



R20



Syllabus Book

Civil Engineering

VISHNU INSTITUTE OF TECHNOLOGY **(Autonomous)**

Approved by AICTE and is permanently affiliated to JNTUK, Kakinada.

Accredited by NAAC with A++

Vishnupur, Bhimavaram, West Godavari District, Andhra Pradesh-534202

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VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

VISION AND MISSION OF THE INSTITUTE

Vision: To empower the students through Academic excellence and Ethics so as to bring about social transformation and prosperity.

Mission:

- To expand the frontiers of knowledge through quality education.
- To provide value added Research and development.
- To embody a spirit of excellence in Teaching, Creativity, Entrepreneurship and Outreach.
- To provide a platform for synergy of Academy, Industry and Community.
- To inculcate high standards of Ethical and Professional behaviour.

VISION AND MISSION OF THE DEPARTMENT

Vision: To provide quality education in civil engineering and develop professionals dedicated to societal growth.

Mission:

- To provide students with a strong foundation in civil engineering principles through quality education and hands-on experience.
- To enable the students to build their leadership, collaboration, and problem-solving skills.
- To encourage the students towards excellence in research, innovation, and consultancy.
- To mould students into skilled professionals and entrepreneurs with strong ethical and moral values.



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DEPARTMENT OF CIVIL ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES

PEO1: Graduates will apply fundamental knowledge of mathematics, science, and civil engineering principles to solve complex infrastructure and environmental challenges.

PEO2: Graduates will pursue successful careers in civil engineering, engage in lifelong learning, and adapt to evolving technological and societal needs through advanced education and professional development.

PEO3: Graduates will demonstrate strong communication, leadership, and teamwork skills to collaborate effectively in multidisciplinary environments.

PEO4: Graduates will uphold ethical values, sustainable practices, and a sense of social responsibility in addressing civil engineering and community development projects.

PROGRAM SPECIFIC OUTCOMES

PSO1: An ability to learn construction concepts to make the structural planning in a smarter way through internship works in industries.

PSO2: To encourage young energetic engineers in technical and software skills in the field of civil engineering with innovative thoughts along with existing and future trends in constructional field.

PSO3: The capability to integrate knowledge in constructional field work and to improve skills to become an entrepreneur.



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PROGRAM OUTCOMES

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.



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PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

B.TECH FOUR YEAR DEGREE COURSE

R20 Regulations

(Applicable for the batches admitted from the A.Y. 2020-21)



VISHNU INSTITUTE OF TECHNOLOGY:

BHIMAVARAM

(Autonomous)

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ACADEMIC REGULATIONS (R20) FOR B.TECH. PROGRAMME

(Applicable for the batches admitted from the A.Y. 2020-21)

1. Award of B.Tech Degree:

- a) A student will be declared eligible for the award of B.Tech Degree if he fulfils the following academic regulations:
 - (i) A student shall be declared eligible for the award of B.Tech Degree, if he pursues a course of study for not less than four and not more than eight academic years. After eight academic years from the year of their admission, he shall **forfeit** their seat in B.Tech course and their admission stands cancelled.
 - (ii) The candidate shall register for 160 credits and secure all the 160 credits.
- b) The medium of instruction for the entire under graduate programme in Engineering & Technology will be in **English** only.

2. Programme Pattern:

- a) Total duration of the B.Tech (Regular) Programme is four academic years.
- b) Each Academic year of study is divided into **Two Semesters**.
- c) Minimum number of instruction days in each semester is 90.
- d) Grade points, based on percentage of marks awarded for each course will form the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).
- e) The total credits for the Programme is 160.
- f) Three week induction program is mandatory for all the first year UG students and shall be conducted as per AICTE/UGC/APSCHE guidelines.
- g) Student is introduced to “Choice Based Credit System (CBCS)”.
- h) A pool of interdisciplinary and job-oriented mandatory skill courses which are relevant to the industry are integrated into the curriculum of the branch of engineering concerned (total five skill courses: two basic level skill courses, one on soft skills and other two on advanced level skill courses).
- i) A student has to register for all courses in a semester.
- j) All the registered credits will be considered for the calculation of final CGPA.
- k) Each semester has - ‘Continuous Internal Evaluation (CIE)’ and ‘Semester End Examination (SEE)’. Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC and course structure as suggested by AICTE are followed.
- l) A 10 months industry/field internship is mandatory during the summer vacation and also in the final semester to acquire the skills required for job and make engineering graduates to connect with the needs of the industry and society at large.

- m) All the students shall be mandatorily registered for Community Service Project as per the Government and University norms.
- n) The college shall assign a faculty advisor/mentor after admission to each student or group of students from the same department to provide guidance in courses registration/career growth/placements/opportunities for higher studies/GATE/other competitive exams etc.

3. Registration for Courses:

- a) In each semester, a student shall mandatorily register for courses which he wishes to pursue within a week from the starting of the class work with the advice of Head of the Department and mentor of the student of the department concerned.
4. If any student wishes to withdraw the registration of the course, he shall submit a letter to the Principal through the Head of the Department within fifteen days.

a) Award of B.Tech. Degree: A student will be declared eligible for the award of B.Tech. Degree if he fulfills the following academic regulations:

- i. A student shall be declared eligible for the award of the B.Tech Degree, if he pursues a course of study in not less than four and not more than eight academic years. After eight academic years from the year of their admission, he shall **forfeit** their seat in B.Tech course and their admission stands cancelled.
- ii. The student shall register for 160 credits and must secure all the 160 credits.
- iii. All students shall mandatorily register for the courses like Environmental Sciences, Constitution of India, Essence of Indian Traditional Knowledge etc., shall be included in the curriculum as non-credit mandatory courses. Environmental Sciences is to be offered compulsorily as mandatory course for all branches. A student has to secure at least 40% of the marks allotted in the internal evaluation for passing the course.
- iv. Credits are defined as per AICTE norms.

b) Award of B.Tech. (Honor)/B.Tech. (Minor): B.Tech. with Honor or B.Tech. with Minor will be awarded if the student acquires 20 additional credits as per the regulations/guidelines. The regulations/guidelines are separately provided. Registering for an Honor/Minor is optional.

5. Attendance Requirements

- a) A student is eligible to write the Semester end examinations if he acquires 75% of attendance in aggregate of all the subjects.
- b) Condonation of shortage of attendance in aggregate up to 10% (65% and above, and below 75%) may be granted by the College Academic Committee. However, this condonation concession is applicable only to any two semesters during the entire programme.
- c) Shortage of Attendance below 65% in aggregate shall not be condoned.
- d) A student who is short of attendance in a semester may seek re-admission into that semester when offered within 4 weeks from the date of commencement of class work.

- e) Students whose shortage of attendance is not condoned in any semester are not eligible to write their semester end examination of that class.
- f) A stipulated fee of Rs. 500/- in the concerned semester shall be payable towards condonation of shortage of attendance. Students availing condonation on medical ground shall produce a medical certificate issued by the competitive authority.
- g) A student will be promoted to the next semester if he satisfies the attendance requirement of the present semester.
- h) For induction programme attendance shall be maintained as per AICTE norms.
- i) For non-credit mandatory courses the students shall maintain the attendance similar to credit courses.

6. Evaluation-Distribution and Weightage of marks

- (i) Paper setting and evaluation of the answer scripts shall be done as per the procedures laid down by the Examination section from time to time.
- (ii) To maintain the quality, external examiners and question paper setters shall be selected from reputed institutes like IITs, IIITs, NITs and Universities.
- (iii) For non-credit mandatory courses, like Environmental Sciences, Universal Human Values, Ethics, Constitution of India, Essence of Indian Traditional Knowledge, the student has to secure 40% of the marks allotted in the internal evaluation for passing the course. No marks or grade shall be allotted for all mandatory non-credit courses.
- (iv) A student is deemed to have satisfied the minimum academic requirements if he has earned the credits allotted to each theory/practical design/drawing subject/ project etc by securing not less than 35% of marks in the end semester exam and minimum 40% of marks in the sum total of the internal marks and end semester examination marks together.
- (v) Distribution and Weightage of marks:

The assessment of the student's performance in each course will be as per the details given:

S. No	Components	Internal	External	Total
1	Theory	30	70	100
2	Engineering Graphics/Design/Drawing	30	70	100
3	Practical	15	35	50
4	Mini Project/Internship/Industrial Training/ Skill Development Programmes	-	50	50
5	Project Work	60	140	200

(vi) Continuous Internal Theory Evaluation:

- 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 for 15 marks for a duration of 90 minutes and (iii) one assignment for 5 marks.

- b) The mid marks submitted to the examination section shall be displayed in the notice boards for the benefit of the students.
- c) If any discrepancy is found in the submitted mid marks, it shall be brought to the notice of examination section within one week from the submission.
- d) Internal marks are calculated using 80% from the better midterm and 20% from the other one.

Example:

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

Mid – 2 Marks = Marks secured in (objective examination – 2 + descriptive examination – 2 + 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)

(vii) Semester End Examinations Evaluation:

- a) The semester end examinations will be conducted by the examination section for 70 marks consisting 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.
- b) For practical subjects there shall be continuous evaluation during the semester for 15 internal marks and 35 end examination marks. The internal 15 marks shall be awarded as follows: day to day work - 5 marks, Record-5 marks and the remaining 5 marks to be awarded by conducting an internal laboratory test. The end examination shall be conducted by the teacher concerned and external examiner appointed.
- c) For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing) and estimation, the distribution shall be 30 marks for internal evaluation (15 marks for continuous Assessment (day-to-day work) and 15 marks for internal tests) and 70 marks for end examination. There shall be two internal tests in a Semester for 15 marks each and final marks can be calculated with 80% weightage for better of the two tests and 20% weightage for other test and these are to be added to the marks obtained in day to day work.
- d) Evaluation of the summer internships: Summer internships shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of concerned specialization of the UG programme. Students shall pursue this course during summer vacation just before its offering as per course structure. The minimum duration of this course is at least 6 weeks. The

student shall register for the course as per course structure after commencement of academic year. A supervisor/mentor/advisor has to be allotted to guide the students for taking up the summer internship. The supervisor shall monitor the attendance of the students during the internship. Attendance requirements are as per the norms. After successful completion, students shall submit a summer internship technical report to the concerned department and appear for an oral presentation before the committee consisting of an external examiner, Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate from industry/skill development center shall be included in the report. The report and the oral presentation shall carry 40% and 60% weightages respectively. It shall be evaluated for 50 external marks at the end of the semester. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, a student fails, he shall reappear as and when semester supplementary examinations are conducted by the college.

