., New Delhi, 2005.

References:

1. Bhavikatti, S.S., Surveying, Vikas Publishing House Ltd, 2010.
2. Chandra, AM., Plane Surveying, New Age International Pvt. Ltd., New Delhi, 2007.
3. Subramanian, R., Surveying and Levelling, Oxford University Press, New Delhi, 2013.

CONCRETE TECHNOLOGY

II-B.Tech-I-Sem **L T P C**
Subject Code: 21P01302 **3 0 0 3**
Pre Requisite: Nil

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

1. Categorize the physical & mechanical properties of aggregates.
2. Evaluate ingredients of concrete through lab tests. Design concrete mix by is method.
3. Analyze the effect of water/cement ratio on the strength of hardened concrete and also the strength of concrete by using NDT testing methods
4. Determine the properties of hardened concrete, factors affecting elasticity, creep & shrinkage in concrete.
5. Familiarize basic concepts of special concrete and their production and applications.

Unit-I: Ingredients and Aggregates **9 hours**

Admixtures - Mineral and chemical admixtures - accelerators - retarders - air entertainers - plasticizers - super plasticizers - fly ash - silica fume.

Aggregates: Classification - Particle shape & texture – Bond, strength - Mechanical properties - Specific gravity - Bulk density - porosity - adsorption - moisture content - Bulking of sand - Deleterious substance - Soundness - Alkali aggregate reaction - Sieve analysis - Fineness modulus - Grading curves - Aggregates Grading - Gap graded and well graded aggregate as per relevant IS code - Maximum aggregate size - Mixing water quality.

Unit-II: Mix Design and Fresh Concrete **9 hours**

Mix Design: Factors affecting - Durability of concrete - Quality Control of concrete - Statistical methods - Acceptance criteria - Concepts - Proportioning of concrete mixes by IS method - polymer concrete - uses.

Fresh Concrete: Production - mix proportion - mixing - placing - compaction - finishing - curing - Properties of fresh concrete - Workability - Factors affecting workability - Measurement of workability - different tests - Setting times - Effect of time and temperature on workability - Segregation - bleeding - Mixing and vibration of concrete.

Unit-III: Hardened Concrete **9 hours**

Water - Cement ratio - Abram's Law - Gel space ratio - strength - Maturity concept - Strength in tension - compression - Factors affecting strength - Relation between compression & tensile strength – Curing. Testing of Hardened Concrete: Compression test - Tension test - Factors affecting strength - Flexure tests - Splitting tests - Non-destructive testing methods - code provisions for NDT - Durability - Relation between durability and permeability - Chemical attack of concrete - corrosion of steel re-bars - durability issues

Unit-IV: Elasticity, Creep & Shrinkage **9 hours**

Modulus of elasticity - Dynamic modulus of elasticity - Poisson's ratio - Creep of concrete - factors influencing creep - Relation between creep and time - Nature of creep - Effects of creep - Shrinkage - types of shrinkage.

Unit-V: Special Concretes **9 hours**

Ready mixed concrete - Shotcrete –Lightweight aggregate concrete - Cellular concrete - No-fines concrete - High density concrete - Fiber reinforced concrete - Different types of fibers - Factors affecting properties of FRC - Polymer concrete - Types of Polymer concrete - Properties of polymer concrete - High performance concrete - self compacting concrete - SIFCON - self-healing concrete.

Textbooks:

1. Shetty, M.S., and Jain A.K., Concrete Technology: Theory and Practice, S. Chand Publishing, 2019.
2. Santha Kumar, A.R., Concrete Technology, Oxford University Press, New Delhi, 2018.

References:

1. A.M., Properties of Concrete by Pearson 5th edition Education ltd 2012.
2. P.K.Mehta and Moterio, McGraw Hill, Properties and Materials by Concrete, Microstructure by 4th edition 2017.
3. M.L. Gambhir.–Tata McGraw Hill Publishers ,ConcreteTechnology,3rdedition New Delhi

STRENGTH OF MATERIALS

II-B.Tech-I-Sem **L T P C**
Subject Code: 21P01303 **3 1 0 3**
Pre Requisite: Nil

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

1. Demonstrate the basic materials behavior under the influence of different external loading conditions and the support conditions.
2. Develop the diagrams indicating the variation of the key performance features like bending moment and shear forces.
3. Analyze section modulus, stresses and deflections developed in the beams due to various loading conditions.
4. examine the stresses in different engineering applications like shafts, springs subjected to different loading conditions
5. Categorize the principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.

Unit-I: Simple Stresses and Strains **9 hours**

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 moduli and the relationship between them – Bars of varying section – stresses in composite bars – Temperature stresses.

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

Unit-II: Shear Force and Bending Moment **9 hours**

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

Unit-III: Flexural and Shear Stresses **9 hours**

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R, Neutral axis – Determination 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, I, T Angle sections.

Unit-IV: Torsion of Circular Shafts and Springs **9 hours**

Torsion of Circular Shafts and Springs: Theory of pure torsion – Derivation of Torsion equations: T/J = q/r = Nϕ/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.

Unit-V: Principal Stresses and Strains and Theories of Failures **9 hours**

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 Failures: Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

Textbooks:

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

References:

1. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications.
2. Mechanics of material by R.C. Hibbeler, Prentice Hall publications.
3. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Press.
4. Strength of Materials by R.K.Bansal, Lakshmi Publications House Pvt.Ltd.

MECHANICS OF FLUIDS

II-B.Tech-I-Sem **L T P C**
Subject Code: 21P01304 **3 0 0 3**
Pre Requisite: Nil

Course Outcomes: At the end of the course, the students will be able to
1. Know the definitions of fundamental concepts of fluid mechanics.
2. Analyzing the nature of flow in pipe and hydrostatic forces acting on submerged static fluid.
3. Analyzing the pressure and velocities by using the bernoulli's equation and momentum equation.
4. Evaluating of head losses in a closed conduit flow interconnected with reynolds number.
5. Justify the rate of flow through channels by using flow measurement devices.

Unit-I: Basics of Fluids **9 hours**

Introduction: Dimensions and units - Physical properties of fluids - specific gravity - viscosity - surface tension - vapour pressure and their influences on fluid motion - pressure at a point - Pascal's law - Hydrostatic law - Relationship between pressures. Measurements: Pressure gauges - Manometers - Differential and Micro Manometers.

Unit-II: Fluid Kinematics **9 hours**

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 irrigational flows, Equation of continuity for one, two, three dimensional flows, stream and velocity potential functions, flow net analysis

Unit-III: Fluid Dynamics **9 hours**

Fluid Dynamics: Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its applications, force on pipe bend. . Pitot tube, Venturimeter and orifice meter - classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches -Broad crested weirs

Unit-IV: Laminar and turbulent flows **9 hours**

Closed Conduit Flow: Laws of Fluid friction - Darcy's equation, Minor losses - pipes in series- pipes in
Laminar Flow and Turbulent Flows: Reynold's experiment - Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long, flow through inclined tubes.
parallel -Total energy line and hydraulic gradient line.

Unit-V: Boundary Layer Theory **9 hours**

Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.

Textbooks:

1. Bansal, R.K., A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi, 2018.
2. Ojha, C.S.P., Berndtsson, R., and Chadramouli, P.N., Fluid Mechanics and Machinery, Oxford University Press,2010.

References:

1. Modi, P.N., and Seth, S.M., Hydraulics and Fluid Mechanics including Hydraulic machine, Standard Publishers and Distributors, New Delhi, 2017.
2. Edward J. Shaughnessy, Jr, Ira M.Katz and James P. Schaffer, Introduction to Fluid Machines, Oxford University Press, New Delhi, 2005.

STRENGTH OF MATERIALS LABORATORY

	L	T	P	C
II-B.Tech-I-Sem				
Subject Code: 21P01311	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Configure and operate a data acquisition system using various testing machines of solid materials.
2. Compute and analyze engineering values (eg., stress or strain) from laboratory measurements.
3. Write a technical laboratory report.

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. Tension test on Mild steel bar.
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on Bricks, wood or concrete.
8. Impact test (Charpy and Izod impact test).
9. Shear test (on UTM).
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges.
12. Continuous beam - deflection test

SURVEYING FIELD WORK LABORATORY

	L	T	P	C
I-B.Tech-I-Sem				
Subject Code: 21P01312	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Measure horizontal and vertical distances and angles.
2. Identification of source of errors and rectification methods.
3. Apply surveying principles to determine areas and volumes and setting out curves.

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Survey in an area by chain survey (Closed Polygon).
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse)..
5. Plane table survey; finding the area of a given boundary by the method of radiation.
6. Plane table survey; finding the area of a given boundary by the method of intersection.
7. Two Point Problem by the plane table survey.
8. Fly leveling: Height of the instrument method (differential leveling).
9. Fly leveling: rise and fall method.
10. Fly leveling: closed circuit/ open circuit.
11. Fly leveling; Longitudinal Section and Cross sections of a given road profile.
12. Height and distances using principles of tachometric surveying.

CONCRETE TECHNOLOGY LABORATORY

I-B.Tech-I-Sem	**L**	**T**	**P**	**C**
Subject Code: 21P01313	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Determine properties & workability of cement.
2. Determine specific gravity of coarse aggregate and fine aggregate by sieve analysis.
3. Understand non-destructive testing procedures on concrete.

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. Determination of normal Consistency and fineness of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of specific gravity and soundness of cement.
4. Determination of compressive strength of cement.
5. Determination of grading and fineness modulus of Coarse aggregate by sieve analysis.
6. Determination of specific gravity of coarse aggregate.
7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
8. Determination of bulking of sand.
9. Determination of workability of concrete by compaction factor method.
10. Determination of workability of concrete by slump test.
11. Determination of workability of concrete by Vee-bee test.
12. Determination of compressive strength of cement concrete and its young's modulus.
13. Determination of split tensile strength of concrete.
14. Non-Destructive testing on concrete (for demonstration).

COMPUTER AIDED DRAFTING OF BUILDINGS

	L	T	P	C
II-B.Tech-I-Sem				
Subject Code: 21S01301	**0**	**0**	**3**	**1.5**
Pre Requisite: Nil				

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

1. Remember about tool bars like draw, modify and dimensional.
2. Develop the planning of buildings using 2d command.
3. Develop the sections and elevations of buildings using 2d command.

LIST OF EXPERIMENTS

1. Introduction to computer aided drafting
2. Practice on AutoCad Screen
3. Practice on 2D commands
4. Drawing of plans of buildings using software
   a) Single storeyed
   b) Multi storeyed
5. Developing sections and elevations for
   a) Single storeyed
   b) Multi storeyed

II-B.TECH.-II-SEMESTER SYLLABUS

ENGINEERING GEOLOGY

II-B.Tech-II-Sem **L T P C**
Subject Code: 21E01401 **3 0 0 3**
Pre Requisite: Nil

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

1. Understand the internal structure of earth and its relation to earthquake, volcanism and the various geological agents.
2. Identify and classify the geological minerals and rocks.
3. Know the occurrence of materials using the strike & dip problems.
4. Identify the site parameters such as contour, slope & aspect for topography.
5. Investigate the project site for mega/mini civil engineering projects. site selection for mega engineering projects like dams, tunnels, etc.

Unit-I: Introduction — 10 hours

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies.
Weathering: Weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

Unit-II: Mineralogy and Petrology — 10 hours

Mineralogy and Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

Unit-III: Structural Geology — 10 hours

Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

Unit-IV: Surface and Sub-Surface Geological Investigations — 10 hours

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.
Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.
Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

Unit-V: Geological Considerations **10 hours**

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs, Purpose of Tunneling, effects, Lining of Tunnels, Influence of Geology for successful Tunneling

Textbooks:

1. Parbin Singh. A Text book of Engineering and General Geology, Katson publishing house, Ludhiana 2009.
2. Varghese, P.C., Engineering Geology for Civil Engineering PHI Learning Private Limited, New Delhi, 2012.

References:

1. Bell, F.G., Fundamentals of Engineering Geology, B.S. Publications. Hyderabad 2011.
2. Chenna Kesavulu, N., Textbook of Engineering Geology, Macmillan India Ltd., 2009.
3. Gokhale, KCGK., Principles of Engineering Geology, BS Publications, Hyderabad 2011
4. Venkatareddy. D. Engineering Geology, Vikas Publishing House Pvt. Ltd. 2010.

PROBABILITY & STATISTICS

II-B.Tech-II-Sem **L T P C**
Subject Code: 21B00402 **3 1 0 3**
Pre Requisite: Nil

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

1. classify the concepts of data science and its importance
2. interpret the association of characteristics and through correlation and regression tools
3. apply discrete and continuous probability distributions to determine the mean and variance of a sampling distribution of means
4. design the components of a classical hypothesis test for large samples
5. develop the use of small sample tests needed by engineers for practical applications.

Unit-I: Descriptive Statistics and Methods for Data Science **12 hours**

Data science – Statistics Introduction – Population vs Sample – Collection of data – primary and secondary data – Type of variable: dependent and independent Categorical and Continuous variables – Data visualization – Measures of Central tendency – Measures of Variability (spread or variance) – Skewness Kurtosis.

Unit-II: Correlation and Regression **12 hours**

Correlation and Curve fitting: Correlation – correlation coefficient – rank correlation – Regression coefficients and properties – regression lines – Method of least squares – Fit a Straight line – parabola – Exponential – Power curves.

Unit-III: Random Variables, Distributions and Sampling Theory **12 hours**

Random variables – Discrete and Continuous random variables – Distribution function – Mathematical Expectation and Variance – Binomial, Poisson and Normal distributions.

Sampling Theory: Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof)

Unit-IV: Estimation and Test Of Hypothesis (Large Samples) **10 hours**

Point and Interval estimations – Maximum error of estimate – Confidence interval – Test of Hypothesis – Null and Alternative Hypothesis – Type I and Type II errors – Level of significance – One tail and two-tail tests – Z-Tests concerning one proportion and two proportions – Z-Test concerning one mean and two means (Large samples)

Unit-V: Test of Hypothesis (Small Samples) **10 hours**

Hypothesis concerning one mean and two means (Small Samples) using t -Test – Tests concerning difference of two variances (Small samples) using F-test – χ^2 -test for goodness of fit and independence of attributes.

Textbooks:

1. Miller and Freund's, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S. C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, SultanChand & Sons Publications, 2012.

References:

1. Shron L. Myers, Keying Ye, Ronald E Walpole, Probability and Statistics Engineersand the Scientists,8th Edition, Pearson 2007.
2. Jay l. Devore, Probability and Statistics for Engineering and the Sciences, 8th Edition,Cengage.
3. Sheldon M. Ross, Introduction to probability and statistics Engineers and theScientists, 4th Edition, Academic Foundation, 2011.
4. Johannes Ledolter and Robert V. Hogg, Applied statistics for Engineers and PhysicalScientists, 3rd Edition, Pearson, 2010.