- e) The job oriented skill courses may be registered at the college or at any accredited external agency. A student shall submit a record/report on the list skills learned. If the student completes job oriented skill course at external agency, a certificate from the agency shall be included in the report. The course will be evaluated at the end of the semester for 50 marks (record: 15 marks and viva-voce: 35 marks) along with laboratory end examinations in the presence of external and internal examiner (course instructor or mentor). There are no internal marks for the job oriented skill courses.
- f) **Mandatory Course (M.C):** Environmental Sciences, Constitution of India, Essence of Indian Traditional Knowledge etc are non-credit (zero credits) mandatory courses. Environmental Sciences shall be offered compulsorily as mandatory course for all branches. There shall be an external examination for 70 marks and it shall be conducted by the college internally. Two internal examinations shall be conducted for 30 marks and a student has to secure at least 40% of the marks for passing the course. There is no objective internal exam for mandatory courses. No marks or grade shall be printed in the transcripts for all mandatory non-credit courses, but only Completed (Y)/Not-completed (N) will be specified.
- g) **Procedure for Conduct and Evaluation of MOOC:** There shall be a Discipline Centric Elective Course through Massive Open Online Course (MOOC) as Program Elective course. The student shall register for the course (as per the credits requirement) offered by SWAYAM/NPTEL through online with the approval of Head of the Department. The Head of the Department shall appoint one mentor for each of the MOOC subjects offered. The student needs to register the course in the SWAYAM/NPTEL portal. During the course, the mentor monitors the student's assignment submissions given by SWAYAM/NPTEL. The student needs to submit all the assignments given and needs to take final exam at the proctor center. The student needs to earn a certificate by passing the exam. The student will be awarded the credits

given in curriculum only by submission of the certificate, and the course grade will be based on the score obtained. In case the student does not pass subjects registered through SWAYAM/NPTEL, the same or alternative equivalent subject may be registered again through SWAYAM/NPTEL in the next semester with the recommendation of HOD and shall pass the course.

h) Major *Project* (Project - Project work, seminar and internship in industry):

In the final semester, the student should mandatorily register and undergo internship and in parallel he should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship. The project report shall be evaluated by an external examiner.

Evaluation: The total marks for project work are 200 and distribution shall be 60 marks for internal and 140 marks for external evaluation. There will be 3 internal reviews conducted by Project Review Committee, comprising supervisor, a senior faculty and HoD. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner and is evaluated for 140 marks.

7. Results Declaration:

- (i) Before results declaration, an academic council meeting shall be conducted and results shall be placed before the academic council for approval.
- (ii) With the approval of academic council, the results shall be submitted to the University to get the approval from Honorable Vice-Chancellor.
- (iii) The college may normalize the result, if required, before declaration of the result.
- (iv) A copy of approved results in a CD shall be submitted to the University examination Center.

8. Academic Audit: Academic audit in each semester will be conducted as per norms.

9. Revaluation of Marks in the End Semester Examination: A student can request for revaluation of his/her answer book on payment of a prescribed fee.

10. Supplementary Examinations: A student who has failed to secure the required credits can appear for a supplementary examination, as per the schedule announced.

11. Malpractices in Examinations: Disciplinary action shall be taken in case of malpractices during Mid/End examinations as per the rules framed by the college.

12. Promotion Rules

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.5 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 norms.
- b) A student will be promoted from II year 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.

13. 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.

14. Course Pattern:

- a) The entire course of study is for four academic years; all years are on semester pattern.
- b) A student who is eligible but either misses or fails the end semester exam can take it the next time it is conducted.
- c) When a student is detained for lack of credits / shortage of attendance, he may be re-admitted into the same semester/year in which he has been detained. However, the academic regulations under which he was first admitted shall continue to be applicable to him/her.

15. Earning of Credit:

A student shall be considered to have completed a course successfully and earned the credits if he secures an acceptable letter grade in the range O to D as given below. Letter grade 'F' in any course implies failure of the student in that course and no credits earned. Absent is also treated as no credits earned. For project the same percentages will be followed for grading.

Marks Range - Theory (Max - 100)	Marks Range - Lab(Max - 50)	Level	Letter Grade	GradePoint
≥ 90	≥ 45	Outstanding	O	10
≥80 to <89	≥40 to <44	Excellent	S	9
≥70 to <79	≥35 to <39	Very Good	A	8
≥60 to <69	≥30 to <34	Good	B	7
≥50 to <59	≥25 to <29	Fair	C	6
≥40 to <49	≥20 to <24	Satisfactory	D	5
<40	<20	Fail	F	0
-	-	Absent	AB	0

16. Award of Class

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

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	≥ 7.75 (Without any supplementary appearance)	Based on the CGPA secured from 160 Credits
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 5.00 to < 5.75	

17. Minimum Instruction Days

The minimum instruction days for each semester shall be 90 working days. There shall be no branch transfers after the completion of the admission process. There shall be no transfer from one college

to another.

18. Withholding of Results

If the student is involved in indiscipline/malpractices/court cases, the result of the student will be withheld.

19. Transitory Regulations

- a) Discontinued or detained candidates are eligible for re-admission as and when next offered.
- b) The re-admitted candidate will be governed by the rules & regulations under which the candidate has been admitted.

20. Gap Year

Gap Year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after I/II/III year to pursue entrepreneurship full time. This period shall be counted for the maximum time for graduation. An evaluation committee shall be constituted to evaluate the proposal submitted by the student and the committee shall decide on permitting the student for availing the Gap Year.

21. General

- a) In this document, any reference to 'he' should be interpreted as 'he/she' to ensure gender neutrality.
- b) The academic regulation should be read as a whole for the purpose of any interpretation.
- c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Head of the Institution is final.
- d) The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College.

ACADEMIC REGULATIONS (R20) FOR B.TECH. (LATERAL ENTRY SCHEME)

Applicable for the students admitted into II year B.Tech. from the Academic Year 2021-22 onwards

1. Award of B.Tech Degree

A student will be declared eligible for the award of B.Tech. Degree if he fulfills the following academic regulations:

- a) A student shall be declared eligible for the award of the B.Tech Degree, if he pursues a course of study for not less than three academic years and not more than six academic years. After six academic years from the year of their admission, he shall **forfeit** their seat in B.Tech course and their admission stands cancelled.
- b) The candidate shall register for 121 credits and secure all the 121 credits.

2. Attendance Requirements: The attendance requirements of B.Tech (Regular) shall be applicable to B.Tech (lateral entry).

3. Promotion Rules

A student shall be promoted from second year to third year if he fulfills the minimum attendance requirement.

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.

4. Award of Class

After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B.Tech degree, he shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	Remarks
First Class with Distinction	≥ 7.75 (Without any supplementary appearance)	Based on the CGPA secured from 121 Credits
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	
Pass Class	≥ 5.00 to < 5.75	

The Grades secured, Grade points and Credits obtained will be shown separately in the memorandum of marks.

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

COMMUNITY SERVICE PROJECT

Introduction:

1. Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development
2. Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
3. 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 the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

1. To sensitize the students to the living conditions of the people who are around them,
2. To help students to realize the stark realities of the society.
3. To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability.
4. To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
5. To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
6. To help students to initiate developmental activities in the community in coordination with public and government authorities.
7. 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:

1. Every student should put in a minimum of **180 hours** for the Community Service Project during the summer vacation.
2. Each class/section should be assigned with a mentor.
3. 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

4. A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.
5. The log book has to be countersigned by the concerned mentor/faculty in charge.
6. Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
7. The final evaluation to be reflected in the grade memo of the student.
8. The Community Service Project should be different from the regular programmes of NSS/NCC/Green Corps/Red Ribbon Club, etc.
9. 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.
10. Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

Procedure:

1. 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.
2. The Community Service Project is a twofold one –
 - a) 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 be another primary source of data.
 - b) 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

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

1. Positive impact on students' academic learning
2. Improves students' ability to apply what they have learned in "the real world"
3. Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
4. Improved ability to understand complexity and ambiguity

Personal Outcomes

1. Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
2. Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

Social Outcomes

1. Reduced stereotypes and greater inter-cultural understanding
2. Improved social responsibility and citizenship skills
3. Greater involvement in community service after graduation

Career Development

1. Connections with professionals and community members for learning and career opportunities
2. Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity

Relationship with the Institution

1. Stronger relationships with faculty
2. Greater satisfaction with college
3. Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

1. Satisfaction with the quality of student learning
2. New avenues for research and publication via new relationships between faculty and community
3. Providing networking opportunities with engaged faculty in other disciplines or institutions

4. A stronger commitment to one's research

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

1. Improved institutional commitment
2. Improved student retention
3. Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

1. Satisfaction with student participation
2. Valuable human resources needed to achieve community goals
3. New energy, enthusiasm and perspectives applied to community work
4. Enhanced community-university relations.

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

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition

14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Flourey culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilization of free electricity to farmers and related issues
40. 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. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
6. Awareness Programme on Socially relevant themes.

Programmes for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Womens' 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 Bharat
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 –

- i. Agriculture
- ii. Health
- iii. Marketing and Cooperation
- iv. Animal Husbandry
- v. Horticulture
- vi. Fisheries
- vii. Sericulture
- viii. Revenue and Survey
- ix. Natural Disaster Management
- x. Irrigation
- xi. Law & Order
- xii. Excise and Prohibition
- xiii. Mines and Geology
- xiv. Energy

Role of Students:

1. Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
2. For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
3. As and when required the College faculty themselves act as Resource Persons.
4. 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.
5. 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.
6. 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) A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- b) 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.

- c) 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 works 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 students 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.

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	<i>If the candidate:</i>	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cellphones, 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 the subsequent subject. 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.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award passmarks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

7.	Leaves the exam hall taking away answer script or intentionally tears the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action and impose suitable punishment.	

VISHNU INSTITUTE OF TECHNOLOGY

(AUTONOMOUS)

(Approved by AICTE & Affiliated to JNTU-Kakinada)

(Accredited by NBA & NAAC 'A' Grade)

Vishnupur, BHIMAVARAM – 534 202

Ragging

Prohibition of ragging in
Educational institutions Act 26 of 1997

Salient Features

- Ragging within or outside any educational institution is prohibited.
- Ragging means doing an act which causes or is likely to cause Insult or Annoyance of Fear or Apprehension or Threat or Intimidation or outrage of modesty or Injury to a student.

	Imprisonment upto		Fine Upto
Teasing, Embarrassing & Humiliation	 6 Months	+	Rs. 1,000/-
Assaulting or Using Criminal force or Criminal intimidation	 1 Year	+	Rs. 2,000/-
Wrongfully restraining or confining or causing hurt	 2 Years	+	Rs. 5,000/-
Causing grievous hurt, kidnapping or Abducts or rape or committing unnatural offence	 5 Years	+	Rs. 10,000/-
Causing death or abetting suicide	 10 Months	+	Rs. 50,000/-

LET US MAKE VIT A RAGGING FREE COLLEGE

VISHNU INSTITUTE OF TECHNOLOGY

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Vishnupur, BHIMAVARAM – 534 202



**ABSOLUTELY
NOT TO RAGGING**

1. Ragging is prohibited as per Act 26 of A.P. Legislative Assembly, 1997.
2. Ragging entails heavy fines and/or imprisonment.
3. Ragging invokes suspension and dismissal from the College.
4. Outsiders are prohibited from entering the College and Hostel without permission.
5. Girl students must be in their hostel rooms by 7.00 p.m.
6. All the students must carry their Identity Cards and show them when demanded.
7. The Principal and the Wardens may visit the Hostels and inspect the rooms any time.