HYDRAULICS AND HYDRAULIC MACHINERY

II-B.Tech-II-Sem **L T P C**
Subject Code: 21P01401 **3 1 0 3**
Pre Requisite: MECHANICS OF FLUIDS

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

1. determine the most economical dimensions of different channel sections and analyze the flow through an open channel
2. formulate an equation for a phenomenon using dimensional analysis
3. evaluating the concept of impact of jets
4. understand different components, function and use of different types of turbines
5. analyze and select suitable type of pumps

.

Unit-I: Open Channel Flow **9 hours**

Types of flows - Type of channels - Velocity distribution - Energy and momentum correction factors - Chezy's, Manning's - Kutter's Equations - Bazin formulae for uniform flow - Most Economical sections.

Critical flow: Specific energy - critical depth - computation of critical depth - critical - sub-critical - super critical flow - uniform flow - open channel or non uniform flow.

Unit-II: Hydraulic Similitude **9 hours**

Dimensional analysis - Rayleigh's method - Buckingham's pi theorem

Study of Hydraulic models - Geometric - kinematic - dynamic similarities - dimensionless numbers - model - prototype relations.

Unit-III: Impact of Jet Vanes **9 hours**

Hydrodynamic force of jets on stationary - moving flat inclined - curved vanes - jet striking centrally - at tip - velocity triangles - at inlet and at outlet - expressions for work done - efficiency - angular momentum principle.

Unit-IV: Hydraulic Turbines **9 hours**

Layout - Installation - Hydropower - Heads - efficiencies - classifications of turbines - Pelton wheel - Francis turbine - Kaplan turbine - velocity diagram - work done - efficiency - tube - theory - function efficiency - Governing of turbines - surge tanks - unit and specific turbines - unit speed - unit quantity - unit power - specific speed performance – characteristics - geometric similarity - cavitations.

Unit-V: Pumps **9 hours**

Centrifugal Pumps: classification - work done by Impeller - Manometric head - minimum starting speed - losses and efficiencies - specific speed - multistage pumps - pumps in parallel - performance of pumps - Characteristic curves - Cavitations.

Reciprocating Pumps: Introduction - classification - main components - working nature - discharge through pumps - indicator diagram - work done by reciprocating pumps - slip of reciprocating pumps.

Textbooks:

1. Chandramouli P .N., Applied Hydraulic Engineering, Yes Dee Publisher, 2017.
2. Jain. A.K., Fluid Mechanics, Khanna Publishers, Delhi, 2010.

References:

1. R.K.Bansal, Fluid mechanics and Hydraulic machines, Laxmi publications, New Delhi.
2. Modi, P.N., and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 19th edition, 2013.
3. Subramanya, K., Flow in open channels, Tata McGraw Hill, New Delhi, 2000.
4. Ven Te Chow, Open Channel Hydraulics, McGraw Hill, New York, 2009.

STRUCTURAL ANALYSIS

II-B.Tech-II-Sem **L T P C**
Subject Code: 21E03202 **3 1 0 3**
Pre Requisite: STRENGTH OF MATERIALS

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

1. Distinguish between the determinate and indeterminate structures, analyze the proppe. cantilever and fixed beams with various types of loads.
2. Analyze the continuous beams, frames using various methods –moment distribution method, slope deflection methods.
3. Analyze the two hinged and three hinged arches.
4. Draw the influence line diagrams for various types of moving loads on beams/bridges.
5. Analyze the continuous beams, frames using various methods – flexibility and stiffness matrix methods.

Unit-I: Propped Cantilever And Fixed Beams **10 hours**

Propped Cantilevers: Introduction -Degree of Static and Kinematic indeterminacy of Beams, frames and trusses. Analysis of propped cantilevers-shear force and Bending moment diagrams- Elastic curve - Deflection of propped cantilever beams.

Fixed Beams – Introduction to statically indeterminate beams with U. D. 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-Elastic curve.

Unit-II: Analysis of Continuous Beams and Portal Frames **10 hours**

Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports. Analysis of Single bay single storey portal frames without sway. Shear force and Bending moment diagrams, Elastic curve.

Moment distribution method: Application to continuous beams with and without settlement of supports. Analysis of Single bay single storey portal frames without sway. Shear force and Bending moment diagrams, Elastic curve.

Unit-III: Arches **10 hours**

Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature. Hinges with supports at different levels

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses.

Unit-IV: Moving Loads and Influence Lines **10 hours**

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, single point load, U.D. load longer than the span, U.D. load shorter than the span.

Unit-V: Matrix Methods of Analysis **10 hours**

Introduction to Flexibility and Stiffness matrix methods of analyses using 'system approach' upto three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods. Analysis of single bay single storey portal frames using only stiffness method - Shear force and bending moment diagrams - Elastic curve.

Textbooks:

1. Bhavikatti,S.S, "Structural Analysis",Vol.1 & 2, Vikas Publishing House Pvt.Ltd., NewDelhi-4, 2014.
2. Vazrani.V.N And Ratwani, M.M, "Analysis of Structures", Vol. I and II, Khanna Publisers2015.

References:

1. Devdas Menon, "Structural Analysis", Narosa Publishing Housing Pvt. Ltd., 2nd edition, 2018.
2. Gambhir.M.L., "Fundamentals of Structural Mechanics and Analysis", PHI Learning Pvt. Ltd., 2011.
3. R. C. Hibbeler, "Structural Analysis by , Pearson Education", 9th edition, 2017.

MANAGERIAL ECONOMICS FOR ENGINEERS

II-B.Tech-II-Sem **L T P C**
Subject Code: 21H01401 **3 0 0 3**
Pre Requisite: Nil

Course Outcomes: At the end of the course, the students will be able to
1. Apply Managerial Economic concepts for decision making
2. Perform cost analysis in Production
3. Apply management theories in Markets & Firms
4. Outline the principles of industrial & business organizations & its financial management
5. Illustrate the importance of capital & capital budgeting in decision Making

Unit-I: Introduction to managerial economics and demand analysis **10 hours**
Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

Unit-II: Theory of production and cost analysis **8 hours**
Theories of Production function- Law of Variable Proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs – Cost –Volume Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

Unit-III: Introduction to markets, managerial theories of the firm &pricing policies 8 hours
Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly Managerial theories of the firm - Marris and Williamson's models. Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing, Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

Unit-IV: Types of industrial organization & introduction to business cycles **10 hours**
Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types. Changing business environment in post-liberalization scenario
FINANCIAL MANAGEMENT: Functions of financial management, simple and compound interest, Methods of evaluating alternatives
DEPRECIATION: Common Methods of Depreciation

Unit-V: Capital and capital budgeting **10 hours**
Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems)

Textbooks:

1. Managerial Economics and Financial Analysis, by J.V.Prabhakar Rao, Maruthi Publications, 2011.
2. Managerial Economics and Financial Analysis, by N. Appa Rao. & P. Vijaya Kumar, Cengage Publications, New Delhi, 2011.

References:

1. Managerial Economics and Financial Analysis, by A R Aryasri, TMH 2011.

2. Managerial Economics by Suma damodaran, Oxford 2011.

3. Mangerial Economice and Financial Analysis by S.A. Siddiqui & A.S. Siddiqui, New Age International Publishers, 2011.

ENGINEERING GEOLOGY LABORATORY

	L	T	P	C
II-B.Tech-II-Sem				
Subject Code: 21E01411	**0**	**0**	**3**	**1.5**
Pre Requisite: Nil				

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

1. Identify mega-scopic minerals, rocks & their properties.
2. Identify the site parameters such as contour, slope & aspect for topography.
3. Know the occurrence of materials using the strike & dip problems.

LIST OF EXPERIMENTS

1. **Physical Properties of minerals**: Mega-scopic identification of Rock forming minerals - Quartz group - Feldspar group - Garnet group - Mica group - Talc - Chlorite - Olivine - Kyanite - Asbestos - Tourmelene - Calcite - Gypsum - Ore forming minerals - Magnetite - Hematite - Pyrite - Pyralusite - Graphite - Chromite.
2. **Igneous rocks:** Granite - Pegmatite - Gabbro - Dolerite - Syenite - Granite – Basalt.
3. **Sedimentary rocks**: Sand stone - Ferrugineous sand stone - Lime stone - Shale - Laterite - Conglamorate.
4. **Metamorphic rocks:** Biotite - Granite - Gneiss - Slate - Muscovite - Biotite - Schist - Marble - Khondalite.
5. **Interpretation**: drawing of sections - geological maps - tilted beds - faults-unconformities.
6. **Field work**: To identify Minerals, Rocks, Geomorphology& Structural Geology.

FLUID MECHANICS & HYDRAULIC MACHINERY LABORATORY

II-B.Tech-II-Sem **L T P C**
Subject Code: 21P01411 **0 0 3 1.5**
Pre Requisite: Nil

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

1. Determine the coefficient of discharge of flow measuring devices.
2. Verify the bernoulli's theorem and knowledge on impact of jets.
3. Determine performance of hydraulic turbines and pumps and draw characteristics curve.

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. Calibration of Venturimeter & Orifice meter.
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch.
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes.
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

GEOGRAPHIC INFORMATION SYSTEM LABORATORY

II-B.Tech-II-Sem	**L**	**T**	**P**	**C**
Subject Code: 21P01412	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Digitize and create thematic map and extract important features.
2. Develop digital elevation model.
3. Compute and manipulate with non spatial data and spatial data.

LIST OF EXPERIMENTS

1. Georeferencing of Image/Toposheet/Map.
2. Preparation of Basemap.
3. Digitization of toposheet.
4. Mosaic of Images
5. Attribute Data Entry and Manipulation.
6. Creation of Thematic Map.
7. Estimation of features and Interpretation.
8. DEM.
9. Simple application of RS&GIS in Transportation.
10. Simple application of RS&GIS in Water Resources.

ADVANCED FIELD SURVEYING

II-B.Tech-II-Sem	**L**	**T**	**P**	**C**
Subject Code: 21S01401	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Measure horizontal and vertical- distances and angles.
2. Identification of source of errors and rectification methods.
3. Apply surveying principles to determine areas and volumes and setting out curves.

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. **Theodolite Survey:** Horizontal and Vertical angles by the method of repetition.
2. **Theodolite Survey:** Finding the distance between two inaccessible points.
3. **Theodolite Survey:** Finding the height of far object.
4. **Tacheomatric Survey:** Heights and distance problems using tachometric principles.
5. **Curve setting:** One Exercise.
6. **Contours:** One Exercise.
7. **Total Station:** Introduction to total station and practicing setting up, leveling up and elimination of parallax error.
8. **Total Station:** Determination of area using total station.
9. **Total Station:** Closed Traversing.
10. **Total Station:** Contouring.
11. **Total Station:** Determination of Remote height object.
12. **Total Station:** distance between two in accessible points.

BASICS OF INDIAN CONSTITUTION

II-B.Tech-II-Sem **L T P C**
Subject Code: 21M00401 **2 0 0 0**
Pre Requisite: Nil
Course Outcomes: At the end of the course, the students will be able to

1. Understand the structure of executive, legislature and judiciary
2. Understand philosophy of fundamental rights and duties
3. Understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
4. Understand the central and state relation financial and administrative.

Unit-I: Introduction to Indian Constitution **10 hours**

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution – Sources and constitutional history, Features – Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

Unit-II: Union Government and its Administration **10 hours**

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions;

Unit-III: State Government and its Administration **10 hours**

State Government and its Administration Governor – Role and Position – CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

Unit-IV: Local Administration **10 hours**

Local Administration – District's Administration Head – Role and Importance, Municipalities – Mayor and role of Elected Representative – CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy – (Different departments), Village level – Role of Elected and Appointed officials – Importance of grass root democracy

Unit-V: Election Commission **10 hours**

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission, Functions of Commissions for the welfare of SC/ST/OBC and women

References:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government andPolitics Hans
7. J. Raj IndianGovernment and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd. New Delhi.

III-B.TECH.-I SEMESTER SYLLABUS

DESIGN AND DETAILING OF REINFORCED CONCRETE STRUCTURES

III-B.Tech-I-Sem | **L T P C**
Subject Code: 21P01501 | **3 1 0 3**
Pre Requisite: Nil

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

1. work on different types of design methods
2. design of members in flexural and shear
3. understand bond and torsion
4. design of compression members under different types of loading
5. understand different types of footings and design

Unit-I: Design Methods **12 hours**

Working stress method: Elastic theory: design constants, modular ratio, neutral axis depth and moment of resistance - balanced, under-reinforced and over-reinforced sections. Design of singly and doubly reinforced beams, IS Code Provisions.
Limit State Design: Basic statistical principles –Characteristic strength – Characteristic loads - Partial load and safety factors – stress-strain curves for HYSD bars and MS bars. Assumptions – stress block parameters – Moment of Resistance.

All units i.e. from unit II to unit V are to be taught in Limit State Design.

Unit-II: Design for Flexure and Shear **12 hours**

Design for Flexure and Shear: Design of singly reinforced beams- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beams- Minimum depth - Minimum and Maximum Flexural Tension Reinforcement - Design of Flanged Sections (T & L)- Effective width of flange - Analysis and Design Problems.
Design for Shear and Torsion: Analysis and design of sections for shear and torsion – bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

Unit-III: Slabs and Serviceability **12 hours**

Slabs and Serviceability: Classification of slabs, design of one - way slabs, one way continuous slab using IS Coefficients (Conventional) –Design of two - way slabs - simply supported slabs and slabs with various edge conditions using IS Coefficients. Design of Stair case
Limit state of serviceability: Deflection, cracking and IS code provisions for beams and slabs.

Unit-IV: Design of Compression members **12 hours**

Design of Compression members: Effective length, Braced and un-braced columns – IS Code provisions, Design of short and long columns under axial loads, uniaxial bending and biaxial bending (Demonstration using SP 16)

Unit-V: Footings **12 hours**

Footings: Types of footings – Design of isolated footings – pedestal, square, rectangular and circular footings subjected to axial loads, uni-axial bending moment.

NOTE: All the designs to be taught in Limit State Method. Following plates in diagrams should be prepared by the students.

1. Reinforcement detailing of T-beams, L-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
3. Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part-B is 60%.

Textbooks:

1. Limit State Design, A. K.Jain, Nem Chand Brothers
2. Reinforced Concrete Structures, N. Krishna Raju & R. N. Pranesh, New Age Publications.

References:

1. RCC Design, B.C Punmia, A. K. Jain and A. K Jain. LakshmiPublications
2. Reinforced Concrete Structures, S. Unnikrishna Pillai &Devdas Menon, Tata c.Graw Hill, New Delhi.
3. Design of Reinforced concrete Structures, N.Subrahmanian, Oxford University Press.
4. Limit state design of reinforced concrete structures by P C Varghese, PHI Learning pvt. Ltd.

GEOTECHNICAL ENGINEERING

III-B.Tech-I-Sem. **L T P C**
Subject Code : 21P01502 **3 1 0 3**
Pre Requisite: Nil

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

1. Demonstrate ability various types of soils and its properties, formulates and solve engineering problems.
2. Show the basic understanding of flow through soil medium and its impact of engineering solution.
3. Understand the basic concept of stress distribution in loaded soil medium and soil settlement due to consolidation.
4. Understand of shear strength of soils and its impact of engineering solutions to the loaded soil medium and also will be aware of contemporary issue on shear strength of soils.
5. Demonstrate an ability to design shallow and deep foundations, it component or process as per the needs and specifications.

Unit-I: Introduction, Index properties of Soils and Compaction **10 hours**

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density . Index Properties of Soils:Grain size analysis – Sieve and Hydrometer methods- consistency limits and indices – Various types of soil Classifications – Unified soil classification and I.S. Soil classification. Compaction: Mechanism of compaction – factors affecting – Field compaction methods- effects of compaction on soil properties - compaction control.

Unit-II: Permeability and Geostatic Stresses **10 hours**

Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law permeability – Factors affecting –laboratory determination of coefficient of permeability of layered systems. Geostatic Stresses: Total, neutral and effective stresses –quick sand condition Seepage: 2-D flow and Laplace's equation-Seepage through soils–Flow nets: Characteristics and Uses.

Unit-III: Stress Distribution in Soils and Consolidation **10 hours**

Stress Distribution in Soils:Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart -2:1 stress distribution method. Consolidation:Compressibility of soils –e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

Unit-IV: Shear Strength of Soils and Shallow Foundations **10 hours**

Shear Strength of Soils: Basic mechanism of shear strength -Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions. Shallow Foundations - Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity -Factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory - IS Methods.

Unit-V: Shallow and Deep Foundations **10 hours**

Shallow Foundations - Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures. Pile Foundation: Types of piles – Load carrying

capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays- negative skin friction (NSF).

Textbooks:

1. Basic and Applied Soil Mechanics, by Gopal Ranjan and A.S.R.Rao, New Age International Publishers.
2. Soil Mechanics and Foundation Engineering, by V.N.S.Murthy, CBS publishers

References:

1. Principles of Foundation Engineering by Das, B.M., - (2011) –6th edition (Indian edition) Cengage learning.
2. Soil mechanics and foundation engineering by K.R. Arora, standard publishers distributors.
3. Foundation Analysis and Design by Bowles, J.E., (1988) – 4th Edition, McGraw-Hill Publishing Company, New York.
4. Theory and Practice of Foundation Design by N.N.SOM & S.C.DAS PHI Learning Private limited.

HIGHWAY ENGINEERING

III-B.Tech-I-Sem. **L T P C**
Subject Code: 21P01503 **3 0 0 3**
Pre Requisite: Nil

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

1. Plan highway network for a given area
2. Determine Highway alignment and design highway geometrics
3. Design Intersections and prepare traffic management plans
4. Judge suitability of pavement materials
5. Design flexible pavements and rigid pavements.

Unit-I: Highway Planning and Alignment **9 hours**

Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans– First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

Unit-II: Highway Geometric Design **9 hours**

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 **9 hours**

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals –Webster Method –IRC Method.

Unit-IV: Highway Materials **9 hours**

Subgrade soil: classification –Group Index – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen – Bituminous paving mixes: Requirements – Marshall Method of Mix Design.

Unit-V: Design of Pavements **9 hours**

Types of pavements; Functions and requirements of different components of pavements; Design Factors.

Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.

Rigid Pavements*:* Design Considerations – wheel load stresses – Temperature stresses Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

Textbooks:

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.
2. Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers, New Delhi.

References:

1. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi.
2. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi.

PROFESSIONAL ELECTIVE- I
a. REPAIR & REHABILITATION OF BUILDINGS

III-B.Tech-I-Sem | **L T P C**
Subject Code: 21L01501 | **3 0 0 3**
Pre Requisite: Nil

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

1. Recognize the mechanisms of degradation of concrete structures and to design durable concrete structures.
2. Design and suggest repair strategies for deteriorated concrete structures including repairing with composites.
3. Understand the methods of strengthening methods for concrete structures
4. Evaluation of causes and mechanism of damage
5. Evaluation of actual capacity of the concrete structure

Unit-I: **10 hours**

Materials for repair and rehabilitation -Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates- Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

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Unit-II: **10 hours**

Strengthening and stabilization- Techniques- design considerations- Beam shear capacity strengthening- Shear Transfer strengthening- stress reduction techniques- Column strengthening-flexural strengthening- Connection stabilization and strengthening, Crack stabilization.

Unit-III: **10 hours**

Bonded installation techniques- Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding- CDC debonding- plate end debonding- strengthening of floor of structures.

Unit-IV: **10 hours**

Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes- Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete- Introduction- classification of flyash- properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state- Durability of flyash concretes.

Unit-V: **10 hours**

High performance concretes- Introduction- Development of high performance concretes- Materials of high performance concretes- Properties of high performance concretes- Self Consolidating concrete- properties- qualifications.

Textbooks:

1. Maintenance Repair Rehabilitation & Minor works of Buildings-P.C.Varghese, PHI Publications
2. Repair and Rehabilitation of Concrete Structures–P.I.Modi, C.N.Patel, PHIPublications

References:

1. Concrete technology- Neville & Brooks
2. Special Structural concrete- Rafat Siddique
3. Concrete repair and maintenance illustrated- Peter H Emmons
4. Concrete Technology-M S Shetty

b. ENVIRONMENTAL IMPACT ASSESSMENT

III-B.Tech-I-Sem **L T P C**
Subject Code: 21L01502 **3 0 0 3**
Pre Requisite: Nil

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

1. Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
2. Selection of an appropriate EIA methodology
3. Evaluation of impacts on environment
4. Evaluation of risk assessment
5. Know the latest acts and guidelines of MoEF & CC

Unit-I: Basic concepts of EIA **10 hours**

Basic concepts of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination- life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA, Environmental economics, Cost/benefit Analysis - EIS and EMP. Identification of activities- application of remote sensing and GIS for EIA.

Unit-II: EIA Methodologies **10 hours**

EIA Methodologies: Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods. **Impact of Developmental Activities and Land use**: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area.

Unit-III: **10 hours**

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

Unit-IV: **10 hours**

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.
Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment- Advantages of Environmental Risk Assessment

Unit-V: EIA: MoEF&CC Acts, Notifications and Guidelines **10 hours**

EIA: MoEF&CC Acts, Notifications and Guidelines: Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO14000. Environmental compliance reports, Case studies and preparation of EIA statement for various Industries

Textbooks:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

References:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. Katania& Sons Publication., New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

c. CONSTRUCTION TECHNOLOGY & MANAGEMENT

III-B.Tech-I-Sem **L T P C**
Subject Code: 21L01503 **3 0 0 3**
Pre Requisite: Nil

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

1. Appreciate the importance of construction planning
2. Understand the functioning of various earth moving equipment
3. Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
4. Apply the gained knowledge to project management and construction techniques
5. Know various equipment's like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery, related to constriction.

Unit-I: **10 hours**

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical Path Method – Applications.

Unit-II: **10 hours**

Project Evaluation and Review Technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources.

Unit-III: **10 hours**

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers.

Unit-IV: **10 hours**

Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing.

Unit-V: **10 hours**

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering.

Textbooks:

1. Construction Planning Equipment and Methods, Peurifoy and Schexnayder , Shapira, Tata Mcgraw hill
2. Construction Project Management Theory and Practice, Kumar NeerajJha (2011), Pearson.

References:

1. Construction Project Management - An Integrated Approach, Peter Fewings , Taylor and Francis
2. Construction Management Emerging Trends and Technologies, Trefor Williams, Cengagelearning.
3. Hand Book of Construction Management, P. K. Joy, Trinity Press Chennai, New Delhi.

GEOTECHNICAL ENGINEERING LABORATORY

III-B.Tech-I-Sem.	**L**	**T**	**P**	**C**
Subject Code : 21P01511	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. determine index properties of soil and classify them.
2. determine permeability of soils.
3. determine Compaction, Consolidation and shear strength characteristics

LIST OF EXPERIMENTS

(Any 10 of the following listed experiments)

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Permeability of soil - Constant and Variable head tests
6. Compaction test
7. Consolidation test (to be demonstrated)
8. Direct Shear test
9. Triaxial Compression test
10. Unconfined Compression test
11. Vane Shear test
12. Differential free swell (DFS)
13. Field Plate Load Test demo
14. Field CBR demo

TRANSPORTATION ENGINEERING LABORATORY

	L	T	P	C
III-B.Tech-I-Sem.				
Subject Code: 21P01512	**0**	**0**	**3**	**1.5**
Pre Requisite: Nil				

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

1. test crushing value, impact resistance, specific gravity and water absorption, attrition value, abrasion value, flakiness index and elongation index for the given road aggregates.
2. know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. test the stability for the given bituminous mix .

LIST OF EXPERIMENTS

1. ROAD AGGREGATES:

a) Aggregate Crushing value Test
b) Aggregate Impact Test.
c) Specific Gravity and Water Absorption Test
d) Attrition Test
e) Abrasion Test.
f) Shape tests

2. BITUMINOUS MATERIALS:

a) Penetration Test.
b) Ductility Test.
c) Softening Point Test.
d) Flash and fire point tests.
e) Stripping Test
f) Viscosity Test.

3. BITUMINOUS MIX:

a) Marshall Stability test.

4. TRAFFIC SURVEYS:

a) Traffic volume study at mid blocks.
b) Traffic Volume Studies (Turning Movements) at intersection.
c) Spot speed studies.
d) Parking study.

5. DESIGN& DRAWING:

a) Earthwork calculations for road works
b) Drawing of road cross sections
c) Rotary intersection design

EMPLOYABILITY SKILLS -I

	L	T	P	C
III-B.Tech-I-Sem.				
Subject Code : 21S01511	**1**	**0**	**2**	**2**

Pre Requisite: Nil

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

1. demonstrate verbal and written skills effectively
2. develop professional correspondence skills
3. build proficiency in quantitative reasoning
4. improve critical thinking skills
5. exhibit confidence in facing the interview process

Unit–I **06 Hours**

Verbal Ability: Fundamentals of Grammar - Sentence Structure - Parts of Speech.
Analytical Skills: Averages - Basic Concepts, combined mean, average principles, wrong values taken, number added or deleted, average speed.
Percentages - Basic Concepts, conversions, finding percentages from given numbers, quantity increases or decreases by given percentage, population increase by given percentage, comparisons, consumption when a commodity price increase or decrease and applications.
Data Interpretation - Introduction to Data Interpretation, quantitative and qualitative data, Tabular Data, Line Graphs, Bar Chart, Pie Charts, X-Y Charts.

Unit–II **06 Hours**

Verbal Ability: Synonyms and Antonyms, Homonyms and Homophones, Word Formation, Idioms and Phrases, Analogy, One-word Substitutes.
Analytical Skills: Reasoning - Number Series, Letter Series, Series completion and correction, Coding and Decoding.

Unit–III **08 Hours**

Part-A: Verbal Ability: Exercises on Common Errors in Grammar.
Analytical Skills: Word analogy-Applied analogy.

Part-B: Verbal Ability: Vocabulary Enhancement, Study skills and using a Dictionary.
Analytical Skills: Classifications, verbal classification.

Unit–IV **10 Hours**

Verbal Ability: Paragraph writing, Picture description, Text Completion, Essay writing.
Analytical Skills: Reasoning Logical Diagrams - Simple diagrammatic relationship, Multi diagrammatic relationship, Venn-diagrams, Analytical reasoning.

Unit–V **10 Hours**

Verbal Ability: Sentence Equivalence, Comparison and Parallelism, Letter writing and e-mail writing.
Analytical Skills: Reasoning Ability - Blood Relations, Seating arrangements, Directions, Decision making.

Activities List:

1. Regular cumulative practice tests.
2. Quiz, Crossword, Word-search and related activities.
3. Picture Description including Description of Photos/Images/Posters/Advertisement Analysis etc.,

PROFESSIONAL ETHICS AND HUMAN VALUES
(Mandatory Course)

III-B.Tech-I-Sem. **L T P C**
Subject Code :21M00501 **2 0 0 0**
Pre Requisite: Nil

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

1. illustrate diverse ethical issues rooted in society and its impact on trade, business and societal issues.
2. impart professional skills as managers, advisors, experts and consultants.
3. apply observations of a spiritual discourse for a better society.
4. make use of professional ethics and rights
5. apply the principles of professional ethics for a better practice in the field of choice

Unit I

Human Values: Morals, values, ethics – integrity – work ethics –service learning –civic virtue – respect for others- living peacefully - Caring –sharing –honesty – courage –valuing time – cooperation – commitment –empathy – self-confidence –spirituality – character- Mini-Cases

Unit II

Professional Ethics: Profession- and professionalism - Two models of professionalism –Professional

etiquette -Three types of Ethics or morality Responsibility in Engineering – Engineering standards – Engineering Ethics – Positive and Negative Faces. Professional Codes and Code of conduct of Institute of Engineers . Mini-cases .

Unit III

Professional Responsibilities: Ethical standards Vs Professional Conduct – Zero Tolerance for Culpable Mistakes – Hazards and Risks - congeniality, collegiality and loyalty. Respect for authority – conflicts of interest –Mini-Cases.

Unit IV

Professional Rights: professional rights and employee rights communicating risk and public policy – Whistle blowing - Professionals /engineers as managers, advisors, experts, witnesses and consultants – moral leadership- Monitoring and control- Mini-Cases

Unit V

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

References

1. S B George, Human Values and Professional Ethics, Vikas Publishing.
2. KR Govindan & Saenthil Kumar: Professional Ethics and Human Values, Anuradha Publications.
3. S K Chakraborthy & D.Chakraborthy: Human Values and Ethics, Himalaya.
4. M. Govindarajan, S. Natarajan, & V.S. Senthilkumar: Engineering Ethics(Includes Human Values), HI Learning Pvt. Ltd., New Delhi – 110001

FUNDAMENTALS OF UTILIZATION OF ELECTRICAL ENERGY
(OPEN ELECTIVE –I)

	L	T	P	C
Subject Code: 21N02501	**3**	**0**	**0**	**3**

Pre Requisite: Power Systems-I, Electrical Machines-I

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

1. know the various sources of electrical energy and its generation technologies for conventional and non-conventional energy sources.
2. know various types of illumination equipment, illumination measurement and illumination techniques.
3. learn about various methods used for electrical energy based heating and welding applications.
4. know about the mechanisms, equipment and technology used in the electric traction.
5. understand the importance of electrical earthing, earthing equipment and electrical earthing measurement methods.

Unit-I: Sources of Electrical Energy **9 hours**

Conventional Sources: Schematic & description of components of thermal power plant - hydro electric power station and nuclear power plants.

Non-conventional sources: schematic and description of components - Solar power generation - Wind power generation – Tidal - Geo-Thermal - Bio energy - Fuel cells technology.

Unit-II: Illumination **9 hours**

Introduction, source of light, term used in illumination - Lux meter - Discharge lamp - MV and SV lamps - types and design of light as flood light - LED light - shed lighting and domestic light-conservation of energy.