LET US MAKE VITB A RAGGING FREE COLLEGE

COURSE STRUCTURE – R20

I Year – I Semester

S. No.	Category	Subject Code	Course Title	L	T	P	C
1	BSC	20BS1T02	Mathematics – I (Linear algebra & calculus)	3	-	-	3
2	BSC	20BS1T03	Engineering Physics	3	-	-	3
3	HSMC	20BS1T01	Communicative English	3	-	-	3
4	ESC	20ME1T01	Engineering Graphics	2	-	2	3
5	ESC	20CS1T01	Computational Thinking & Programming	3	-	-	3
6	HSMC LAB	20BS1P01	English Communication Skills Lab	-	-	3	1.5
7	BSC LAB	20BS1P02	Engineering Physics Lab	-	-	3	1.5
8	ESC LAB	20CS1P01	Computational Thinking & Programming Lab	-	-	3	1.5
Total				14	0	11	19.5

I Year – II Semester

S. No.	Category	Subject Code	Course Title	L	T	P	C
1	BSC	20BS2T01	Mathematics–II (vector & transform calculus)	3	-	-	3
2	BSC	20BS2T02	Engineering Chemistry	3	-	-	3
3	ESC	20CE2T01	Building Material and Concrete Technology	3	-	-	3
4	ESC	20CE2T02	Engineering Mechanics	3	-	-	3
5	ESC	20CS2P01	Computer Programming Lab	1	-	4	3
6	ESC LAB	20CE2P01	Building Planning & Computer Aided Building Drawing	-	-	3	1.5
7	BSC LAB	20BS2P01	Engineering Chemistry Lab	-	-	3	1.5
8	ESC LAB	20ME2P01	Engineering workshop	-	-	3	1.5
9	MC	20BS2T07	Environmental Science	2	-	-	-
Total				17	0	9	19.5

II Year – I Semester

S. No.	Category	Subject Code	Course Title	L	T	P	C
1	BSC	20BS3T01	Mathematics -III (Complex Variables & PDE)	3	-	-	3
2	PCC	20CE3T01	Strength of Materials – I	3	-	-	3
3	PCC	20CE3T02	Fluid Mechanics	3	-	-	3
4	PCC	20CE3T03	Surveying	3	-	-	3
5	PCC	20CE3T04	Highway Engineering	3	-	-	3
6	PCC LAB	20CE3P01	Concrete Technology Lab	-	-	3	1.5
7	PCC LAB	20CE3P02	Highway Engineering Lab	-	-	3	1.5
8	PCC LAB	20CE3P03	Surveying Field Work Lab	-	-	3	1.5
9	SOC	20CE3P04	Building & Earth Science	-	-	4	2
10	MC	20BS3A01	Constitution of India	2	-	-	-
Total				17	0	13	21.5

II Year – II Semester

S. No.	Category	Subject Code	Course Title	L	T	P	C
1	BSC	20BS4T01	M-IV (Numerical Methods, Probability & Statistics)	3	-	-	3
2	PCC	20CE4T01	Strength of Materials –II	3	-	-	3
3	PCC	20CE4T02	Hydraulics and Hydraulic Machinery	3	-	-	3
4	ESC/PCC	20CE4T03	Environmental Engineering	3	-	-	3
5	HSMC	20HS4T01	Universal Human Values II	3	-	-	3
6	ESC/PCC LAB	20CE4P01	Environmental Engineering Lab	-	-	3	1.5
7	PCC LAB	20CE4P02	Strength of Materials Lab	-	-	3	1.5
8	PCC LAB	20CE4P03	Fluid Mechanics & Hydraulics Machinery Lab	-	-	3	1.5
9	SOC	20CE4P04	Advanced Construction Planning	-	-	4	2
10	MC	20HS4A01	Critical Reading and Creative Writing	2	-	-	-
Total				17	0	13	21.5

III Year – I Semester

S. No.	Category	Subject Code	Course Title	L	T	P	C
1	PCC	20CE5T01	Structural Analysis	3	-	-	3
2	PCC	20CE5T02	Geotechnical Engineering-I	3	-	-	3
3	PCC	20CE5T03	Design & Drawing of Reinforced Concrete Structures	2	-	2	3
4	OEC/JOE-I (CE)	20OE5T01	Elements of Civil Engineering	3	-	-	3
		20OE5T02	Advanced Concrete Technology				
5	PEC-I	20CE5T04	Air pollution And Control	3	-	-	3
		20CE5T05	Remote Sensing & GIS Applications				
		20CE5T06	Traffic Engineering				
		20CE5T07	Low-Cost Housing				
6	PCC LAB	20CE5P01	Geotechnical Engineering Laboratory	-	-	3	1.5
7	PCC LAB	20CE5P02	Remote Sensing & GIS Laboratory	-	-	3	1.5
8	SOC/SSC	20BS5P01	Advanced English Communication Skills Lab	-	-	4	2
9	MC	20CE5J01	Engineering Exploration Project	-	-	2	-
10	Internship	20CE5I01	Summer Internship 2 months (To be completed after second year, and evaluated during V semester)	-	-	-	1.5
Total				14	0	14	21.5

III Year – II Semester

S. No.	Category	Subject Code	Course Title	L	T	P	C
1	PCC	20CE6T01	Design and Drawing of Steel Structures	2	-	2	3
2	PCC	20CE6T02	Water Resource Engineering	3	-	-	3
3	PCC	20CE6T03	Geotechnical Engineering-II	3	-	-	3
4	PEC-II	20CE6T04	Architecture & Town Planning	3	-	-	3
		20CE6T05	Road Safety Engineering				
		20CE6T06	Advanced Structural Analysis				
		20CE6T07	Precast and Prefabricated structures				
5	OEC/JOE- II	20OE6T01	Basics of Environmental Engineering	3	-	-	3
		20OE6T02	Innovative Construction Materials				
6	PCC LAB	20CE6P01	Surveying Field Work- II Laboratory	-	-	3	1.5
7	PCC LAB	20CE6P02	Estimation, Costing & Contracts Laboratory	-	-	3	1.5
8	PCC LAB	20CE6P03	STAAD Pro Laboratory	-	-	3	1.5
9	SOC/SSC	20CE6P04	Building Information Modeling (BIM) in Design Construction and Operations Laboratory	-	-	4	2
10	MC	20HS6A01	Employability Skills for Civil Engineers	-	-	2	-
11	Internship	20CE6I01	Industrial/Research Internship of 2 Months (to be completed before III year)	-	-	-	-
Total				14	01	17	21.5

IV Year – I Semester

S. No.	Category	Subject Code	Course Title	L	T	P	C
1	PEC-III	20CE7PE01	Pre-stressed Concrete	3	-	-	3
		20CE7PE02	Advanced Structural Engineering				
		20CE7PE03	Urban Transportation and Planning				
		20CE7PE04	Bridge Engineering				
2	PEC-IV	20CE7PE05	Ground Improvement Techniques	3	-	-	3
		20CE7PE06	Geo-Spatial Technologies				
		20CE7PE07	Reinforced Soil Structures				
		20CE7PE08	Industrial Waste Water Treatment				
3	PEC-V	20CE7PE09	Design & Drawing of Irrigation Structures	2	-	2	3
		20CE7PE10	Solid Waste Management	3	-	-	
		20CE7PE11	Urban Hydrology				
		20CE7PE12	Earth Retaining Structures				
4	OEC/JOE-III	20OE7T01	Repair & Rehabilitation of Structures	3	-	-	3
		20OE7T02	Disaster Management & Mitigation				
5	OEC/JOE-IV	20OE7T03	Smart City Planning & Development	3	-	-	3
		20OE7T04	Green Building Technologies				
6	HSSE	20HS7T01	Managerial Economics and Management Science	3	-	-	3
		20HS7T02	Fundamentals of Entrepreneurship				
		20HS7T03	Business Environment				
7	SAC/SSC	20CE7P01	Computer Aided Project Management Laboratory	-	-	4	3
8	Internship	20CE7I01	Industrial/Research Internship 2 months (after third year, to be evaluated after VII semester)	-	-	-	2
Total				18	0	4	23



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IV Year – II Semester

S. No.	Category	Subject Code	Course Title	L	T	P	C
1	Major Project	20CE8J01	Project	-	-	-	8
Total				0	0	0	8

Community Service Project @ 4 Credits

Student can complete Project Work @ Industries/Higher Learning Institutions/APSSDC

OPEN ELECTIVES TO OTHER BRANCHES

S. No.	Course Year	Category	Course Title	L	T	P	C
1	III B.Tech. I Sem.	OEC / JOE - I	Elements of Civil Engineering	3	-	-	3
			Advanced Concrete Technology				
2	III B.Tech. II Sem.	OEC / JOE - II	Basics of Environmental Engineering	3	-	-	3
			Innovative Construction Materials				
3	IV B.Tech. I Sem.	OEC / JOE - III	Repair & Rehabilitation of Structures	3	-	-	3
			Disaster Management & Mitigation				
4	IV B.Tech. I Sem.	OEC / JOE - IV	Smart City Planning and Development	3	-	-	3
			Green Building Technologies				

MINOR COURSES OFFERED BY CIVIL ENGINEERING

S. No.	Course Year	Course Title	L	T	P	C
1	II B.Tech. II Sem.	Concrete Technology	4	0	0	4
2	III B.Tech. I Sem.	Building Planning	3	0	2	4
3	III B.Tech. II Sem.	Strength of Materials	4	0	0	4
In addition to the four subjects, MOOC/NPTEL Courses for 04 credits (02 courses @ 2 credits each) are compulsory in the domain of Civil Engineering						



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Syllabus for

I B.Tech. - I Semester

(R20)



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Subject	MATHEMATICS - I (LINEAR ALGEBRA & CALCULUS)				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

To enable the students to

1. Know the importance of matrices to solve linear equations using matrices.
2. Identify and solve various differential equations using corresponding methods.
3. Apply methods of solving higher order linear differential equations.
4. Comprehend the theory of maxima and minima of a function of two variables.
5. Analyze the techniques of tracing the curves and evaluate the lengths, areas, volumes of objects using multiple integrals.

Course Outcomes:

After completing this course, the students will be able to

1. Solve linear system of equations in engineering problems.
2. Find Eigen-values and Eigen vectors of a matrix in engineering studies.
3. Model engineering problems as differential equations and solve analytically.
4. Find out local /global optimum of functions of several variables.
5. Compute areas and volumes by integrals.