Unit-III: Heating and Welding **9 hours**

Advantages of Electric heating - types of electric heating - Resistance Heating - properties of heating element - direct heating - indirect heating - Induction heating - Factors effecting heat – Characteristics – application - description of direct core - vertical core - indirect core and core less type of Induction heating - Dielectric heating – applications of dielectric heating. Advantages of heating – arc furnace – direct arc furnace – indirect arc furnace. Welding: Introduction - Resistance welding – Spot welding – Projection welding –Seam welding– Butt welding – Arc welding – Metal arc welding – Helium arc welding – carbon arc welding –Hydrogen arc welding.

Unit – IV: Traction **8 hours**

Introduction – Advantages and disadvantages - systems of traction – classification – speed-time curve for different service – various factors affecting the energy consumption – components of electric locomotive (for collecting and discharging) – description of each component.

Unit-V: Grounding **8 hours**

Introduction – earth and safety – nature of an electrode system – earth conductor sizes – design of earthing electrodes – earthing system – substation earthing mats – earthing practices – earth testing: methodology - earth tester and use

Textbooks:

1. Electrical Power Systems (Generation, Transmission, Distribution, Protecection and Utilization of Electrical Energy) – Dr. S.L.Uppal and Prof. Sunil S.Rao – Khanna Publisher, 15th edition, 1987.

2. Electric Power Distribution – A S Pabla – McGrawHill.

Reference Books:

1. Generation Distribution and Utilization of Electrical Energy – C.L.Wadhwa- New Age International Publishers- revised third edition.

INTRODUCTION TO ADDITIVE MANUFACTURING
(Open Elective - I)

III-B.Tech-I-Sem. **L T P C**
Subject Code : 21N03501 **3 0 0 3**

Pre Requisite: Nil

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

1. explain the concepts of AM
2. differentiate liquid and solid based rapid prototyping systems
3. illustrate powder based rapid prototyping and tooling systems
4. apply various data file formats in 3D printing
5. summarize various RP applications

Unit-I **9 hours**

Introduction: Prototyping fundamentals, Historical development, Fundamentals of Rapid Prototyping, Advantages, and Limitations of Rapid Prototyping, commonly used Terms, Classification of RP process, Rapid Prototyping Process Chain: Fundamental Automated Processes, Process Chain.

Unit-II **10 hours**

Liquid-based Rapid Prototyping Systems: Stereo lithography Apparatus (SLA), Models and specifications, Process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, Applications,

Unit-III **10 hours**

Solid-based Rapid Prototyping Systems: Laminated Object Manufacturing (LOM): Models and specifications, Process, working principle, Applications, Case studies.Fused Deposition Modeling (FDM): Models and specifications, Process, working principle, Applications, Case studies.

Unit-IV **9 hours**

Part-A: Powder Based Rapid Prototyping Systems: Selective laser sintering (SLS): Models and specifications, Process, working principle, Applications, case studies. Three dimensional Printing (3DP): Models and specifications, Process, working principle, Applications, Case studies. **Rapid Tooling:** Introduction to Rapid Tooling (RT), Conventional Tooling Vs RT, need for RT. Rapid Tooling Classification; Indirect Rapid Tooling Methods: Spray Metal Deposition,

Unit-V **10 hours**

Rapid Prototyping Data Formats: STL Format, STL File Problems, Consequence of Building Valid and Invalid Tessellated Models, STL file Repairs: Generic Solution,

RP Applications: Application - Material Relationship, Application in Design, Application in Engineering, Analysis and Planning, Aerospace Industry, Automotive Industry, Jewelry Industry, Coin Industry, GIS application, Arts and Architecture. RP Medical and Bioengineering Applications: Planning and simulation of complex surgery, Customized Implants & Prosthesis, Design and Production of Medical Devices, Forensic Science and Anthropology, Visualization ofBiomolecules.

Textbooks:

1. Rapid prototyping; Principles and Applications, Chua C.K., Leong K.F. and LIM C.S, WSP.
2. Rapid Manufacturing, D.T. Pham and S.S. Dimov/Springer.

References:

1. Terry Wohlers, Wholers Report 2000, Wohlers Associates.
2. Rapid Prototyping and Manufacturing, PaulF.Jacobs, ASME.

PRINCIPLES OF COMMUNICATION
(OPEN ELECTIVE - I)

L	T	P	C
3	0	0	3

Subject Code: 21N04501
Pre Requisite: NIL

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

1. analyze the power and transmission bandwidth of amplitude and frequency modulated signals.
2. familiarize the process of reproduction of base band signal.
3. demonstrate various pulse analog modulation techniques
4. analyze various pulse pulse digital modulation techniques.
5. explain the transmission of binary data in communication systems

Unit-1 Amplitude Modulation: **08 hours**

Introduction to Modulation, Need for Modulation, Ordinary Amplitude Modulation – Modulation index, Side bands, AM Power, Double Side Band Suppressed Carrier Modulation, Single Side Band Modulation, Vestigial Side Band Modulation, AM demodulation, Applications of AM.

Unit-2 Angle Modulation: **08 hours**

Angle Modulation fundamentals, Frequency Modulation – Modulation index and sidebands, Narrowband FM, Wideband FM, Principles of Phase Modulation, Frequency Modulation verses Amplitude Modulation, FM demodulation, Frequency Division Multiplexing, Applications of FM.

Unit-3 Signal Sampling and Analog Pulse Communication: **08 hours**

Ideal Sampling, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation.

Unit-4 Digital Communication Techniques: **08 hours**

Quantization, Digital Transmission of Data, Parallel and Serial Transmission, Data Conversion, Time Division Multiplexing, Pulse Code Modulation, Delta Modulation.

Unit-5 Transmission of Binary Data in Communication Systems: **08 hours**

Digital Codes, Principles of Digital Transmission, Transmission Efficiency, Modem Concepts and Methods – FSK, BPSK, Error Detection and Correction.

Text Books:

1. Louis E. Frenzel, Principles of Electronic Communication Systems, 3rd Edition. Tata Mcgraw Hill.
2. Wayne Tomasi, Electronic Communications Systems, 5th Edition, Pearson Education

.**References Books:**

1. Principles of Communication Systems - Herbert Taub, Donald L Schilling, Goutam Saha, 3 rd Edition, McGraw-Hill, 2008.
2. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004
3. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004

OPERATINGSYSTEMS
(OPEN ELECTIVE - I)

III-B.Tech-I-Sem. | **L T P C**
Subject Code : 21N05501 | **3 0 0 3**
Pre Requisite: Nil

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

1. describe various generations of Operating System and functions of Operating System
2. describe the concept of program, process and thread and analyze various CPU
3. scheduling Algorithms and compare their performance
4. solve Inter Process Communication problems using Mathematical Equations by various methods
5. outline File Systems in Operating System like UNIX/Linux and Windows.

Unit-I: **9hours**

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, Computing Environments, Open-Source Operating Systems. System Structures: Operating System Services, User and Operating- System Interface, System calls, Types of System Calls, Operating System debugging, System Boot.

Unit-II: **11hours**

Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems. Multi threaded Programming: Multithreading models, Thread libraries, threading issues. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, multiple processor scheduling, thread scheduling. Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy Waiting, Sleep and wakeup, Semaphores, Monitors, Message passing, Barriers. Classical IPC Problems– Dining philosopher's problem, Readers and writers problem.

Unit-III: **10hours**

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation. Virtual Memory Management: Introduction, Demand paging Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation

Unit-IV: **9 hours**

Deadlocks: Resources, Conditions fore source dead locks, Ostrich algorithm, Deadlock Detection and recovery, Deadlock avoidance, Deadlock prevention.
File Systems: Files, Directories, File system implementation, management and optimization. Secondary – Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

Unit-V: **9 hours**

Multivariable calculus (Partial Differentiation and applications)
System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.
System Security: Introduction, Program threats, System and network threats, Cryptography for security, User authentication, implementing security defenses, Fire walling to protect systems and networks, Computer security classification. Case Studies: Linux, Microsoft Windows

Textbooks:

1. Silberschatz A, Galvin PB, and Gagne G,Operating System Concepts,9th edition,Wiley,2013.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008.

References:

1. Dhamdhere DM, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
2. Stallings W, Operating Systems-Internals and Design Principles,6th edition, Pearson Education,2009.
3. Nutt G, Operating Systems,3rd edition, Pearson Education,2004.

III-B.TECH.-II-SEMESTER SYLLABUS

DESIGN & DETAILING OF STEEL STRUCTURES

III-B.Tech-II-Sem **L T P C**
Subject Code: 21P01601 **3 1 0 3**
Pre Requisite: Nil

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

1. work with relevant is codes
2. carryout analysis and design of flexural members and detailing
3. design compression members of different types with connection detailing
4. design plate girder and gantry girder with connection detailing
5. produce the drawings pertaining to different components of steel structures

Unit-I: Introduction **10 hours**

Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behaviour of steel. Concepts of limit State Design – Different Limit States – Load combinations for different Limit states - Design Strengths- deflection limits – serviceability – stability check;
Connections: Design of Connections– Different types of connections – Bolted connections – Design strength – efficiency of joint
Welded connections: Advantages and disadvantages - Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to in-plane moment acting in the plane and at right angles to the plane of the joints.

All units i.e. from unit II to unit V are to be taught in Limit State Design.

Unit-II: Beams **12 hours**

Plastic Analysis: Plastic moment – Plastic section modulus - Plastic analysis of continuous beams.
Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

Unit-III: Compression and Tension Members **12 hours**

Compression and Tension Members: Effective length - Slenderness ratio – permissible stresses. Design of compression members, and struts. Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.
Roof Truss Element: Different types of trusses – Design loads – Load combinations as per IS Codes –Design of simple roof trusses involving design of purlins, rafters and joints – tubular trusses.

Unit-IV: Design of Column Foundations **12 hours**

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected moment.

Unit-V: Design of Plate Girder & Gantry Girder **12 hours**

Design of Plate Girder: Design consideration – I S Code recommendations Design of plate girder - Welded – Curtailment of flange plates, stiffeners – splicing and connections.
Design of Gantry Girder: impact factors - longitudinal forces, Design of Gantry girders.

NOTE: Welding connections should be used in Units II – V. The students should prepare the following works in diagrams.

Plate 1 Detailing of simple beams,
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens,
Plate 4 Detailing of Column bases – slab base and gusseted base,
Plate 5 Detailing of steel roof trusses including joint details and
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

Textbooks:

1. Steel Structures Design and Practice, N. Subramanian, Oxford University Press.
2. Limit State Design of steel structures, S. K. Duggal, Tata Mc Graw Hill, New Delhi

References:

1. Structural Design in Steel, SarwarAlamRaz, New Age International Publishers, New Delhi
2. Structural Design and Drawing by N.Krishna Raju, Universities Press
3. Design of Steel Structures by K.S.Sai Ram, Person India Education Services

IS Codes:

1) IS-I800:2007, Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.
3) Steel Tables.

These codes and steel tables are permitted to use in the examinations.

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WATER RESOURCES ENGINEERING

III-B.Tech-II-Sem. **L T P C**
Subject Code : 21P01602 **3 1 0 3**
Pre Requisite: Nil

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

1. quantify hydrologic components and apply concepts in hydrologic design of water resources projects.
2. develop intensity-duration-frequency and depth-area duration curves to design hydraulic structures.
3. develop design storms and carry out frequency analysis.
4. develop flow mass curve and flow duration curve, apply hydrograph analysis in the design of water resources projects.
5. develop unit hydrograph and synthetic hydrograph.

Unit-I: Introduction to Irrigation **9 hours**

Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

Unit-II: Canals and Diversion Head works **10 hours**

Canals: Classification, design of non-erodible canals - methods of economic section, design of erodible canals -Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.
Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. Causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

Unit-III: Introduction to Engineering Hydrology **10 hours**

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.
Precipitation: Types and forms, measurement, introduction to radar measurement of rain fall, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm

Unit-IV: Abstractions & Runoff Factors **10 hours**

Abstractions: Initial abstractions, Evaporation: factors affecting, measurement, estimation, reduction, Evapotranspiration: factors affecting, measurement, estimation, control, Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.
Runoff: Factors affecting runoff, components, empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Unit-V: Hydrograph Analysis **10 hours**

Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, dimensionless unit hydrograph, synthetic unit hydrograph, introduction to IUH.

Textbooks:

1. 'Irrigation and Waterpower Engineering' by Punmia B C, P.B.B Lal, A.K. Jain and A.K. Jain (2009), Laxmi Publications Pvt. Ltd., New Delhi
2. 'Irrigation Water Resources and Waterpower Engineering' by Modi P N (2011), Standard Book House, New Delhi

References:

1. 'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T. K (2012), S. Chand & Co Publishers.
3. 'Water Resources Engineering' by Satyanarayana Murthy Challa (2008), New Age International Publishers.

ENVIRONMENTAL ENGINEERING

III-B.Tech-II-Sem. **L T P C**
Subject Code: 21P01603 **3 0 0 3**
Pre Requisite: Nil

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

1. select a source based on quality and quantity and Estimate design population and water demand.
2. design a water treatment plant for a village/city
3. design a sewer by estimating DWF and Strom water flow and plumbing system for buildings
4. design a Sewage Treatment Plant for a town/city.
5. characterise the sewage and design ultimate disposal of sewage.

Unit-I: Sources of Water **9 hours**

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer.
Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - factors affecting water demand, Design Period, Population forecasting.
Sources of Water: Lakes, Rivers, Comparison of sources with reference to quality, quantity and other considerations- Ground water sources: springs, Wells and Infiltration galleries, Characteristics of water– Physical, Chemical and Biological characteristics and WHO guidelines for drinking water - IS 10500 2012 - Water quality standards for Agriculture, Industries and Construction.

Unit-II: Treatment of Water **9 hours**

Treatment of Water: Treatment methods: Theory and Design of Sedimentation, Coagulation, Filtration.
Disinfection: Theory of disinfection-Chlorination and other Disinfection methods.
Removal of color and odors- Removal of Iron and Manganese - Adsorption- Fluoridation and deflouridation– Reverse Osmosis- Solar stills- Freezing

Unit-III: Distribution of Water **9 hours**

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, Design of economical diameter of pumping main, HP of pump and monthly expenditure for an apartment and a village. Laying and testing of pipe lines- Capacity of storage reservoirs, Mass curve analysis.
Distribution of Water: Methods of Distribution system, Layouts of Distribution networks, Water main appurtenances - Sluice valves, Pressure relief valves, air valves, check valves, hydrants, and water meters– Ideal water supply system. Case studies.

Unit-IV: Sewer Appurtenances and House Plumbing **9 hours**

Sewerage: Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - design of sewers.
Sewer appurtenances – cleaning and ventilation of sewers.
House Plumbing: Systems of plumbing-sanitary fittings and other accessories– one pipe and two pipe systems – Design of drainage in Gated communities, Apartments and Hotels.
Septic Tank - working Principles and Design

Unit-V: Sewage Characterization and Ultimate Disposal **9 hours**

Sewage characteristics –Characteristics of sewage - BOD equations. ThOD, COD and BOD.

Treatment of Sewage: Primary treatment.

Secondary treatment: Activated Sludge Process, principles, designs, and operational problems. Oxidation ponds, Trickling Filters – classification – design, operation and maintenance problems. RBCs. Fluidized bed reactors –Anaerobic digestion of sludge, Sludge Drying Beds.

Ultimate Disposal of sewage: Methods of disposal – disposal into water bodies-Oxygen Sag Curve-Disposal into sea, disposal on land, Crown corrosion, Sewage sickness. Effluent standards.

Textbooks:

1.Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.
2. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.

References:

1. Wastewater Engineering – Treatment and Reuse, Mc-Graw-Hill Book Company, New Delhi,2014.
2. Environmental Engineering, Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier,2003.
3. Environmental Engineering, D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.
4. Water Supply Engineering, P N Modi, Rajsons Publications,1998.

PROFESSIONAL ELECTIVE – II

a. PRE-STRESSED CONCRETE

III-B.Tech-II-Sem. **L T P C**
Subject Code: 21L01601 **3 0 0 3**
Pre Requisite: Nil

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

1. understand different methods of prestressing.
2. estimate effective prestress including short and long term losses.
3. analyze and design prestressed concrete beams under flexure.
4. understand the deflection, composite beams and relevant IS Code provisions for prestressed concrete
5. analyze and design prestressed concrete beams under torsion and shear

Unit-I: Introduction, Methods and Systems of prestressing **10 hours**

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. Pretensioning and Posttensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system. **Flexure**: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons, Line of Thrust – Pressure Line, Load Balancing Concept.

Unit-II: Losses of Pre-stressing **10 hours**

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members - Elastic shortening, shrinkage, and creep of concrete; Relaxation of steel, slip in anchorage, and frictional losses- Total loss and allowable loss of prestress for design.

Unit-III: Design for Flexure **10 hours**

Design for Flexure -Types of failure – Code procedures - Design for flexure using IS Code (IS 1343 - 2012) Cable profile in two span continuous members.

Unit-IV Deflections and Composite Beams **10 hours**

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

Unit-V: Design for Shear and Torsion **10 hours**

Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcement - Code Provisions- Design for Torsion, Design for Combined bending, shear and torsion, Control of deflections- Factors influencing Deflection- Prediction of short term and long term deflections.

Textbooks:

1. Prestressed Concrete by N.Krishna Raju, 6e Tata Mc Graw Hill Book co.
2. Prestressed Concrete by K.U.Muthu PHI Learning Pvt. Ltd.

References:

1. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
2. Prestressed Concrete by N. Rajagopalan Narosa Publishing House.

3. Prestressed concrete by S. Ramamrutham Dhanpat Rai & Sons, Delhi.
4. IS 1343:2012

b. WATERSHED MANAGEMENT

III-B.Tech-II-Sem. **L T P C**
Subject Code: 21L01602 **3 0 0 3**
Pre Requisite: Nil

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

1. Calculate watershed parameters and analyse watershed characteristics to take appropriate management action.
2. Quantify soil erosion and design control measures.
3. Apply land grading techniques for proper land management .
4. Suggest suitable harvesting techniques for better watershed management.
5. Apply appropriate models for watershed management.

Unit-I: Introduction **10 hours**

Concept of watershed development, objectives of watershed development, need for watershed development, Characteristics of Watersheds: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socioeconomic characteristics.

Unit-II : Principles of Erosion **10 hours**

Types and causes of erosion, factors affecting erosion, estimation of soil loss due to erosion- Universal soil loss equation. Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, check dams, rock-fill dams, brushwood dam, Gabion.

Unit -III: Water Harvesting **10 hours**

Techniques of rain water harvesting- rain water harvesting from roof top, surface flow harvesting, subsurface flow harvesting, stop dams, farm ponds and dugout ponds, percolation tanks.

Unit-IV: Land Management **10 hours**

Land use and Land capability classification, management of forest, agricultural, grassland and wild land, land grading operation, Reclamation of saline and alkaline soils.

Unit -V: Watershed Modelling **10 hours**

Data of watershed for modelling, application and comparison of watershed models, model calibration and validation, advances of watershed models. Integrated and multidisciplinary approach for watershed management.

Textbooks:

1. 'Watershed Management' by Das MM and M.D Saikia, PHI Learning Pvt. Ltd, 2013.
2. 'Land and Water Management' by Murthy.VVN, Kalyani Publications, 2007.

References:

1. 'Water Resource Engineering'by Wurbs R A and James R A, Prentice Hall Publishers, 2002.
2. 'Watershed Hydrology' by Black P E, Prentice Hall, 1996.
3. 'Watershed Management' by Murthy J V S, New Age International Publishers, 2006.

c. ADVANCED FOUNDATION ENGINEERING

III-B.Tech-II-Sem. **L T P C**
Subject Code: 21L01603 **3 0 0 3**
Pre Requisite: Nil

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

1. demonstrate an ability to plan and execute a detailed site investigation to select a geotechnical design parameters.
2. demonstrate an ability to design both finite and infinite slopes, retaining walls, its components or processes as per needs and specifications.
3. demonstrate an ability to design shallow foundations , it component or process as per the needs and specifications.
4. demonstrate an ability to design mat foundations, it component or process as per the needs and specifications.
5. demonstrate an ability to design well foundations and understand the problems, foundation practices appropriate to expansive soils.

Unit-I: Soil Exploration **10 hours**

Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – planning of Program and preparation of soil investigation report

Unit-II: Stability of slopes and Earth-Retaining Structures **10 hours**

Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions. Earth-Retaining Structures:Rankine's & Coulomb's theory of earth pressure – Cullman's graphical method - earth pressures in layered soils.

Unit-III: Bearing capacity and settlement analysis of foundations **10 hours**

Bearing capacity of Foundations using general bearing capacity equation - Meyerhof's, Brinch Hansen's and Vesic's methods – Bearing capacity of Layered soils - Strong layer over weak layer,
weak layer on strong layer – Bearing capacity of foundations on a top of slope – Bearing capacity of foundations at the edge of the slope.
Settlement analysis: Immediate settlement of footings resting on granular soils - Schmertmann& Hartman method - De Beer and Martens method - Immediate settlement in clays - Janbu's method - correction for consolidation settlement using Skempton and Bjerrum's method - Correction for construction period.

Unit-IV: Mat foundations **10 hours**

Mat foundations – Purpose and types of isolated and combined footings – Mats/ Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils – compensated rafts.

Unit-V: Well Foundations and Foundation in expansive soils **10 hours**

Types – Different shapes of well – Types of cassions – Components of well - functions – forces acting on well foundations - Design Criteria – Determination of staining thickness and plug - construction and Sinking of wells – Tilt and shift. Foundation in expansive soils:Foundations in expansive soils – definitions of swell potential and swelling pressure – determination of free swell index – factors affecting swell potential and swelling pressure – foundation practices – sand cushion method – CNS layer - drilled piers and belled piers – under-reamed piles – moisture control methods.

Textbooks:

1. Basic and Applied Soil Mechanics, by Gopal Ranjan and A.S.R.Rao, New Age International Publishers.
2. Soil Mechanics and Foundation Engineering, by V.N.S.Murthy, CBS publishers

References:

1. Principles of Foundation Engineering by Das, B.M., - (2011) –6th edition (Indian edition) Cengage learning.
2. Soil mechanics and foundation engineering by K.R. Arora, standrad publishers distributors.
3. Foundation Analysis and Design by Bowles, J.E., (1988) – 4th Edition, McGraw-Hill Publishing Company, New York.
4. Theory and Practice of Foundation Design by N.N.SOM & S.C.DAS PHI Learning Private limited.

ESTIMATION, COSTING AND CONTRACTS LAB

III-B.Tech-II-Sem	**L**	**T**	**P**	**C**
Subject Code: 21P01611	**1**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.

LIST OF EXPERIMENTS

1. Estimation of building using individual wall method.
2. Estimation of building using centre line method.
3. Estimation of Earthwork for roads and canals by i) Mid-sectional area method, ii) Mean area method.
4. Estimation of Earthwork for roads and canals by i) Prismoidal method, ii) Trapezoidal method.
5. Estimation of Reinforcement bar bending and bar requirement schedules for given plans.
6. Prepration for approximate estimate for road project.
7. Estimating cost of building on plinth area method.
8. Analysis of Rate for different items of works in Building Construction.
9. Prepare a Report On Estimates for the Construction of Residential Building
10. Prepare a Report on the Estimate for a Road Construction

ENVIRONMENTAL ENGINEERING LABORATORY

	L	T	P	C
III-B.Tech-II-Sem.				
Subject Code: 21P01612	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1. estimate Chloride, EC and Salinity of Soil and suggest their suitability for Construction/ Agriculture
2. estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments
3. demonstration of various instruments used in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry.

LIST OF EXPERIMENTS

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Physical parameters – Temperature, Color, Odor, Turbidity and Taste.
3. Determination and estimation of Total Hardness–Calcium &Magnesium in water.
4. Determination of P&M Alkalinity/Acidity
5. Determination of Chloride in water and soil
6. Determination of Chlorine residue and demand
7. Determination of Optimum coagulant dose- with and without coagulant aids
8. Determination and Estimation of total solids, organic solids and inorganic solids and Settleable Solids by Imhoff Cone.
9. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method and BOD.
10. Determination of C.O.D.

COMPUTER AIDED DESIGN LABORATORY

	L	T	P	C
III-B.Tech-II-Sem.				
Subject Code : 21P01613	**0**	**0**	**3**	**1.5**

Pre Requisite: Nil

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

1) model the geometry of real-world structure Represent the physical model of structural element/structure and perform analysis
2) interpret from the post processing results
3) design the structural elements and a system as per IS Codes

LIST OF EXPERIMENTS

1. Analysis &Design determinate structures using a software
2. Analysis &Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis &Design of space frames subjected to DL & LL
5. Analysis &Design of residential building subjected to all loads (DL,LL,WL,EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design program for foundation using EXCEL Spread Sheet
9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

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

EMPLOYABILITY SKILLS – II

	L	T	P	C
III-B.Tech-II-Sem.				
Subject Code : 21S01611	**2**	**0**	**1**	**2**

Pre Requisite: Nil

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

1. make use of soft skills to become a professional team member
2. demonstrate quantitative aptitude concepts
3. apply knowledge of decision making, leadership, motivation
4. adapt principles of quantitative aptitude to achieve qualitative results
5. exhibit confidence in facing the interview process

Unit–I **08 hours**

Soft Skills: Self awareness and Self esteem, Discipline, Integrity, Attitude, Change and Adaptability.
Quantitative Aptitude:Number Systems: Basic Concepts, Number Systems: Natural numbers, whole numbers, integers, fractions, Rational Numbers, Irrational Numbers, Real Numbers, Divisibility Rules, Logic Equations, Remainder theorem, Unit digit calculation

Unit-II **08 hours**

Soft Skills:People Skills: Relationships - Personal & Professional Relationships – Rapport Building – Personal Space; Definition of Motivation –Motivation – Self-motivation; Time Management – Stephen Covey's time management.

Quantitative Aptitude:

Profit and Loss: Basic Concepts, discounts, marked price and list price, dishonest shopkeeper with manipulated weights, successive discounts etc.
Interest (Simple and Compound): Basic Concepts, Yearly, Half-yearly, and quarterly calculations, multiples, differences between simple and compound interest.
Ratio and Proportion: Basic Concepts of ratio and proportion, continued or equal proportions, mean proportions, invest proportion, alternative proportion, division proportion, compound proportion,

Unit–III **08 hours**

Soft Skills: Teamwork: Definition of Team, Team Dynamics – Specialization and Teamwork – Rewards of Teamwork. **Leadership:** Definition of Leadership, Leading a Team, Leadership Qualities – Leader vs Manager – Leadership Styles.
Quantitative Aptitude: Speed, Time and Distance: Basic Concepts, Single train problems, two train problems: **Time and Work:** Basic Concepts, comparative work, mixed work, alternative work, middle leave and middle join, ratio efficiency.

Unit IV **08 hours**

Soft Skills: Problem Solving and Decision Making: Definitions –Problem Solving and Decision Making – Hurdles in Decision Making - Case studies.**Quantitative Aptitude: Permutations and combinations:** Basic Concepts, differences between permutations and combinations, always together-never together, alternative arrangement

Unit – V **09 hours**

Soft Skills: Preparation for Interviews: Body Language – Posture - Dressing and Grooming – Researching the Industry and the Organization- Types of Interviews – First Impressions – Dos and Don'ts of an Interview. **Quantitative Aptitude: Geometry and Mensuration:** Basic concepts, types of angles. **Plane figures:** rectangles, squares, triangles, quadrilateral, areas, perimeters, etc. **Solid figures:** cubes, cuboids, cylinders-area (total surface area and lateral surface area), volumes, perimeters.**Others:** Parallelogram, Rhombus, Trapezium, Circle, Sector, Segment, Cone, Sphere, Hemisphere, etc.

IPR & PATENTS
(Mandatory Course)

III-B.Tech-II-Sem. **L T P C**
Subject Code : 21M00601 **2 0 0 0**
Pre Requisite: Nil

Course Outcomes: At the end of the course, the student will be able to
1. outline basics of intellectual property law
2. identify the various trademarks
3. analyze patent and copy rights law
4. differentiate trade secret and unfair practice
5. summarize new developments in Intellectual Property Rights

Unit-I **06 hours**

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

Unit-II **07 hours**

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 **09 hours**

Part-A: 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.

Part-B: Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Unit-IV **06 hours**

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 **06 hours**

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.

Textbooks:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, TMH.

FUNDAMENTALS OF ELECTRICAL MACHINES
(OPEN ELECTIVE – II)

L	T	P	C
3	0	0	3

Subject Code :21N02601
Pre Requisite: Electrical Circuits-I, Electrical Machines-I,II

Course Outcomes: At the end of the course, the student will be able to
1.apply fundamentals in various electrical circuits.
2.explain the operation and characteristics of DC machines.
3.determine the efficiency and regulation of transmission.
4.explain the operation and starting methods of Induction Motors.
5.apply the applications of Synchronous Machines.

Unit-I: Introduction **9 hours**

Active and passive elements- Ohm's Law – Kirchhoff's Laws –Electromagnetic Induction– Faraday's Laws - Series – Parallel circuits- Self and Mutual Inductance-Numerical problems. Purpose of Earthing – Methods of Earthing – Merits of Earthing. Different types of Electrical Machines

Unit-II: DC Machines **9 hours**

Principle of operation of DC generator - Types of DC machines – EMF equation –- Open Circuit Characteristics- Principle of operation of DC Motor- Torque Equation- speed control methods ofDC motor – Losses in DC machines - Swinburne's Test-Brake test on DC shunt motor – Performance Characteristics - Numerical problems.

Unit-III: Transformers **9 hours**

Principle of operation and construction Details – Classification of Transformers - EMF equation – Losses in a Transformer – Open Circuit & Short Circuit Test – Calculation of efficiency and regulation -Numerical Problems.