SYLLABUS

UNIT – I

Matrices - Linear system of equations: Introduction, Different types of matrices, Rank- Echelon form - Normal form, Solution of a System of Linear Equations – Non-homogeneous and homogeneous equations, Gauss- Jordan method, Gauss – Elimination Method, LU Decomposition, Applications of electric circuits.

UNIT - II

Eigen values - Eigen vectors: Eigen values - Eigen vectors – Properties– Cayley-Hamilton Theorem - finding inverse and power of a matrix by using Cayley-Hamilton theorem,



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Diagonalization of matrices, Spectral Decomposition, Singular Value Decomposition and Principal Component Analysis.

UNIT – III

Differential Equations: Differential equations of first order and first degree–Exact and Non–exact differential equations, Linear and Bernoulli differential equations. Orthogonal trajectories, Newton’s Law of cooling, Law of natural growth and decay, Higher order homogenous and non- homogenous linear differential equations with constant coefficients - Particular integrals for the functions of type e^{ax} , $\sin(ax+b)$, $\cos(ax+b)$, Polynomial of x , $e^{ax} V(x)$, L-C-R Circuits.

UNIT – IV

Partial Differentiation: Functions of several variables- Partial derivatives, Total derivative, Chain rule, Change of variables, Jacobians, Functional dependence. Generalized Mean Value theorem –Taylor’s theorem and Maclaurin’s theorem (without proof) for a function of two variables, Maxima and Minima of functions of two variables, Lagrange’s method of undetermined multipliers.

UNIT – V

Multiple Integrals and Applications: Review of Curve tracing-Cartesian-Polar and Parametric curves.

Multiple integrals - double integrals - change of variables (Cartesian and Polar coordinates), Change of order of integration and Evaluation of triple integrals, computing area and volume.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 42nd Ed., Khanna Publishers, New Delhi, 2012.
2. Erwin. Kreyszig, Advanced Engineering Mathematics, 9th Ed., Wiley, 2012

References:

1. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganathan and M.V.S.S.N. Prasad, Engineering Mathematics, Volume-I, 12th Ed., S. Chand Publishers, 2014.



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2. B. V. Ramana, Engineering Mathematics, 4th Ed., Tata McGraw Hill, New Delhi, 2009.
3. D. S. Chandrashekharaiah, Engineering Mathematics, Volume 1, Prism Publishers, 2010.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, reprint, 2008



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Subject	ENGINEERING PHYSICS				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
2. Understand the mechanism of emission of light, utilization of lasers as coherent light sources for low and high energy applications. Study of propagation of light through optical fibers and their implications in optical communications.
3. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
4. Familiarize the concepts of theoretical acoustics for their practical utility in engineering acoustics. Explanation for the significance of ultrasound and its application in NDT application.
5. Enlighten the periodic arrangement of atoms in Crystalline solids by Bragg's law – Learning the structural analysis through X-ray diffraction.

Course Outcomes:

Upon the completion of the course the students will be able to:

1. Explain the need of coherent sources and the conditions for sustained interference. Identify the applications of interference in engineering. Analyze the differences between interference and diffraction with applications. Illustrate the concept of polarization of light and its applications.
2. Explain various types of emission of radiation. Identify the role of laser in engineering applications. Describe the construction and working principles of various types of lasers. Explain the working principle of optical fibers. Classify optical fibers based on refractive index profile and mode of propagation. Identify the applications of optical.
3. Explain the concept of dielectric constant and polarization in dielectric materials. Summarize various types of polarization of dielectrics. Classify the magnetic materials



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- based on susceptibility and their temperature dependence. Explain the applications of dielectric and magnetic materials. Apply the concept of magnetism to magnetic devices.
4. Explain sound waves and its propagation/absorption of construction material used in design of buildings. Analyze acoustic parameters of typical materials used in buildings. Recognize sound level disruptors and their application in architectural acoustics. Identify the use of ultrasonics in diversified fields of NDT.
 5. Interpret various crystal systems and analyze the characterization of materials by XRD. Identify the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique. Analysis of structure of the crystals by Laue and Powder techniques.

SYLLABUS

UNIT – I WAVE OPTICS

Interference: Introduction - Principle of Superposition-Coherence-Conditions for Sustained Interference -Interference in thin films (reflected Geometry)-Newton's Rings-Determination of Wavelength and Refractive Index-Applications of Interference.

Diffraction: Introduction- Fresnel and Fraunhofer diffraction-Fraunhofer Diffraction due to Single slit, double slit –N – slits (Qualitative)-Diffraction Grating -Determination of Wavelength-Applications of Diffraction.

Polarization: Introduction- types of polarized light, Polarization by reflection, refraction and double refraction- Nicol's Prism-Half wave and Quarter wave plates.

UNIT – II LASERS & FIBER OPTICS

Lasers: Introduction-Characteristics of Laser–Spontaneous and Stimulated emissions of radiation-Einstein's coefficients & Relation between them and their significance – population inversion - Ruby laser – Helium Neon laser –Semiconductor diode laser (Qualitative)- Applications of Lasers.

Fiber Optics: Introduction to Optical Fibers-Total Internal Reflection- Construction of optical fibers -Acceptance Angle-Numerical Aperture-Classification of fibers based on Refractive



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index profile, modes - Propagation of electromagnetic wave through optical fiber -Block Diagram of Fiber optic Communication- Applications of optical fibers.

UNIT – III MAGNETIC MATERIALS AND DIELECTRIC PROPERTIES

Magnetic Materials: Introduction - Magnetic dipole moment – Magnetization - Magnetic susceptibility and permeability - Origin of permanent magnetic moment - Classification of Magnetic materials - Weiss theory of ferromagnetism (qualitative) – Hysteresis - soft and hard magnetic materials - Magnetic device applications.

Dielectrics: Introduction to Dielectrics - Electric polarization - Dielectric polarizability, Susceptibility and Dielectric constant - Types of polarizations with derivations for polarisabilities (Qualitative) – Lorentz (internal) field - Clausius - Mosotti equation.

UNIT - IV ACOUSTICS AND ULTRASONICS

Acoustics: Introduction – Reverberation - Reverberation time -Classification of Sound waves- Weber–Fechner law - Sabine’s formula- derivation using growth and decay method – Absorption coefficient and its determination –factors affecting acoustics of buildings and their remedies.

Ultrasonics: Introduction -Production of ultrasonics by Magnetostriction and piezoelectric methods - Detection of ultrasonics -acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - applications

UNIT - V CRYSTALLOGRAPHY AND X-RAY DIFFRACTION

Crystallography: Introduction-Space lattice, Basis, Unit Cell and Lattice Parameters-, Bravais lattices – Crystal Systems (3D)-coordination number-Packing fraction of SC, BCC and FCC structures.

X- ray Diffraction: Introduction - Miller indices-Separation between successive (hkl) planes. Bragg’s Law-X-ray Diffractometer-Crystal Structure determination by Laue’s and Powder Methods (Qualitative).



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Text books:

1. M.N. Avadhanulu, P.G.Kshirsagar “A Text book of Engineering Physics”-S.Chand Publications,2017.
2. H.K.Malik & A.K.Singh “Engineering Physics”,- McGraw Hill Publishing Company Ltd, 2018
3. P.K. Palanisamy, Applied Physics, SciTech Publications.

Reference Books:

1. Gerd Keiser “Optical Fiber Communications”- 4/e, Tata Mc GrawHill ,2008
2. Charles Kittel “Introduction to Solid State Physics”,Wiley Publications,2011
3. S.M.Sze “Semiconductor devices-Physics and Technology”-Wiley,2008
4. Halliday, Resnick and Walker, “Fundamentals of Physics”, John WileySons.
5. M.R. Srinivasan, Engineering Physics, NewAge International Publishers.



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Subject	COMMUNICATIVE ENGLISH				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

SYLLABUS

Introduction: The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from learning about the language to using the language. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Objectives:

1. Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
2. Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials.
3. Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
4. Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information.
5. Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

Course Outcomes

At the end of the course, the learners will be able to



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1. Appreciate a piece of prose; employ suitable strategies for skimming and scanning to get the general idea of a text; recognize paragraph structure and formulate sentences using proper grammatical structures and correct word forms of nouns and pronouns and GRE Words.
2. Study a piece of prose; write well structured paragraphs and understand applying cohesive devices and use articles and prepositions accurately and learn good vocabulary.
3. Analyze a text in detail and summarize and employ verbs, tenses and subject verb agreement appropriately; apply vocabulary and word associations.
4. Understand a text, and learn and apply information transfer and apply the use of adjectives and adverbs and vocabulary.
5. Interpret ideas from reading comprehension and write formal letters and emails, use voice and reported speech properly and edit short texts by correcting common errors and learn vocabulary

Methodology:

1. The classes are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

(R-20 Regulations) Detailed Textbook:

Infotech English by Maruthi Publications

Non-Detailed Textbook:

Wings of Fire: APJ Abdul Kalam by University Press



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UNIT – I

Detailed: A Drawer Full of Happiness

Non-detailed: APJ Abdul Kalam's Wings of Fire 1-5 Chapters

Reading: Skimming text to get the main idea. Scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph.

Writing: Writing Sentences with proper word order - Basic Sentence Structures.

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: countables and uncountables; singular and plural, pronouns, basic sentence structures; simple question form - wh-questions; word order in sentences.

UNIT – II

Detailed: Nehru's letter to his daughter Indira on her birthday

Non-detailed: APJ Abdul Kalam's Wings of Fire 6-10 Chapters

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

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 words). GRE Vocabulary Analogies (20 words) Antonyms and Synonyms, Word applications Grammar: Use of articles and zero article; prepositions.

UNIT – III

Detailed: Stephen Hawking-Positivity "Benchmark"

Non-detailed: APJ Abdul Kalam's Wings of Fire 10-15 Chapters

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.

Reading for Writing: Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions.



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Vocabulary: Technical vocabulary from across technical branches (20 words). GRE Vocabulary (20 words) Antonyms and Synonyms, Word applications, Association Grammar: Verbs - tenses; Subject-verb agreement.

UNIT – IV

Detailed: Liking a Tree, Unbowed: Wangari Maathai's Biography

Non-detailed: APJ Abdul Kalam's Wings of Fire 16-20 Chapters

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicative process or display complicated data.

Reading for Writing: Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) Antonyms and Synonyms, Word applications

Grammar: Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison.

UNIT – V

Detailed: Stay Hungry-Stay foolish from "Infotech English", Maruthi Publications.

Non-detailed: APJ Abdul Kalam's Wings of Fire 21-24 Chapters by University Press Reading: Reading for comprehension. RAP Strategy Intensive reading and Extensive reading techniques.