Unit – IV: InductionMotors **8 hours**

Principle of operation- Constructional Details - Classification – Revolving Magnetic Fields– Starting Methods – Numerical Problems. Principle of operation of Single Phase Induction Motor - Starting Methods- Applications.

Unit-V: Synchronous Machines **8 hours**

Principle of operation and construction of alternators –EMF Equation - Regulation of alternatorby Synchronous Impedance Method – Numerical Problems.
Principle of operation of synchronous motor - Synchronous Condenser – Applications.

Textbooks:
1. Principles of Electrical Machines by V.K. Mehta & Rohit Mehta, S.Chand publications
2. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria & Sons.

Reference Books:
1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications,2nd edition
3. Basic Electrical Engineering by Nagsarkar,Sukhija, Oxford Publications,2nd edition
4. Circuit Theory (Analysis and Synthesis) by A. Chakrabarti, Dhanpat Rai & Co.

FUNDAMENTALS OF MANUFACTURING PROCESSES
(OPEN ELECTIVE – II)

III-B.Tech-II-Sem. **L T P C**
Subject Code: 21N03601 **3 0 0 3**

Pre Requisite: Nil

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

1. select materials for patterns.
2. apply welding principles appropriately.
3. explain hot working and cold working methods
4. develop process-maps for metal forming processes using plasticity principles.
5. identify the effect of process variables to manufacture defect free products.

Unit-I **10 hours**

Casting: Steps involved in making a casting – Advantage of casting and its applications; Patterns - Pattern making, Types, Materials used for patterns, pattern allowances and their construction; Properties of moulding sands. Methods of Melting - Crucible melting and cupola operation – Defects in castings; Casting processes – Types – Sand moulding, Centrifugal casting, die- casting, Investment casting, shell moulding; Principles of Gating – Requirements – Types of gates, Design of gating systems – Riser – Function, types of Riser and Riser design.

Unit-II **10 hours**

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

Unit-III **10 hours**

Hot working, cold working, strain hardening, recovery, recrystallisation, and grain growth. Stamping, forming, and other cold working processes. Blanking and piercing – Bending and forming – Drawing and its types – wire drawing and Tube drawing – coining – Hot and cold spinning. Types of presses and press tools. Forces and power requirement in the above operations.

Unit-IV **10 hours**

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

Unit-V **10 hours**

Forging Processes: Forging operations and principles – Tools – Forging methods – Smith forging, Drop Forging – Roll forging – Forging hammers: Rotary forging – forging defects –cold forging, swaging, Forces in forging operations.

Text books:

1. Manufacturing Technology / P.N. Rao / Mc Graw Hill
2. Manufacturing Engineering and Technology/Kalpakjin S/ Pearson.

References

1. Metal Casting / T.V Ramana Rao / New Age
2. Métal Fabrication Technology/ Mukherjee/PHI

IC APPLICATIONS
(OPEN ELECTIVE - II)

L	T	P	C
3	0	0	3

Subject Code: 21N04601
Pre Requisite: NIL

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

1. Explain the operational amplifiers with linear integrated circuits.
2. attain the knowledge of functional diagrams and applications of ic 555 and ic 565
3. acquire the knowledge about the data converters.
4. acquire the knowledge of active filters & oscillators:
5. compare of DAC and ADC techniques

Unit-1 Integrated Circuits **08 hours**

Classification, chip size and circuit complexity, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC Characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

Unit-2 Op-amp and Applications **08 hours**

Basic information of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, Sample & hold circuits, multipliers and dividers, differentiators and integrators, comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723

Unit-3 Active Filters & Oscillators **08 hours**

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

Unit-4 Timers & Phase Locked Loops: **08 hours**

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

Unit-5 D-A and A-D Converters: **08 hours**

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC dual slope integration type ADC, DAC and ADC specifications.

Text Books:

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

.**References Books:**

1. Operational Amplifiers & Linear Integrated Circuits, R.F. Coughlin & Fredrick F. Driscoll, PHI.

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

DATA SCIENCE
(OPEN ELECTIVE – II)

III-B.Tech-II-Sem. **L T P C**
Subject Code: 21N05601 **3 0 0 3**
Pre Requisite: Nil

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

1. describe what Data Science is and the skill sets needed to be a data scientist
2. illustrate in basic terms what Statistical Inference means. Identify probability Distributions commonly used as foundations for statistical modeling , Fit a model to data
3. use R to carry out basic statistical modeling and analysis
4. apply basic tools (plots, graphs, summary statistics) to carry out EDA
5. describe the Data Science Process and how its components interact

Unit-I: **10 hours**

Introduction, The Ascendance of Data, Motivating Hypothetical: Data Sciencester, Finding Key Connectors, The Zen of Python, Getting Python, Virtual Environments, White space Formatting, Modules,Functions,Strings,Exceptions,Lists,Tuples,Dictionariesdefaulted,Counters,Sets, Control Flow, Truthiness, Sorting, List Comprehensions, Automated Testing and assert, Object Oriented Programming, Iterable sand Generators, Randomness, Regular Expressions, Functional Programming, zip and Argument Unpacking, args and kwargs, Type Annotations, How to Write Type Annotations.

Unit-II: **10 hours**

Visualizing Data: mat plot lib, Bar Charts, Line Charts, Scatter plots. Linear Algebra: Vectors, Matrices, Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Some Other Co-relational Caveats, Correlation and Causation. Gradient Descent: The Idea Behind Gradient Descent, Estimating the Gradient, Using the Gradient, Choosing the Right Step Size, Using Gradient Descent to Fit Models, Mini batch and Stochastic Gradient Descent.

Unit-III: **10 hours**

Getting Data: stdin and stout, Reading Files, Scraping the Web, Using APIs, Working with Data: Exploring Your Data Using Named Tuples, Data classes, Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction. Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem

Unit-IV: **9 hours**

Machine Learning: Modeling, Over fitting and Under fitting, Correctness, The Bias-Variance Trade off, Feature Extraction and Selection, k-NearestNeighbors,NaïveBayes,SimpleLinear Regression, Multiple Regression, Digression, Logistic Regression

Unit-V: **10 hours**

Clustering: The Idea, the Model, Choosing k, Bottom-Up Hierarchical Clustering. Recommender Systems: Manual Curation, Recommending What's Popular, User-Based Collaborative Filtering, Item-Based Collaborative Filtering, Matrix Factorization Data Ethics, Building Bad Data Products,Trading Off Accuracy and Fairness, Collaboration, Interpretability, Recommendations, Biased Data,Data Protection IPython, Mathematics, NumPy, pandas, scikit-learn, Visualization,

Textbooks:

1) Joel Grus,"Data Science From Scratch", OReilly.
2) Allen B. Downey," Think Stats",OReilly.

Reference Books:

1) Doing Data Science: Straight Talk from the Frontline,1st Edition, Cathy O' Neiland Rachel Schutt, O'Reilly, 2013
2) Mining of Massive Data sets, 2nd Edition, Jure Leskovek, Anand Rajaramanand Jeffrey Ullman,v2.1, Cambridge University Press, 2014

IV-B.TECH.-I-SEMESTER SYLLABUS

PROFESSIONAL ELECTIVE-III
a. BRIDGE ENGINEERING

IV-B.Tech-I-Sem. **L T P C**
Subject Code: 21L01701 **3 0 0 3**
Pre Requisite: Nil
Course Outcomes: At the end of the course, the students will be able to

1. discuss the different types of Bridges with diagrams and Loading standards
2. carryout analysis and design of Slab bridges, T Beam bridges, Box culvers and suggest structural detailing
3. carryout analysis and design of Plate girder bridges
4. organize for attending inspections and maintenance of bridges and prepare reports.
5. design criteria of the culverts.

Unit-I: **9 hours**

General Introduction to types of Bridges- (Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts) - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading.

Unit-II: **10 hours**

Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Guyon's – Massonet Method –Hendry-Jaegar Methods- Courbon's theory- Pigeaud's method.

Unit-III: **10 hours**

T-Beam bridges- Analysis and design of various elements of bridge –Design of deck slab, longitudinal girders, Secondary beams- Reinforcement detailing.

Unit-IV: **9 hours**

Plate Girder Bridges: Elements of plate girder and their design-web- flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.

Unit-V: **9 hours**

Box Culverts: Loading – Analysis and Design- Reinforcement detailing.
Inspection and Maintenance of Bridges: Procedures and methods for inspection – Testing of bridges- Maintenance of Sub Structures and Superstructures- Maintenance of bearings- Maintenance.

Textbooks:

1. 'Essentials of Bridge Engineering' by Johnson Victor D
2. 'Design of Bridge Structures' by T. R. Jagadeesh, M.A. Jayaram, PHI

References:

1. 'Design of Concrete Bridges' by Aswini, Vazirani, Ratwani
2. 'Design of Steel Structures' by B. C. Punmai, Jain & Jain, Lakshmi Publications
3. 'Design of Bridges' by Krishna Raju

PROFESSIONAL ELECTIVE-III
b. INDUSTRIAL WASTE WATER TREATMENT

IV-B.Tech-I-Sem. | **L T P C**
Subject Code: 21L01702 | **3 0 0 3**
Pre Requisite: Nil

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

1. know the quality and quantity of water for various industries and Advanced water treatment methods
2. learn the common methods of treatment of wastewaters and Biological treatment methods
3. study of methods to reduce impacts of disposal of wasters into environment and CETPs.
4. study of methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods
5. study of methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods

Unit-I: **9 hours**

Industrial water Quantity and Quality requirements: Boiler, Cooling, Domestic/Canteen and Process waters for Textiles, Food processing, Dairy, Aqua industry, Sugar mills, Brewery and distillery Industries, Fertilizer industry, Power plants. Advanced water treatment - Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, elutriation, Removal of Iron and Manganese, Removal of Colour and Odour. Use of Municipal wastewater in Industries

Unit-II: **10 hours**

Basic theories of Industrial Wastewater Management: Industrial waste survey -Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis - Wastewater characterization- Toxicity of industrial effluents-Common methods of Treatment of wastewaters - Unit operations and processes- Volume and Strength reduction –Neutralization – Equalization and proportioning- recycling, reuse and resources recovery. Miscellaneous Treatment: Biological treatment of sewage- Primary, secondary and Tertiary treatment of sewage.

Unit-III: **10 hours**

Industrial wastewater disposal management: Discharges into Sewers, Streams- Oxygen sag curve, Lakes-eutrophication and oceans and associated problems, Land treatment – sewage sickness, Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges-Recirculation of Industrial Wastewaters- Effluent Disposal Method.

Unit-IV: **9 hours**

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants. Case studies.

Unit-V **9 hours**

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Aqua industry, Pharmaceutical Plants. Case studies.

Textbooks:

1. Industrial Wastewater Treatment by KVSG Murali Krishna, Paramount Publishers, Visakhapatnam, 2019
2. Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, New Delhi.

References:

1. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc- Graw Hill, Third Edition
2. Wastewater Engineering by Metcalf and Eddy Inc, Tata McGraw hill Co., New Delhi
3. Wastewater Treatment- Concepts and Design Approach by G.L. Karia & R.A. Christian, Prentice Hall of India.
4. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard, Cengage Learning.

PROFESSIONAL ELECTIVE-III
c. EARTH AND ROCK FILL DAM

IV-B.Tech-I-Sem. **L T P C**
Subject Code: 21L01703 **3 0 0 3**
Pre Requisite: Nil

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

1. design earth and rock fill dams
2. control the failure and damage of earth dam
3. get familiarity with slope stability calculations,
4. Prevention techniques for slope failures
5. design criteria of the rock fill dam

Unit-I: **9 hours**

Earth and Rock fill Dams: General features, Selection ofsite; Merits and demerits of the earth and rock fill dams, Classification of earth dams, Materials of construction and requirements, Causes of failure, Safe design criteria. Instrumentation in earth dams: Pore pressure measurements, Settlement gauges, Inclinometers, Stress measurements, Seismic measurements.

Unit-II: **9 hours**

Failures, Damages and Protection of Earth Dams: Nature and importance of failure, piping through embankment and foundations, Methods of seepage control through embankments and foundations, Design Criteria for filters, Treatment of upstream and downstream of slopes, Drainage control, Filter design.

Unit-III: **9 hours**

Slope Stability Analysis: Types of Failure: Failure surfaces – Planar surfaces, Circular surfaces, Non- circular surfaces, Limit equilibrium methods, Total stress analysis versus effective Stress analysis, Use of Bishop's pore pressure parameters, Short term and Long term stability in slopes.

Unit-IV: **9 hours**

Methods of Slope Stability: Taylor Charts, Method of Slices, Effect of Tension Cracks, Vertical Cuts. Bishop's Analysis, Bishop and Morgenstern Analysis, Non-circular Failure Surfaces: Morgenstern and Price Analysis, Janbu Analysis, Spencer Analysis, Sliding Block Analysis, Seismic stability, Stabilization of slopes: Drainage measures, Soil reinforcement (geosynthetics/soil nailing/micro piles etc.), soil treatment (cement/lime/thermal treatment), surface protection (vegetation/erosion control mats/concrete).

Unit-V **9 hours**

Rock fill Dams: Requirements of compacted rock fill, Shear strength of rock fill, Rock fill mixtures, Rock fill embankments, Earth-core Rock fill dams, Stability, Upstream & Downstream slopes.

Textbooks:

1. Christian, K. Earth & Rock fill Dams – Principles of Design and Construction, CRC Press, 1997.
2. Sowers, G.F. – Earth and Rock fill Dam Engineering, Asia Publishing House, 1962.

References:

1. Bharat Singh and Sharma, H. D. – Earth and Rock fill Dams, 1999
2. Abramson, L. W., Lee, T. S. and Sharma, S. – Slope Stability and Stabilisation methods – John Wiley & sons. (2002)
3. Sherard, Woodward, Gizienski and Clevenger. Earth and Earth-Rock Dams. John Wiley &. Sons. 1963.
4. US Army Corp of Engineers, Earth and Rock-fill Dams, General Design and construction Considerations, University Press of the Pacific (2004)

PROFESSIONAL ELECTIVE-IV
a. FINITE ELEMENT METHODS

IV-B.Tech-I-Sem. | **L T P C**
Subject Code: 21L01704 | **3 0 0 3**
Pre Requisite: Nil

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

1. solve simple boundary value problems using Numerical technique of Finite element method.
2. develop finite element formulation of one and two dimensional problems and solve.
3. assemble Stiffness matrices, apply boundary conditions and solve for displacements.
4. compute Stresses and Strains and interpret the result.
5. create shape functions that would ensure the compatibility of the displacement between neighboring elements while maintaining the requirements for shape functions.

Unit-I: Introduction **9 hours**

Principles of Elasticity: Equilibrium Equations, Strain Displacement relationships, Constitutive relationship for plane stress, plane stain and axi-symmetric bodies of revolution with axi-symmetric loading. Stiffness method- Principle of Stationary potential energy, Potential energy of an elastic body, Rayleigh-Ritz method of functional approximation.

Unit-II: Finite Element formulation of truss element **9 hours**

Stiffness matrix, properties of stiffness matrix, Selection of approximate displacement functions, solution of a plane truss, transformation matrix, Galerkin's method for 1-D truss, Computation of stress in a truss element.

Unit-III: Finite element formulation of Beam elements **9 hours**

Beam stiffness, beam stiffness matrix, Examples on Analysis of beams Subjected to Concentrated and Distributed loading.

Unit-IV: Finite element formulation for plane stress and plane strain **9 hours**

Finite element formulation for plane stress and plane strain problems- Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces.

Unit-V: Iso-parametric Formulation **9 hours**

Isoparametric bar element, plane bilinear isoparametric element, quadratic plane element, shape functions, evaluation of stiffness matrix, consistent nodal load vector, Gauss quadrature for performing numerical integrations.

Textbooks:

1. Introduction to Finite Elements in Engineering, Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.
2. Introduction to Finite Element Method, Desai & Abel CBS Publications

References:

1. Concepts and applications of Finite Element Analysis, Robert D. Cook, Michael E Plesha, John Wiley & sons Publication
2. A first course in the Finite Element Method, Dary L. Logan, Thomson Publications.

PROFESSIONAL ELECTIVE-IIV
b. GROUND WATER DEVELOPMENT

IV-B.Tech-I-Sem. **L T P C**
Subject Code : 21L01705 **3 0 0 3**
Pre Requisite: Nil
Course Outcomes:

At the end of the course the student will be able to design various irrigation structures.

1. estimate aquifer parameters and yield of wells
2. analyse radial flow towards wells in confined and unconfined aquifers.
3. determine the process of artificial recharge for increasing groundwater potential.
4. take effective measures for controlling saline water intrusion.
5. apply appropriate measures for groundwater management.

Unit – I: Introduction **9 hours**
Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.
Well Hydraulics Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jocob and Chow's methods, Leaky aquifers.

UNIT – II: Well Design **9 hours**
Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery

UNIT III: Well Construction and Development **9 hours**
Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail- down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT IV: Artificial Recharge **9 hours**
Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge
Saline Water Intrusion Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT V: Geophysics **9 hours**
Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications

Text Books:
1. Groundwater, Raghunath H M, New Age International Publishers, 2005.
2. Groundwater Hydrology, Todd D. K., Wiley India Pvt Ltd., 2014.

References:
1. Groundwater Assessment and Management, Karanth K R, Tata McGraw Hill Publishing Co., 1987.
2. Groundwater Hydrology, Bouwer H, McGraw Hill Book Company, 1978.
3. Groundwater Systems Planning and Management, Willis R and W.W.G. Yeh, Prentice Hall Inc., 1986.
4. Groundwater Resources Evaluation, Walton W C, McGraw Hill Book Company, 1978.

PROFESSIONAL ELECTIVE-III
c. ROAD SAFETY ENGINEERING

IV-B.Tech-I-Sem. **L T P C**
Subject Code: 21L01706 **3 0 0 3**
Pre Requisite: Nil

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

1. understand fundamental of Traffic Engineering.
2. investigate & determine the collective factors & remedies of accident involved.
3. design & planning various road geometrics.
4. massage the traffic system from road safety point of view.
5. design of mitigation measures.

Unit-I: Introduction to safety **9 hours**

Road accidents, Trends, causes, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors; Highway safety in India. Multi-causal dynamic systems approach to safety; Crash Vs Accident; Road safety improvement strategies; Elements of a road safety plan, Safety data Needs; Safe vehicle design.

Unit-II: Statistical Interpretation and Analysis of Crash Data **9 hours**

Before-after methods in crash analysis, Recording of crash data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Case Studies.

Unit-III: Road Safety Audits **9 hours**

Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies.

Unit-IV: Crash Reconstruction **9 hours**

Describe the basic information that can be obtained from the roadway surface, Understand basic physics related to crash reconstruction, speed for various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables involved in pedestrian crashes, Case Studies.

Unit-V: Mitigation Measures **9 hours**

Accident prevention by better planning, Accident prevention by better design of roads, Crash Countermeasures, Highway operation and accident control measures, Highway Safety Measures during construction, Highway geometry and safety; Safety in urban areas; Public transport and safety; Road safety policy making, Stakeholders involvement; Road safety law.

Textbooks:

1. Institute of Transportation Engineers (ITE), The Traffic Safety Toolbox: A Primer on Traffic Safety, ITE, 1999. Towards Safe Roads in Developing country, TRL – ODA, 2004
2. Geetam Tiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 2016.

References:

1. Athelstan Popkess, Traffic Control and Road Accident Prevention, Chapman and Hall, 1997 (Digitized 2008)
2. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (reprinted 2002).

PROFESSIONAL ELECTIVE-V
a. ADVANCED STRUCTURAL ANALYSIS

IV-B.Tech-I-Sem. **L T P C**
Subject Code: 21L01707 **3 0 0 3**
Pre Requisite: Nil

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

1. differentiate Determinate and Indeterminate Structures
2. analyze structures using Kani's Method
3. analyze structures using Approximate methods.
4. analyze Cable and Suspension Bridge structures
5. analyze structures using Moment Distribution Method.

Unit-I: Energy Theorems and Indeterminate Trusses **9 hours**

Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed plane trusses.
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.

Unit-II: Kani's Method **9 hours**

Kani's Method: Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway. Shear force and bending moment diagrams - Elastic curve.

Unit-III: Approximate Methods of Analysis **9 hours**

Application to building frames. (i) Portal Method (ii) Cantilever Method (iii) Substitute frame method for approximate analysis of multi-storey frames subjected to gravity loads and lateral loads. Shear force and bending moment diagrams – Elastic curve.

Unit-IV: Cable Structures and Suspension Bridges **9 hours**

Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

Unit-V: Moment Distribution Method **9 hours**

Moment Distribution Method: Analysis of Portal frames – including Sway-Substitute frame analysis by two cycle. Slope deflection method: Analysis of Portal frames – including Sway. Analysis of inclined frames- Shear force and bending moment diagrams - Elastic curve.

Textbooks:

1. Structural Analysis by R.C. Hibbeler, Pearson, New Delhi.
2. Basic Structural Analysis, K U Muthu et. al., IK International Publishing house pvt. Ltd.

References:

1. Indeterminate Structural Analysis, K U Muthu et. al., IK International Publishing house pvt. Ltd.
2. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi**.**
3. Mechanics of Structures Vol – II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
4. Structural Analysis by Devdas Menon, Narosa Publishing Housing Pvt. Ltd.

PROFESSIONAL ELECTIVE-V
b. GROUND IMPROVEMENT TECHNIQUES

IV-B.Tech-I-Sem. **L T P C**
Subject Code: 21L01708 **3 0 0 3**
Pre Requisite: Nil

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

1. know various methods of ground improvement and their suitability to different field situations.
2. design a reinforced earth embankment and check its stability.
3. know the various functions of Geosynthetics and their applications in Civil Engineering practice.
4. able to understand the concepts and applications of grouting.
5. know about stabilization of soils.

Unit-I: **9 hours**

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

Unit-II: **9 hours**

Dewatering – sumps and interceptor ditches – single and multistage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis.

Unit-III: **9 hours**

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag. Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests. Introduction to Liquifaction & its effects & applications.

Unit-IV: **9 hours**

Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

Unit-V: **9 hours**

Geosynthetics – geotextiles – types – functions , properties and applications – geogrids, geomembranes and gabions - properties and applications.

Textbooks:

1. ‘Ground Improvement Techniques’ by Purushotham Raj, Laxmi Publications, New Delhi.
2. ‘Ground Improvement Techniques’ by NiharRanjanPatro ,Vikas Publishing House (p) limited, New Delhi.

References:

1. ‘Ground Improvement’ by MP Moseley , Blackie Academic and Professional, USA.
2. ‘Designing with Geosynethetics’ by RM Koerner , Prentice Hall.

PROFESSIONAL ELECTIVE-V
c. LOW COST HOUSING

IV-B.Tech-I-Sem. **L T P C**
Subject Code: 21L01709 **3 0 0 3**
Pre Requisite: Nil

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

1.know the housing scenario and also the status of rural and urban housing.
2.know the land use and physical planning for housing.
3.develop low cost housing technology.
4.design low cost infrastructure services.
5.know about housing in disaster prone areas.

Unit-I: **9 hours**

Housing Scenario Status of urban housing- Status of Rural Housing, Housing Finance: Introducing- Existing finance system in India- Government role as facilitator. Status at Rural Housing Finance- Impenitently in housing finance and related issues

Unit-II: **9 hours**

Land Use and Physical Planning for Housing: Planning of urban land- Urban land ceiling and regulation act- Efficiency of building bye laws -Residential Densities.
Housing the Urban Poor: Living conditions in slums- Approaches and strategies for housing urban poor.

Unit-III: **9 hours**

Development and Adopt on of Low-Cost Housing Technology
Adoption of innovative cost effective construction techniques- Adoption of precast elements in partial prefabrication- Adopting of total prefabrication of mass housing in India- General remarks on pre cast rooting/flooring systems- Economical wall system- Single Brick thick loading bearing wall- 19cm thick load bearing masonry walls- Half brick thick load bearing wall-Fly ash, gypsum thick for masonry- Stone Block masonry- Adoption of precast R.C. plank and join system for roof/floor in the building.
Alternative Building Materials for Low Cost Housing: Substitute for scarce materials- Ferrocement- Gypsum boards- Timber substitutions- Industrial wastes- Agricultural wastes.

Unit-IV: Analysis and Management **9 hours**

Low Cost Infrastructure Services
Present status- Technological options- Low cost sanitation's- Domestic wall- Water supply energy.
Rural Housing: Introduction- traditional practice of rural housing continuous- Mud Housing technology- Mud roofs- Characteristics of mud- Fire resistant treatment for thatched roof- Soil stabilization- Rural Housing programs.

Unit-V: **9 hours**

Housing in Disaster Prone Areas
Earthquake- Damages to houses- Traditional Houses in disaster prone areas Type of Damages and Railways of non-engineered buildings- Repair and restore action of earthquake Damaged non engineered buildings recommendations for future constructions- Requirements of structural safety of thin precast roofing units against - Earthquake forces- Status of R&D in earthquake strengthening measures - Floods- cyclone- future safety.

Textbooks:

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Modern trends in housing in development countries – A.G. Madhava Rao, D.S. Ramachnadra Murthy & G. Annamalai

References:

1. Building Systems for Low Income Housing, Ashok Kumar Jain; Management Publishing House, 1992
2. Hand book of low-cost housing - by A. K. Lal – Newage international publishers.
3. Low Cost Housing in Developing Countries, Guru Charan Mathur; For Centre for Science &Technology of the Non-Aligned and Other Developing Countries, Oxford & IBH Publishing Company, 1993

Web References:

1. https://csmrs.gov.in/

PROJECT PLANNING AND TOWN PLANNING

	L	T	P	C
IV-B.Tech-I-Sem.				
Subject Code: 21S01701	**1**	**0**	**2**	**2**
Pre Requisite: Nil				

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

1. know the important codes and by-laws that will benefit young professionals.
2. acquire the knowledge in planning of smart city.
3. gain the professional knowledge in the design and construction procedures of various Civil Engineering projects.
4. gain the knowledge about the existing cities including roads and metros.

Project Planning and Town Planning

1. Byelaws in a smart city
2. Planning of new town
3. Planning of Satellite towns with roads
4. Study of best practices in cities like Chandigarh, Surat, and Indore etc.
5. Theories of urban planning.
6. Re-planning existing cities including roads and metros

References:

1. Town Planning by S.C. Rangwala and K.S. Rangwala, 31st Edition, 2021, Charotar Publishing House, India
2. Cities and Public Policy by Prasanna K Mohanty, SAGE Publications India Pvt Ltd

FUNDAMENTALS OF POWER SYSTEM ENGINEERING
(OPEN ELECTIVE - III)

	L	T	P	C
Subject Code: 21N02701	**3**	**0**	**0**	**3**

Pre Requisite: Power Systems-I

Course Outcomes: At the end of the course, the student will be able to
1.Know the concepts of power generation by various types of power plants.
2.Learn about transmission line concepts and distribution systems schemes.
3.Learn about protection equipments and grounding methods of power system.
4.Know the economic aspects of electrical energy and their importance.
5.Know the importance of power factor improvement and voltage control in power systems.

Unit-I: Power Generation Concepts & Types **9 hours**

Generation and sources of Energy – working principle and Schematic diagram approach of Thermal Power Plant – Hydro Power Plant - Nuclear Power Plant – Gas Power Plants – Comparison between Power Plants.

Unit-II: Transmission and Distribution Concepts **9 hours**

Types of Conductors Materials – Constants of Transmission Line – Classification of OverheadTransmission Lines – Performance of Short Transmission Lines – Simple Problems.
Basic concept of Sub Station – Distribution Systems – Connection Schemes of Distribution Systems – Structure of Cables – Differences between Overhead & Underground systems.

Unit-III: Protection and Grounding **9 hours**

List of Faults – Basic concepts of fuse – Circuit Breakers – Relays – SF_6 Circuit Breakers – Vacuum Circuit Breakers – Operation of Lightning Arrester – Grounding and its advantages - Methods of Neutral Grounding: Resistance - Reactance and Resonant Grounding – Numerical Problems.

Unit – IV: Economic Aspects

8 hours

Definitions of Load - Load & Load Duration Curves - Load Factor - Demand Factor – Utilization Factor– Types of Tariff - Cost of Electrical Energy – Expression for Cost of Electrical Energy – NumericalProblems

Unit-V: Power Factor Improvement and Voltage Control **8 hours**

Power Factor – Effects and Causes of low Power Factor- Shunt & Series Capacitor Compensation - Numerical Problems – Need of Voltage Control – Types of Voltage regulating Devices.

Textbooks:

1.Principles of Power System by V.K.Mehata - Rohit Mehata - S.Chand Publishers.

Reference Books:

1.Electrical Power Systems by C.L.Wadwa - New Age International Publishers.

FUNDAMENTALS OF AUTOMOBILE ENGINEERING
(OPEN ELECTIVE - III)

IV-B.Tech-I-Sem. **L T P C**
Subject Code: 21N03701 **3 0 0 3**

Pre Requisite: Nil

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

1. identify power generation, transmission and control mechanisms in an automobile
2. manipulatethe chemical, thermal, mechanical and electrical energies in an automobile
3. infer the interaction between subsystems
4. analyze how transmission system works
5. learn different components of suspension systems.

Unit-I **10 hours**

Introduction: Components of four-wheeler automobile – chassis and body – power unit – power transmission rear wheel drive, front wheel drive, 4-wheel drive – types of automobile engines, engine construction – engine lubrication, splash and pressure lubrication systems, oil filters, oil pumps – crank case ventilation – engine service, re boring, decarburization.