Reading for Writing: Letter writing, E mail writing, email etiquette.

Vocabulary: Technical vocabulary from across technical branches (20 words) GRE Vocabulary (20 words) Antonyms and Synonyms, Word applications.

Grammar: Direct and indirect speech, reporting verbs for academic purposes, Active Voice-Passive Voice; editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement and conjunctions)

Reference Books:

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.



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Sample Web Resources

Grammar/Listening/Writing

1-language.com

<http://www.5minuteenglish.com/>

<https://www.englishpractice.com/>

Grammar/Vocabulary

English Language Learning Online

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

<https://www.vocabulary.com/>

BBC Vocabulary Games

Free Rice Vocabulary Game

Reading

<https://www.usingenglish.com/comprehension/>

<https://www.englishclub.com/reading/short-stories.htm>

<https://www.english-online.at/>

Listening

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

Speaking

<https://www.talkenglish.com/>

BBC Learning English – Pronunciation tips

Merriam-Webster – Perfect pronunciation Exercises

All Skills

<https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

Online Dictionaries

Cambridge dictionary online, MacMillan dictionary, Oxford learner's dictionaries



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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING GRAPHICS				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	2	0	2	3

Course Objectives:

1. To introduce the students to use drawing instruments and to draw polygons, Engg. Curves and use scales.
2. To introduce the students orthographic projections, projections of points & lines.
3. The objective is to make the students draw the projections of the plane inclined to both the planes.
4. The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
5. The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Course Outcomes:

Students will be able to:

1. Construct engineering curves and scales.
2. Understand orthographic projections, projections of points & lines.
3. Draw the projections of a plane inclined to both the planes.
4. Draw the projections of various types of solids in different positions inclined to one or both the planes.
5. Visualize and convert the isometric view to orthographic view and vice versa.

SYLLABUS

UNIT - I

Introduction to Graphics

Curves: Ellipse, Parabola and Hyperbola by general methods, Tangent & Normal, Cycloids, Involute, tangent & normal for the curves.

Scales: Plain scale, Diagonal scale and Vernier scale.



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UNIT - II

Orthographic Projections: Introduction to Projections, Horizontal plane, Vertical plane, Profile plane, importance of reference lines.

Projections of points in various quadrants.

Projections of straight lines inclined to one plane, inclined to both the planes, traces.

UNIT - III

Projections of planes: inclined to one reference plane; inclined to both the reference planes.

UNIT - IV

Projections of Solids – Projections of Prisms, Pyramids, Cones and Cylinders simple positions, the axis inclined to one of the reference planes and axis inclined to both the reference planes.

UNIT - V

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Text books:

1. Engineering Drawing by N.D. Bhatt, Charotar Publishing House Pvt. Ltd
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill

Reference books:

1. Engineering Drawing by K.L.Narayana& P. Kannaiah, Scitech Publications
2. Engineering Graphics for Degree by K.C. John, PHI Learning
3. Engineering Graphics by PI Varghese, McGrawHill Publishers.
4. Engineering Drawing + AutoCAD by K. Venugopal, V. Prabhu Raja, New Age



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DEPARTMENT OF CIVIL ENGINEERING

Subject	COMPUTATIONAL THINKING & PROGRAMMING				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To teach problem solving through Algorithms and Flowcharts
2. To elucidate problem solving through Python programming language
3. To train in the development of solutions using modular concepts
4. To explain the role of data structures in programming
5. To introduce object oriented programming paradigm through Python

Course Outcomes:

Student should be able to

1. Understand the working principles of various components of a computer.
2. Develop computational thinking and be able to use Python constructs to solve basic problems.
3. Understand modularization and data structures concepts in Python.
4. Apply file handling concepts in problem solving.
5. Solve Real world problems by applying Object Oriented Concepts

SYLLABUS

UNIT – I

Knowing the Computer: Definition and Block Diagram of a Computer. Basic parts of a computer (Memory, CPU, Input, and Output), Memory hierarchy, Circuits and Logic, Hardware vs Software, Representation of Data in memory (integer (including negative), floating points etc. to text, images, audio and video), Principle of Abstraction, Operating System, Language Hierarchy - Machine Language to High Level Language, Compiler, Interpreter, The Command Line Interface (basic Linux commands)

UNIT – II

Computational Thinking and Introduction to Python: Simple logic building through flowcharting. Flowchart symbols, conditional and repetition blocks.



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Computational Thinking, Algorithm, Pseudocode, Time/Space complexity. Only Big O notation.

Basic structure of a Python program, Elements of Python programming Language: token, literals, identifiers, keywords, expression, type conversions, Numbers, Variables, Input/Output statements, basic data types. Operators and their types and precedence, expressions. Control structures in Python - conditionals and loops

UNIT – III

Python Data Structures and Modularization: List and List Operations, Using Lists to represent Matrices, Strings, String operations, Tuples, Dictionaries, Sets, Iterators and generators, comprehensions.

Basic math functions, User defined Functions, parameters to functions, positional, keyword and default arguments, Lambda Functions, recursion. Packages, modules and name spaces.

UNIT – IV

File Handling: Files, Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules

UNIT – V

Object Oriented Programming: Object Oriented Design. Classes and Objects. Polymorphism, Abstraction, Inheritance, Encapsulation. Constructors. Function and operator overloading. Exception Handling.

Text Book:

1. Think Python: How to Think Like a Computer Scientist, Allen B. Downey, 2nd Edition
(<https://www.greenteapress.com/thinkpython/thinkCSpy.pdf>)

Reference Books:

1. Core python programming, W Chun PHI
(http://emixam.sevla.free.fr/books/2.PythoProg_softarchive.net.pdf)
2. Python programming a modern approach, Vamsi Kurama, pearson

Web Resources:

1. <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
2. <https://snakify.org>



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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGLISH COMMUNICATION SKILLS LAB				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

1. To sensitize the student's nuances of English speech sounds.
2. To bring about a consistent accent and intelligibility in students, pronunciation of English by providing an opportunity for practice in speaking.
3. To improve the fluency in spoken English in different contexts.
4. To demonstrate the synchronization of verbal and non verbal communication.
5. To speak with clarity and confidence.
6. To enrich the persuasive skills.

Course Outcomes:

The students will be able to:

1. Understand Non Verbal Communication and Identify the topic, the context, specific questions and overall idea by listening to short audio texts and answering a series of questions and will also be able to introducing themselves and others.
2. Articulate Vowels and Consonants properly and answer a series of questions about main idea and supporting ideas after listening to audio texts and will be able to use expressions for Greetings and Leave takings, Complaining and Apologizing.
3. Understand stress and listen for global comprehension and summarize what is listened to and will be able to use expressions for Permissions, Requesting, Inviting.
4. Apply the rules of stress and intonation while reading a text; will be able to speak on short topics and will also be able to use expressions for Asking for and giving Information/Directions; Suggesting/Opinion giving.
5. Write and enact Dialogues/Role Plays and practice topics from Science and Technology - using PPT slides and neutralize accent.



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MODULE – I

Listening: Listening to short audio texts and identifying the topic, context and specific pieces of information to answer a series of questions both in speaking and writing.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests. Self introduction and introducing others.

Non Verbal Communication

Pronunciation: Introduction to Phonetics-Sounds of English-Phoneme

MODULE – II

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts, both in speaking and writing.

Functional English: Greetings and leave taking, Complaining and Apologizing.

Pronunciation: Vowels and Consonants, Past tense markers, Plural markers

MODULE – III

Listening: Listening for global comprehension and summarizing what is listened to, both in speaking and writing.

Functional English: Permissions, Requesting, Inviting.

Pronunciation: Syllable, Word Stress: Weak and Strong forms, Stress in compound words, Contrastive Stress

MODULE – IV

Speaking: Just a Minute (JAM)

Functional English Asking for and giving Information/Directions; Suggesting/Opinion giving.

Pronunciation: Rhythm & Intonation

MODULE – V

Functional English: Dialogues/Role Plays

Speaking: Formal oral presentations on topics from Science and Technology - with the use of PPT slides.

Pronunciation: Accent Neutralization



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Infrastructure:

1. 60 computer systems for a class of 60 students.
2. LAN facility and English Language Software for self-study by learners.
3. Audio System
4. Projector

System Requirement: Hardware Component

5. P – IV Processor
6. Speed – 2.8 GHZ
7. RAM – 512 MB minimum
8. Hard Disk – 80 GB
9. Headphones of high quality

Suggested Software:

1. Cambridge Advanced Learners,, English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley
3. Punctuation Made Easy by Darling Kindersley
4. Clarity Pronunciation Power – Part I
5. Clarity Pronunciation Power – part II
6. Oxford Advanced Learner,,s Compass, 7th Edition
7. DELTA,,s key to the Next Generation TOEFL Test: Advanced Skill Practice.
8. MELL - K Van Solutions Software
9. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
10. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge
11. English Pronunciation in Use, Cambridge University Press
12. Technical Communication, OUP
13. Communication Skills, OUP

Suggested reading:

1. Infotech English, Maruthi Publications (with Compact Disc).
2. Exercises in Spoken English Part 1,2,3,4, OUP and CIEFL.
3. English Pronunciation in use- Mark Hancock, Cambridge University Press.



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4. English Phonetics and Phonology-Peter Roach, Cambridge University Press.
5. English Pronunciation in use- Mark Hewings, Cambridge University Press.
6. English Pronunciation Dictionary- Daniel Jones, Cambridge University Press.
7. English Phonetics for Indian Students- P. Bala Subramanian, Mac Millan Publications.



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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING PHYSICS LAB				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Outcomes:

The students will be able to:

1. Analyze and understand the concepts of oscillations and standing waves. (Sonometer, Melde's experiment)
2. Know how to determine the acceleration due to gravity at a place using Compound pendulum.
3. Perform experiments on Properties of matter such as the determination of moduli of elasticity viz., Young's modulus, Rigidity modulus of certain materials
4. Gain hands-on experience of using various optical instruments like spectrometer, and making finer measurements of wavelength of light using Newton Rings experiment, diffraction grating etc.
5. Demonstrate simple electronic circuits consisting of basic circuit elements, and understand applications and of various electrical & Electronic devices

List of Experiments:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence
2. Newton's rings –Radius of Curvature of Plano Convex Lens.
3. Determination of thickness of a thin object using parallel interference fringes.
4. Determination/ of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of stretched string – Sonometer.
8. Determination of velocity of sound – Volume resonator.
9. L C R Series Resonance Circuit
10. Study of I/V Characteristics of Semiconductor diode
11. I/V characteristics of Zener diode
12. Thermistor characteristics – Temperature Coefficient



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13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor P-N junction.
15. Hall Effect for semiconductor.

Conduct 10 out of 15 experiments

Reference:

1. Engineering Physics Lab Manual by Dr. Y. Aparna & Dr. K. Venkateswarao (V. G. S. Book links)
2. Physics Practical Manual, Lorven Publication.