Unit-II **10 hours**

Fuel System: S.I. Engine: Fuel supply systems, Mechanical and electrical fuel pumps – Carburetor – types – air filters – petrol injection. **C.I. Engines:** Requirements of diesel injection systems, types of injection systems, fuel pump, nozzle, Alternative fuels for Automobiles-injection, Classification, Properties, Hybrid vehicles injection timing, testing of fuel, pumps.**Cooling System:** Cooling Requirements, Air Cooling, Liquid Cooling and Forced Circulation System – Radiators – Types – Cooling Fan - water pump, thermostat, evaporating cooling – pressure sealed cooling – antifreeze solutions.

Unit-III **10 hours**

Electrical System: Charging circuit, generator, current – voltage regulator – starting system, bendix drive mechanism solenoid switch, lighting systems, Horn, wiper, fuel gauge – oil pressure gauge, engine temperature indicator etc.

Ignition System: Function of an ignition system, battery ignition system, constructional features of storage battery, auto transformer, contact breaker points, condenser and spark plug – Magneto coil ignition system, electronic ignition system using contact breaker, electronic ignition using contact triggers – spark advance and retard mechanism.

Unit-IV **10 hours**

Transmission System: Clutches, principle, types- cone clutch, single plate clutch, multi plate clutch, magnetic and centrifugal clutches, fluid fly wheel – Gear boxes, types, sliding mesh, construct mesh, synchro mesh gear boxes, epicyclic gear box, over drive torque converter.

Propeller shaft – Hoatch – Kiss drive, Torque tube drive universal joint, differential rear axles – types wheels and tyres.

Steering System: Types of steering mechanism – Ackerman steering mechanism, Davis steering mechanism

Unit-V **10 hours**

Suspension System: Objects of suspension systems – rigid axle suspension system, torsion bar, shock absorber, Independent suspension system. **Braking System:** Mechanical brake system, Hydraulic brake system, Master cylinder, wheel cylinder tandem master cylinder Requirement of brake fluid, Pneumatic and vacuum brakes.

Text books

1. Automobile Engineering, Vol. 1 & Vol. 2/ Kripal Singh
2.Automobile Engineering, Vol. 1 & Vol. 2 ,by K.M Gupta,Umesh publication

References

1. A System approach to Automotive Technology by Jack Erjavec YesDee publishing Pvt Ltd.
2. Automobile Engineering / William Crouse

FUNDAMENTALS OF MICROPROCESSORS AND MICROCONTROLLERS (OPEN ELECTIVE - III)

L	T	P	C
3	0	0	3

Subject Code: 21N04701
Pre Requisite: NIL

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

1. construct the architecture of microprocessor and their operation.
2. demonstrate programming skills in assembly language for processors and controllers.
3. analyze various interfacing techniques and apply them for the design of processor/Controller based systems.
4. construct the architecture of microcontroller and their operation
5. demonstrate micro controller programming & applications

Unit-1: 8085 Processor &8086 Architecture **08 hours**

8085 Processor :Hardware Architecture, pinouts — Functional Building Blocks of Processor — Memory organization— I/O ports and data transfer concepts,Interrupts.

8086 Architecture :Main features, pin diagram/description, 8086 microprocessor family, internal architecture, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

Unit-2: 8086 Programming **08 hours**

Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

Unit-3:8086 Interfacing **08 hours**

Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

Unit-4: 8051 Micro Controller **08 hours**

Hardware Architecture, pinouts — Functional Building Blocks of Processor — Memory organization — I/O ports and data transfer concepts– Timing Diagram — Interrupts- Data Transfer, Manipulation, Control Algorithms& I/O instructions, Comparison to Programming concepts with 8085.

Unit-5: Micro Controller Programming & Applications **08 hours**

Simple programming exercises- key board and display interface –Control of servo motor stepper motor control- Application to automation systems.

Text Books:

1. R.S. Gaonkar, Microprocessor Architecture Programming and Application, with 8085, Wiley Eastern Ltd., New Delhi, 2013.
2. A.K Ray, K.M.Bhurchandhi," Advanced Microprocessor and Peripherals", Tata McGraw Hill Publications, 2000..

References Books:

1. The 8051 Microcontrollers and Embedded systems Using Assembly and C, Muhammad Ali Mazidi and Janice GillespieMazidi and Rollin D.McKinlay; Pearson 2-Edition, 2011.
2. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSPRao, Tata Mc Graw Hill Education PrivateLimited,3rdEdition,1994

MACHINE LEARNING
(OPEN ELECTIVE - III)

IV-B.Tech-I-Sem. **L T P C**
Subject Code: 21N05701 **3 0 0 3**
Pre Requisite: Nil

Course Outcomes: After the completion of the course, student will be able to
1. explain the fundamental usage of the concept Machine Learning system
2. demonstrate on various regression Technique
3. analyze the Ensemble Learning Methods
4. illustrate the Clustering Techniques and Dimensionality Reduction Models in Machine Learning.
5. discuss the Neural Network Models and Fundamentals concepts of Deep Learning

Unit - I: **10 hours**

Introduction-Artificial Intelligence, Machine Learning, Deep learning, Types of Machine Learning Systems, Main Challenges of Machine Learning.
Statistical Learning: Introduction, Supervised and Unsupervised Learning, Training and Test Loss, Tradeoffs in Statistical Learning, Estimating Risk Statistics, Sampling distribution of an estimator, Empirical Risk Minimization.

Unit-II: **10 hours**

Supervised Learning (Regression/Classification): Basic Methods: Distance based Methods, Nearest Neighbours, Decision Trees, Naive Bayes, Linear Models: Linear Regression, Logistic Regression, Generalized Linear Models, Support Vector Machines, Binary Classification: Multiclass/Structured outputs, MNIST, Ranking.

Unit - III: **10 hours**

Ensemble Learning and Random Forests: Introduction, Voting Classifiers, Bagging and Pasting, Random Forests, Boosting, Stacking.
Support Vector Machine: Linear SVM Classification, Nonlinear SVM Classification SVM Regression, Naïve Bayes Classifiers.

Unit - IV: **10 hours**

Unsupervised Learning Techniques: Clustering, K-Means, Limits of K-Means, Using Clustering for Image Segmentation, Using Clustering for Preprocessing, Using Clustering for Semi-Supervised Learning, DBSCAN, Gaussian Mixtures.
Dimensionality Reduction: The Curse of Dimensionality, Main Approaches for Dimensionality Reduction, PCA, Using Scikit-Learn, Randomized PCA, Kernel PCA.

UNIT V: **10hours**

Neural Networks and Deep Learning: Introduction to Artificial Neural Networks with Keras, Implementing MLP swith Keras, Installing Tensor Flow2,Loading and Preprocessing Data with Tensor Flow.

TextBooks:

1. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow,2ndEdition,O'Reilly Publications, 2019
2. Data Science and Machine Learning Mathematical and Statistical Methods, Dirk P. Kroese, Zdravko I. Botev, Thomas Taimre, Radislav Vaisman,25th November 2020

Reference Books:

1. MachineLearningProbabilisticApproach,KevinP.Murphy,MITPress,2012.

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION
(OPEN ELECTIVE - IV)

	L	T	P	C
Subject Code:21N02702	**3**	**0**	**0**	**3**

Pre Requisite: Nil

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

1. choose right type of instrument for measurement of ac and dc Electrical quantities.
2. choose right type of instrument for measurement of power and power factor.
3. select right type for measurement of R, L,C.
4. understand the effectiveness of Transducer.
5. understand Digital Meters.

Unit-I: Analog Ammeter and Voltmeters **9 hours**

Classification – deflecting, control and damping torques,– PMMC, Moving Iron type andElectrostatic instruments, Construction, Torque equation, advantages and disadvantages.
Instrument transformers: Current Transformer and Potential Transformer-construction, theory, (Without derivation of ratio and phase angle error) - Numerical Problems.

Unit-II: Analog Wattmeters and Power Factor Meters **9 hours**

Electrodynamometer type wattmeter (LPF and UPF), Power factor meters: Dynamometer and M.I type (Single phase), construction, theory, torque equation, advantages and disadvantages -Numerical Problems.

Unit-III: Measurements of Electrical Parameters **9 hours**

DC Bridges: Method of measuring low, medium and high resistance – Kelvin's double bridge for measurement low resistance, Wheatstone bridge for measurement of medium resistance - Loss of charge method for measurement of high resistance, Megger – measurement of earth resistance - Numerical Problems.
AC Bridges: Measurement of inductance and quality factor, Maxwell's bridge, measurement of capacitance and loss angle, Desauty's bridge, Schering Bridge, Wien's bridge- Numerical Problems

Unit – IV: Transducers **8 hours**

Classification, Resistive, Inductive and Capacitive Transducer, LVDT, Strain Gauge,Thermistors, Thermocouples, Piezo electric and Photo Diode Transducers, Digital shaft encoders, Hall effect sensors- Numerical Problems.

Unit-V: Digital Meters **8 hours**

Digital voltmeter – Successive approximation DVM, – Digital frequency meter, Digitalmultimeter, Digital tachometer, Digital Energy Meter, LCRQ – Meter

Textbooks:

1. Electrical Measurements and measuring Instruments by E.W. Golding and F.C.Widdis, fifth Edition, Wheeler Publishing.
2. Modern Electronic Instrumentation and Measurement Techniques by A.D.Helfrick and W.D.Cooper, PHI, 5th Edition, 2002

Reference Books:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai &Co.Publications.
2. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand.
3. Electrical Measurements by Buckingham and Price, Prentice – Hall
4. Electrical Measurements by Foest K. Harris. John Wiley and Sons

NON-CONVENTIONAL ENERGY RESOURCES
(OPEN ELECTIVE - IV)

III-B.Tech-I-Sem.	**L**	**T**	**P**	**C**
Subject Code : 21N03702	**3**	**0**	**0**	**3**

Pre Requisite: Nil

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

1. analyze global and national energy scenarios
2. illustrate the various solar energy systems
3. demonstrate the aspects related to wind energy power plants
4. build the power plants using bio gas
5. estimate the power generation in hydroelectric plants

Unit-I **10 hours**

Global and National Energy Scenario: Over view of conventional & renewable energy sources, need & development of renewable energy sources, types of renewable energy systems, Future of Energy Use, Global and Indian Energy scenario, Renewable and Non-renewable Energy sources, Energy for sustainable development, Potential of renewable energy sources, renewable electricity and key elements, Global climate change, CO_2 reduction potential of renewable energy- concept of Hybrid systems.

Unit-II **09 hours**

Solar Energy: Solar energy system, Solar Radiation, Availability, Measurement and Estimation, Solar Thermal Conversion Devices and Storage, Applications Solar Photovoltaic Conversion solar photovoltaic, solar thermal, applications of solar energy systems.

Unit-III **10 hours**

Wind Energy: Wind Energy Conversion, Potential, Wind energy potential measurement, Site selection, Types of wind turbines, Wind farms, wind Generation and Control. Nature of the wind, power in the wind, factors influencing wind, wind data and energy estimation, wind speed monitoring, classification of wind, characteristics, applications of wind turbines, offshore wind energy.
Hybrid systems, wind resource assessment, Betz limit, site selection, wind energy conversion devices. Wind mill component design, economics and demand side management, energy wheeling, and energy banking concepts. Safety and environmental aspects, wind energy potential and installation in India.

Unit-IV **10 hours**

Biogas: Properties of biogas (Calorific value and composition), biogas plant technology and status, Bio energy system, design and constructional features. Biomass resources and their classification, Biomass conversion processes, Thermo chemical conversion, direct combustion, biomass gasification, pyrolysis and liquefaction, biochemical conversion, anaerobic digestion, types of biogas Plants, applications.

Unit-V **09 hours**

Hydel Energy: Small hydro Power Plant - Importance of small hydro power plants and their Elements, types of turbines for small hydro, estimation of primary and secondary power.

Textbooks:

1. Non-Conventional Energy Sources by G.D Rai.
2. Twidell, J.W. and Weir, A., Renewable Energy Sources, EFN Spon Ltd., 1986.

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION
(OPEN ELECTIVE -IV)

	L	T	P	C
Subject Code: 21N04702	**3**	**0**	**0**	**3**

Pre Requisite: NIL

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

1. measure electrical parameters with different meters and understand the basic definition of measuring parameters
2. use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.
3. operate an Oscilloscope to measure various signals.
4. measure various physical parameters by appropriately selecting the transducers.
5. identify the usage of Various types of bridges

Unit-1: Measuring Instruments **06 hours**

DC Voltmeters, D"Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

Unit-2: Signal Analyzers **08 hours**

AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Capacitance-Voltage Meters, Oscillators.

Unit-3: Signal Generators **08 hours**

AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary Waveform Generator, Video Signal Generators, and Specifications

Unit-4: Oscilloscopes **08 hours**

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

Unit-5: Special Purpose Oscilloscopes **08 hours**

Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

Text Books:

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

References Books:

1. Electrical and Electronic Measurement and Measuring Instruments – A K Sawhney, DhanpatRai & Sons, 2013.
2. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.

CYBER SECURITY
(OPEN ELECTIVE - IV)

IV-B.Tech-I-Sem. **L T P C**
Subject Code : 21N05702 **3 0 0 3**
Pre Requisite: Nil

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

1. Illustrate the broad set of technical, social & political aspects of Cyber Security and security management methods to maintain security protection
2. appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure
3. illustrate the nature of secure software development and operating systems
4. demonstrate the role security management plays in cyber security
5. defense and legal and social issues at play in developing solutions

Unit - I: **9 hours**

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication,AccessControl,andCryptography,Authentication,AccessControl,Cryptography Programs and Programming:Unintentional(Non-malicious)ProgrammingOversights,Malicious Code—Malware, Countermeasures.

Unit - II: **8 hours**

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.
Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Unit - III: **10 hours**

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Counter measures Cryptography in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management.
Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Unit - IV: **10 hours**

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.
Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Unit - V: **10 hours**

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Text Books:

1) Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
2) Schneier, Bruce. Applied Cryptography, Second Edition, JohnWiley&Sons,1996

Reference Books:

1) Rhodes-Ousley, Mark Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts andPractice,McGraw-Hill,2013.
2) Whitman, Michael E. And Herbert J.Mattord. Roadmap to Information Security for IT and Info sec Managers. Boston, MA: Course Technology, 2011.

IV-B.TECH.-II-SEMESTER SYLLABUS

PROJECT WORK

IV-B.Tech-II-Sem. **L T P C**
Subject Code: 21P01821 **0 0 18 10**

The main objective of the Project work is

1. To enable the student apply engineering knowledge that has been taught all through the programme for solving practical engineering problem.
2. To enable the student capable for problem solving / problem shooting.
3. To instill and inculcate team spirit/ team work in to the minds of the students.
4. To enable/ train the students report making/ documentation.
5. To provide students an opportunity to use any civil engineering software for their project work.

Outcomes of the Project work.

Up on completion of the Project work, the student will be able to

1. Apply all levels of Engineering knowledge in solving the Engineering problems.
2. Work together with team spirit.
3. Use Civil Engineering software at least one.
4. Document the projects