Subject	COMPUTATIONAL THINKING & PROGRAMMING LAB				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

1. Get acquainted with fundamentals of writing Python scripts.
2. Master core Python scripting elements by solving more number of problems
3. Able to identify right data structure to solve the problem
4. Design Python functions to facilitate code reuse.
5. Gaining familiarity in Python file I/O

Course Outcomes:

1. Understand core python scripting elements by solving more problems.
2. Identify the right data structure to solve problems.
3. Design Python functions to facilitate code reuse.
4. Solving Input and Output related problems using Python.

Week 1 - 3

- Design algorithms and flowcharts for given problems
- Python programs on decision and loop control statements
 - Whether the given number is even or odd
 - Maximum of three numbers
 - Sum of digits, Palindrome
 - Factorial of a number,
 - GCD of given numbers
 - Sum of first n natural numbers
 - Evaluate Cosine and Sine Series etc.

Week 4 - 6

- Exercise programs on lists and functions
 - Finding the sum and average of given numbers using lists.
 - To display elements of list in reverse order.



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- Finding the minimum and maximum elements in the lists.
- Using functions to calculate power, factorial etc
- Passing lists as function arguments
- Call by value and call by reference
- Recursion

Week 7 - 9

- Exercise programs on Strings.
 - Palindrome Checking
 - Count the number of characters, number of vowels etc in the given line of text etc
- Exercise programs on Tuples, Dictionaries

Week 10 - 12

- Exercise programs on file handling
- Exercise programs on regular expressions
- Exercise programs on exception handling



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Syllabus for

I B.Tech. - II Semester

(R20)



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DEPARTMENT OF CIVIL ENGINEERING

Subject	MATHEMATICS–II (VECTOR & TRANSFORM CALCULUS)				
Year / Semester	I B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. Find the vector differentiation and Integration
2. Apply the techniques of Laplace transforms in engineering studies
3. Learn the Fourier series of periodic functions and expand a function in sine and cosine series
4. Solve problems related to engineering applications using integral transform techniques
5. Evaluate the problems to engineering applications using Z- transform techniques

Course Outcomes:

After completing this course, the students will be able to

1. Understand gradient, divergence, curl and their physical significance.
2. Compute line, surface and volume integrals and evaluate the work done, flux, potential functions.
3. Make use of Laplace transforms in solving the differential equations with the initial and boundary conditions.
4. Compute Fourier series of periodic functions.
5. Solve problems related to engineering applications using transform techniques

SYLLABUS

UNIT – I

Vector Differentiation: Vector Differentiation - Scalar and Vector Fields, Level surfaces, Directional Derivative, Gradient of a Scalar Field, Divergence, Curl of a vector field and applications, Vector Identities

UNIT – II

Vector Integration: Vector Integration - Line integral, work done, areas, Surface integrals. Vector integral theorems - Green's theorem, Stokes theorem and Gauss Divergence theorem (All theorems without proof) and applications areas, surface areas and volumes.



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UNIT – III

Laplace Transforms: Laplace transform-Definition-conditions for existence– Linear Property - Shifting Theorems, Laplace transforms of Standard Functions-Transforms of derivatives and integrals–Unit step function–Dirac delta function.

Inverse Laplace transforms by Partial fractions–Convolution theorem (without proof) – inverse by convolution, Solving ordinary differential equations with constant coefficients.

UNIT – IV

Fourier Series: Introduction, Periodic function, Dirichlet's conditions, Fourier series of periodic function, Fourier series at the point of discontinuity, Fourier series of even and odd functions, Half-range Fourier Sine and Cosine series. Fourier series in an arbitrary interval.

UNIT – V

Fourier Transforms and Z-Transforms: Fourier integral theorem (only statement) – sine and cosine integrals, Fourier transforms – sine and cosine transforms –Inverse Formulae- Properties- Finite Fourier Transforms.

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems – Inverse Z –transform - Convolution theorem – solving difference equations by using Z-transforms.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 42nd Ed., Khanna Publishers, New Delhi, 2012
2. Erwin.Kreyszig, Advanced Engineering Mathematics,9th Ed., Wiley, 2012

References:

1. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I, 12th Ed., S. Chand Publishers, 2014
2. B. V. Ramana, Engineering Mathematics, 4th Ed., Tata McGraw Hill, New Delhi, 2009
3. D. S. Chandrashekharaiah, Engineering Mathematics, Volume 1, Prism Publishers, 2010
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, reprint, 2008



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Subject	ENGINEERING CHEMISTRY				
Year / Semester	I B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. Recall the information related to polymers and their application. (Remembering)
2. Distinguish between different parts in electrochemical cell, batteries and fuel cells. (Analyzing)
3. Solve the corrosion related problems. (Applying)
4. Use the information related to water treatment methods. (Applying)
5. Classify the different types of fuels and its applications (Understanding)
6. Design manufacturing process of cement. (Creating)

Course Outcomes:

After completing the course, Students will be able to,

1. To gain the knowledge on Polymer based materials in household appliances, aerospace and automotive industries.
2. To relate the need of fuels as a source of energy to industries like thermal power stations, steel, fertilizer industry etc., and hence introduced
3. To learn the basic principles and applications of Electrochemistry. To understand the mechanism of corrosion and how it can be prevented
4. Explain the importance and usage of water as basic material in almost all the industries; interpret drawbacks of steam boilers and also how potable water is supplied for drinking purposes.
5. To train the students on the principles and applications of Cement, Refractories and Lubricants

SYLLABUS

UNIT – I

Polymer Chemistry: Introduction to polymers, functionality of monomers, co-polymerization, Stereospecific polymerization with specific examples. Plastics - Thermoplastics and Thermo



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settings, Preparation, Properties and Applications of – Bakelite, Urea-Formaldehyde, Nylon-6,6, Carbon fibres. Elastomers–Buna-S, Buna-N– Preparation, Properties and Applications. Conducting polymers – polyacetylene, polyaniline, polypyrroles – Mechanism of conduction and Applications.

UNIT - II

Fuel Technology: Fuel - Introduction – Calorific value - HCV and LCV – Bomb calorimeter – Numerical problems – Coal — Proximate and Ultimate analysis –Significance of the analysis. Liquid fuels – Petroleum- Refining – Cracking – Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents. Gaseous fuels – Natural gas, LPG and CNG. Bio-fuels- Bio-diesel and Power alcohol.

UNIT – III

Electrochemistry and Corrosion

PART-1: Electrochemistry and Its Applications

Electrodes –Reference electrodes (Hydrogen electrode and Calomel electrode), Electrochemical cell, Nernst equation. Concept of pH, pH meter and applications of pH metry, Potentiometry- Potentiometric titrations (Redox titrations), Concept of Conductivity, Conductivity cell, Conductometric titrations (acid-base titrations). Primary cells – Dry cell - Zinc-air battery, Secondary cells – Lead acid battery, Lithium-ion batteries- working of the batteries including cell reactions, and button cells.

Fuel cells - Hydrogen-Oxygen and Methanol-Oxygen fuel cells – working of the cells.

PART-2: Chemistry of Corrosion

Corrosion: Introduction to corrosion, Chemical and Electrochemical theory of corrosion, Pilling- Bedworth ratio rule, Differential aeration corrosion, Waterline corrosion and Galvanic corrosion. Environmental factors (pH, temperature, Dissolved Oxygen) affecting the rate of corrosion.

Protection – Galvanizing, Tinning, Electroplating and Electro less plating (Nickel and Copper). Organic coatings - Paints (constituents and functions).

UNIT – IV

Water Technology: Introduction –Soft Water and Hardness of water, Estimation of hardness by EDTA Method - Boiler troubles - scale and sludge, Industrial water treatment – Specifications



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for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Zeolite and Ion-exchange processes. Municipal water treatment –Break point of chlorination. Defluoridation technique.

Desalination of Brackish water- Reverse Osmosis (RO) and Electrodialysis.

UNIT – V

CHEMISTRY OF MATERIALS: Cement: Introduction to Building materials – Portland cement, constituents, manufacturing process- raw materials for manufacturing process, reactions below 1300oC and reactions between 1300 and 1450oC, reactions during cooling, grinding or storage, chemical equations, Chemistry of setting and hardening of cement (hydration, hydrolysis, equations).

Lubricants: Definition, Properties and Applications.

Refractories: - Definition, Classification, Properties and Applications.

Text Books:

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

Reference Books:

1. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
2. A text book of Engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition.
3. A text book of Engineering Chemistry by Sashi Chawla, Dhanpat Rai & Co. 2017

Subject	BUILDING MATERIALS & CONCRETE TECHNOLOGY				
Year / Semester	I B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To introduce various building construction materials.
2. To describe various properties of ingredients of concrete.
3. To explain various properties and tests of fresh and Hardened Concrete.

Course Outcomes:

1. Know various engineering properties of building construction materials and suggest their suitability.
2. Identify the functional role of ingredients of concrete and apply this knowledge to concrete mix design.
3. Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete
4. Understand different types of construction materials, their manufacturing processes, and sustainability aspects
5. Apply the principles of building materials and concrete technology in construction practices.

SYLLABUS

UNIT – I

Stones: Classification of Stones–Properties of stones in structural requirements Bricks: Composition of good brick earth, various methods of manufacturing of bricks Tiles: Characteristics of good tile–Manufacturing methods, Types of tiles
Wood: Structure–Properties–Seasoning of timber–Classification of various types of woods used in buildings – Defects in timber
Paints: White washing and distempering, Constituents of paint–Types of paints–Painting of new and old wood – Varnish

UNIT – II

Aggregates: Classification of aggregate, Bond, Strength and other mechanical properties of aggregate, Physical properties of aggregate, bulking of sand, Deleterious substance in aggregate, Soundness of aggregate, Alkali-Aggregate reaction – Thermal properties, Sieve



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analysis – Fineness modulus – Grading curves – Grading of fine and coarse aggregates as per relevant IS code, Maximum aggregate size

Portland Cement: Chemical composition, Hydration, Structure of hydrated cement–Setting of cement, Fineness of cement, Tests for physical properties – Different grades of cements
Supplementary cementitious materials: Fly ash, GGBS, Silica fume, Rice husk ash, Calcinated ash (Basic properties and their contribution to concrete strength) Admixtures: Mineral and Chemical admixtures

UNIT – III

Fresh Concrete: Manufacture of concrete – Mixing and vibration of concrete, Workability – Segregation and bleeding– Factors affecting workability, Measurement of workability by different tests, Effect of time and temperature on workability – Quality of mixing water, Ready mix concrete, Shotcrete

UNIT – IV

Hardened Concrete: Water / Cement ratio – Abram’s law, Gel space ratio, Nature of strength of concrete – Maturity concept, Strength in tension and compression – Properties of Hardened Concrete (Elasticity, Creep, Shrinkage, Poisson’s ratio, Water absorption, Permeability, etc.), Relating between compression and tensile strength, Curing

UNIT – V

Testing of Hardened Concrete: Factors affecting properties of Hardened concrete, Compression tests, Tension tests, Flexure tests, Non-destructive testing methods – Codal provisions for NDT – Rebound hammer and UPV method

Text Books:

1. “Concrete Technology” by M. S. Shetty - S. Chand & Co., 2004
2. “Engineering Materials” by Rangwala S C, (36th edition), Anand Charotar Publishing House
3. “Concrete Technology” by Shantha Kumar – Oxford Publications

Reference Books:

1. “Building Materials” by S. K. Duggal, New Age International Publications.
2. “Building Materials” by P. C. Verghese, PHI learning (P) Ltd., 2009.
3. “Properties of Concrete” by A. M. Neville – Pearson – 4th edition



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Subject	ENGINEERING MECHANICS				
Year / Semester	I B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. Understand particle, body, rigid body, concept of force, analysis of forces acting on a rigid body.
2. Understand moment and the principle of moments.
3. Understand the laws of friction and its applications.
4. Analyzing trusses for its member forces.
5. Understand the concept of centre of gravity and area moment of inertia.
6. Understanding principles of kinematics and kinetics applied to rigid bodies.

Course Outcomes:

The students will be able to:

1. Simplify the system of forces and moments to equivalent systems and construct free body diagrams and develop appropriate equilibrium equations.
2. Analyze systems with friction and for member forces.
3. Determine centroids of simple and composite areas and moment of inertia.
4. Apply the fundamental concepts of kinematics of particles and rigid bodies along with equilibrium condition in solving engineering problems.
5. Analyze the problems of simple systems and connected bodies for displacement, velocity and acceleration.

SYLLABUS

UNIT – I STATICS OF PARTICLES AND RIGID BODIES

Introduction: Fundamental concepts and principles of engineering mechanics – Forces on particles – Concurrent forces in a plane – Resolution of forces – Resultant of several concurrent forces.

Equilibrium of Particles: Free body diagram – Equilibrium of rigid bodies in two dimensions- Equilibrium of a two, three force body.



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Moment of a force – Varignon's theorem – Equivalent system of forces – Reduction of system of forces into single force and couple.

UNIT - II FRICTION AND TRUSSES

Friction: Introduction-Types of friction – laws of Friction – Limiting friction – Cone of friction-static and Dynamic Frictions. Applications of Friction: Wedges – Ladder friction.

Analysis of trusses – statically determinate and indeterminate structures – Method of Joints.

UNIT – III PROPERTIES OF SURFACES AND VOLUMES

Centre of Gravity: Centroids of lines, areas, and volumes – Determination of centroids by integration – Theorem of Pappu's.

Area Moment of Inertia: Second moment or Moment of inertia of an area – Determination of moment of inertia of area by integration – Radius of gyration – Parallel and perpendicular axis theorems

UNIT – IV KINEMATICS

Rectilinear motion: Uniform velocity and uniformly accelerated motion – Rectangular components of velocity and acceleration, Variable acceleration

Curvilinear motion: Normal and tangential components – Radial and transverse components – Motion of Projectile

UNIT – V KINETICS

Newton second law – D. Alembert's principle, Principle of work and energy for a rigid body – connected bodies – Principle of impulse and momentum – connected bodies.

Text Books:

1. Timoshenko and Young, Engineering Mechanics, 3rdEd, McGraw HillPublishers, 2006.
2. Engineering Mechanics - Statics and Dynamics/ Ferdin L. Singer/Harper International Edition.

Reference Books:

1. Engineering Mechanics: Statics and Dynamics/James L. Meriam, L. Glenn Kraige/7th/John Wiley & Sons/2012.
2. Engineering Mechanics: Statics and Dynamics/R. C. Hibbeler/13th/ Prentice Hall/2012.
3. Vector Mechanics for Engineers: Statics and Dynamics/ Ferdinand. P. Beer. E, Russell Johnston Jr., David Mazurek, Philip J Cornwell/6th/ McGraw-Hill/2012.



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4. Theory and problems of Engineering Mechanics -Statics and Dynamics/ Mclean, and Nelson/ Schaum Series/2010.
5. Engineering Mechanics -Statics and Dynamics A K Tayal /Umesh Publications/2008.
6. Engineering Mechanics/ Rajasekaran. S, & Sankarasubramanian G/3rd/Vikas Publishing House/2004.
7. A Text book of Engineering Mechanics/ Dr. Bansal R. K, & Sanjay Bansal /8th/Lakshmi publications/2014.
8. A Text book of Engineering Mechanics/ R. S. Kurmi /20th/S. Chand
9. A Text book of Engineering Mechanics/ S. S. Bhavakatti /2nd/New age international/2014.



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Subject	COMPUTER PROGRAMMING LAB				
Year / Semester	I B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	1	0	4	3

Course Objectives:

1. Formulating algorithmic solutions to problems and implementing algorithms in C.
2. Understanding branching, iteration and data representation using arrays.
3. Modular programming and recursive solution formulation.
4. Understanding arrays, pointers and dynamic memory allocation.
5. Understanding Strings and Structures

Course Outcomes:

1. Use the appropriate control statements to write programs for the given task.
2. Write programs using arrays and strings.
3. Use structures, unions and pointers in programming.
4. Write programs using modular programming and programs using user defined datatypes, preprocessor directives, storage classes

SYLLABUS

UNIT – I

Introduction to C Programming- Identifiers, The main () Function, The printf () Function
Programming Style - Indentation, Comments, Data Types, Arithmetic Operations, Expression
Types, Variables and Declarations, Negation, Operator Precedence and Associativity,
Declaration Statements, Initialization.

Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment
Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format
Modifiers.

UNIT – II

Control Flow-Relational Expressions - Logical Operators:

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if,
examples. Repetition: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled



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and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do- while Statement.

UNIT – III

Arrays & Pointers:

Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices

Pointers: Concept of a Pointer, Initialisation of pointer variables, passing by address, Dangling memory, address arithmetic, Dynamic memory management functions, command line arguments.

UNIT – IV

Modular Programming: Function and Parameter Declarations, Returning a Value, Classifications of Functions, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Array as a Function arguments. Case Study: Recursion - Mathematical Recursion, Recursion versus Iteration

UNIT – V

Strings & Structures: Strings: String Fundamentals, String Input and Output, String Processing, Library Functions. Structures: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

Text books:

1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
2. Let us C Authentic Guide to C Programming Language by yashavant kanetkar.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference books:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.



Subject	BUILDING PLANNING & COMPUTER AIDED BUILDING DRAWING				
Year / Semester	I B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

To help the student to attain competency in preparation of engineering drawings as per principles of planning using a suitable CAD software through various teaching learning experiences.

Course Outcomes:

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 of residential and public buildings using principles of planning.
4. Prepare submission and working drawing from the given requirement for Load Bearing and Framed structures

Major Equipment/Instruments/System required

1. Computer with specification suitable for relevant CAD software with any suitable CAD Software
2. Laser Printer preferably for the output of A3 size.

Week 1, 2 and 3

Concepts to be studied

Introduction to CAD software: Basic commands of CAD to draw, modify 2D drawings

Building Byelaws: Introduction – Terminology – Objectives of building byelaws – Principles under laying building byelaws – Types of Buildings.

Regulations: Introduction – Development Control Rules of buildings General Building Requirements as per NBC – Open space, Lighting and ventilation requirements – Floor area ratio & Floor space index.

Conventions, signs and symbols: Conventions as per IS 962-1989, signs and symbols for earthwork, brickwork, stonework, concrete, woodwork and glass used in civil engineering.

Construction, Graphical symbols for door and window, Abbreviations, symbols for sanitary and electrical installations.



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Types of lines and scales: Types of lines – visible lines, centre line, hidden line, section line, dimension line, extension line, pointers, arrow head or dots. Appropriate size of lettering and numerals for Titles, sub titles, notes and dimensions.

Types of scale- Monumental, Intimate, criteria for Proper Selection of scale for various types of drawing.

Sizes of various standard papers / sheets.

Exercise 0

Prepare a given line drawing in minimum three layers using CAD software.

Exercise 1

Reading and interpreting readymade Architectural building drawing (To be procured from Architect, Planning Consultants, Planning Engineer)

Week 4, 5 and 6

Concepts to be studied

Principles of building planning: Introduction to buildings, Classification of Buildings, Building Components, Orientation of building, Principles of architecture composition.

Principles of planning of Residential and Public building, Orientation of building and Principles of architecture composition: Aspect, Prospect Orientation, Grouping, Privacy, Elegance, Flexibility. Roominess, Circulation, Furniture requirements, Sanitation, Ventilation, Illumination and Economy. Space requirements and bye-laws: Space requirement and norms for minimum dimension of different units in the residential and public buildings as per IS 962-1989. Rules and bye-laws of sanctioning authorities for construction work. Plot area, built up area, super built-up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio) / FSI.

Exercise 2

Line plans for residential building of minimum three rooms including w/c, bath and staircase as per principles of planning.

Exercise 3

Line plans for public building - School building, primary health centre, restaurant, bank, post office, hostel, Function Hall and Library.



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Week 7, 8, 9 and 10

Concepts to be studied

Drawing of Load Bearing Structure: Developed plan, elevation, section, site plan, schedule of openings construction notes with specifications, area statement. Planning and design of staircase

Rise and Tread for residential and public building (2 BHK Load bearing structure). Component parts of the given load bearing structure

Exercise 4

Draw developed plan, elevation, section, site plan from the given line plan for a load bearing residential building (2BHK) with stair case.

Exercise 5

Prepare submission drawing (including foundation plan) of the given load bearing residential building with stair case.

Week 11, 12, 13 and 14

Concepts to be studied

Drawing of Framed Structure: Developed plan, elevation, section, site plan, schedule of openings construction notes with specifications, area statement. Planning and design of staircase Rise and Tread for residential and public building (G+1, 2BHK framed structure). Component parts of the given framed structure

Exercise 6

Draw developed plan, elevation, section, site plan from the given line plan for framed structure residential building including stair case (2BHK, G+1).

Exercise 7

Prepare submission drawing (including foundation plan) of the given framed structure residential building with stair case.

Suggested student activities:

1. Prepare report on Provisions given in National Building Code 2005.



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6. Collect and study building Bye laws, rules and regulation for planning as per local competent authority.
7. Prepare list of the documents required for obtaining permission for construction of residential building/apartment from competent authority and write report.
8. Prepare list of the documents required for obtaining permission for construction of commercial building from competent authority and write report.
9. Prepare a model of a simple building using card board showing different components with suitable color.

Subject	ENGINEERING CHEMISTRY LAB				
Year / Semester	I B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Outcomes:

1. Ability to find the Fe²⁺, Ca, Mg, Cu and Cl⁻ present in unknown samples/ores using titrimetric and instrumental methods.
2. The students will get the ability to identify any unknown chemical and its nature according to its functionality.
3. Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially
4. Understand the principles of Stoichiometric, Potentiometric and Conductometric measurements
5. Understand the practical way of thinking through the prescribed experiments given to them
6. They get the knowledge about pH which influences human health, growth of plants and aquatic bio-components

Experiments:

1. Trial experiment - Determination of HCl using standard Na₂CO₃ solution.
2. Determination of alkalinity of a sample containing Na₂CO₃ and NaOH.
3. Determination of KMnO₄ using standard Oxalic acid solution.
4. Estimation of MnO₂ in Pyrolusite.
5. Determination of Copper using standard K₂Cr₂O₇ solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Vitamin – C.
8. Determination of PH of the given sample solution using PH meter.
9. Conductometric titration between strong acid and strong base.
10. Potentiometric titration between strong acid and strong base.
11. Estimation of copper by Colorimetry.
12. Photo Chemical Reduction of Ferric Salt (Blue-Printing).



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13. Adsorption of acetic acid on charcoal.
14. Determination of rate of corrosion.
15. Preparation of a polymer.
16. Thin layer chromatography.

Reference Books:

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuri (2012) Laboratory Manual of Engineering chemistry-II, VGS, Techno Series.
3. Chemistry Practical Manual, Lorven Publications.
4. Practical Engineering Chemistry, K. Mukkanti (2009) B.S. Publication



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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING WORKSHOP				
Year / Semester	I B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

1. To develop a skill in dignity of labour, precision, safety at work place, team working and development of right attitude.
2. To identify the hand tools and instruments used in the fitting, carpentry, black smithy and tin smithy trades.
3. To acquire skills in basic engineering practices like fitting, carpentry, black smithy and tin smithy etc.
4. To gain measuring and marking skills.
5. To gain basic knowledge in electrical wiring and assembly and disassembly of computer.

Course Outcomes:

The student will be able to:

1. Identify the basic tools and equipments used in carpentry, fitting, black smithy, house wiring and tin smithy.
2. Produce different joints in carpentry trade such as lap and dove tail joint
3. Produce various fittings in the trade of fitting such as square fit and V fit.
4. Make various objects in tinsmithy trade such as open scoop and square box.
5. Perform various basic house-wiring connections
6. Produce various shapes in black smithy trade such as round rod to square rod and S hook
7. Assemble & Disassemble of computer

Note: At least two exercises to be done from first five trades & experiment from last trade is compulsory.

TRADES:

Carpentry:

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint



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4. Mortise and Tenon Joint

Fitting:

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

Black Smithy:

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring:

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy:

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

System Assembly:

1. Assembly & Disassembly of computer

Text books:

1. Workshop Technology Vol I & II/ S K Hajra Choudhury, A K Hajra Choudhury, N. Roy/
Media Promoters & Publishers Pvt. Ltd.
2. Workshop Practice/H S Bawa/ McGraw Hill Education; 2nd edition.

Reference books:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
2. Engineering Practices Lab Manual/Jeyapooan, Saravana Pandian, 4/e Vikas
3. Dictionary of Mechanical Engineering/GHF Nayler/Jaico Publishing House



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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENVIRONMENTAL SCIENCE				
Year / Semester	I B.Tech./ II Sem	L	T	P	C
Regulation year	R - 20	2	0	0	0

Course Objectives:

To make the student to get awareness on environment, to understand the important of protecting natural recourses, ecosystems for futures generations and pollution causes due to the day to day activates of human life to save Earth from the inventions by the engineers.

Course Outcomes:

Students will be able to:

1. Articulate the basic structure, functions, and processes of key social systems affecting the Environment.
2. Explain how Natural Recourses should be used.
3. Identify the threats to biodiversity.
4. Understand causes, effects and control measures of Environmental pollution.
5. Gain knowledge about Watershed management and Environmental ethics. Gain a rigorous foundation in various scientific disciplines as they apply to environmental science, such as ecology, evolutionary biology, hydrology, and human behavior.

SYLLABUS

UNIT – I

Multidisciplinary nature of Environmental Science and Ecosystems

Definition, Scope and Importance – Sustainability: Need for public awareness-Human population and Environment. Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. -Types of EcosystemForest, Grassland, Desert and Aquatic Ecosystems– Food chains, food webs and ecological pyramids.

UNIT – II

Natural Resources

Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources: Conflicts over water, Dams – benefits and problems



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Mineral resources: Use and exploitation, Environmental effects of extracting and using mineral resources.

Energy resources: Growing energy needs, renewable and non-renewable energy sources
Food resources: World food problems.

Land resources: Wasteland reclamation. Role of an individual in conservation of natural resources.

UNIT – III

Biodiversity and its conservation

Definition, Genetic, species and ecosystem diversity- classification - Value of biodiversity: Consumptive use, Productive use, Social use, Biodiversity at national and local levels. Hot-spots of biodiversity - Threats to biodiversity - Endangered and Endemic species of India – Conservation of biodiversity

UNIT – IV

Environmental Pollution

Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. Pollution case studies. Solid Waste Management: Sources, effects and control measures of urban and industrial solid wastes. Bio medical and e-waste management. Global Environmental Challenges: Global warming and climate change-Acid rains, Ozone layer depletion.

UNIT – V

Social Issues and Environmental Management

Urban problems related to energy -Water conservation, Rain water harvesting-Resettlement and rehabilitation of people. Environmental Protection Act –Air Act –Water Act - Wildlife Protection Act -Forest Conservation Act-Public awareness. International protocols: Stockholm and Rio Summit, Kyoto protocol and Montreal Protocol. Impact Assessment and its significance various stages of EIA, Environmental audit, Ecotourism. The student should Visit an Industry / Ecosystem.

Text Books:

1. A Textbook of Environmental Studies, Shashi Chawla, TMH, New Delhi.
2. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.



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Syllabus for

II B.Tech. - I Semester

(R20)



Subject	Mathematics – III (Complex Variables & PDE)				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

To enable the students to

1. Make use the significance of differentiability and analyticity for complex variable functions and be familiar with the Cauchy-Riemann equations.
2. Find integrals along a path in the complex plane using the Cauchy's theorem and Residue theorem.
3. Solve the singularities of complex variable function by expanding them into Taylor's and Laurent's series and finding residues.
4. Make the students learn modeling various physical phenomena as first and higher order PDE and applications

Course Outcomes:

After undergoing this course, students will be able to

1. Understand the differentiability and analyticity for complex variable functions and learn sufficient conditions for analyticity
2. Evaluate the integration of complex valued functions.
3. Expand the functions in power series, classify the singularities of complex function
4. Model first order linear and non-linear partial differential equations and solve analytically
5. Model higher order partial differential equations and solve analytically and physical problems of engineering like steady and unsteady heat conduction, vibration of string, etc.

SYLLABUS

UNIT – I

Functions of Complex Variables: Continuity and differentiability, Analyticity, properties, Cauchy Riemann equations in Cartesian and polar coordinates, harmonic and conjugate harmonic functions, Milne – Thompson method.



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UNIT – II

Complex Integration: Integration of complex functions – Line Integrals, Cauchy's Integral theorem, Cauchy's Integral Formula - Generalized Cauchy's Integral formula (without proofs)

UNIT – III

Complex power series and Residues: Complex power series-Taylor's Series and Laurent's Series, Singularities, Poles and Residues-Cauchy Residues theorem (without proof), evaluation of integrals of type $\int_{-\infty}^{\infty} f(x)dx$ and $2\pi \int_0^{2\pi} f(\cos\theta, \sin\theta) d\theta$ using Residue theorem.

UNIT – IV

First Order Partial Differential Equations: Formation of Partial differential equations by elimination of arbitrary constants and arbitrary functions– solutions of first order linear (Lagrange) equations and nonlinear equations-standard types

UNIT – V

Higher Order Partial Differential Equations and Applications: Solutions of Linear Partial differential equations with constant coefficients. RHS terms of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$. Classification of second order partial differential equations-parabolic, elliptical and hyperbolic.

Method of Separation of Variables, Applications to wave equation, heat conduction equation in one dimensions and Laplace equation in two dimensions

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 42nd Ed., Khanna Publishers, New Delhi, 2012
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Ed., Wiley, 2012.

References:

1. T.K.V.Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I, 12th Ed., S. Chand Publishers, 2014
2. D. S. Chandrashekharaiyah, Engineering Mathematics, Volume 1, Prism Publishers, 2010
3. B. V. Ramana, Engineering Mathematics, 4th Ed., Tata McGraw Hill, New Delhi, 2009
4. S.KaleshaValli, G.VenkataRao and A.V.Papa Rao, Engineering Mathematics-I, Cengage Publications, 2018.



Subject	STRENGTH OF MATERIALS – I				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress conditions and to develop diagrams of variation of various stresses across the length.
2. To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections
3. The concepts above will be utilized in measuring deflections in beams under various loading and support conditions
4. To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

Course Outcomes:

1. To understand the materials, behave under different loads and support conditions.
2. Estimate the bending moment and shear forces in beams for different load conditions.
3. Analyze the bending concepts, calculate section modulus, and determine stresses and deflections in beams.
4. Analyze the deflection of beams under loading conditions by using slope deflection method and Macaulay's method.
5. Analyze stresses in thin and thick cylinders and use Lamé's equation to design them for internal pressure.

SYLLABUS

UNIT – I

Simple Stresses and Strains: Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain,



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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: 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 in beams: 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

Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic curve of a beam – Double integration and Macaulay's methods – Determination of slope and deflection 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. Mohr's theorems – Moment area method – application to simple cases of cantilever.

UNIT – V

Thin cylindrical shells: Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders. Thick cylinders: Introduction: Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders-distribution of stresses.



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Text books:

1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi.
2. Strength of materials by R. K. Bansal, Lakshmi Publications.

References:

1. Mechanics of Materials- by R. C.Hibbler, Pearson publishers
2. Mechanics of Solids – E P Popov, Prentice Hall.
3. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition,Universities Press
4. Mechanics of Structures Vol – I by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.



Subject	FLUID MECHANICS				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Learning Objectives:

1. To understand the properties of fluids and fluid statics
2. To derive the equation of conservation of mass and its application
3. To solve kinematic problems such as finding particle paths and streamlines
4. To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems
5. To analyze laminar and turbulent flows
6. To understand the various flow measuring devices
7. To study in detail about boundary layers theory

Course Outcomes:

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

1. Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
2. Calculate the forces that act on submerged planes and curves.
3. Ability to analyse various types of fluid flows.
4. Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
5. Able Measure the quantities of fluid flowing in pipes, tanks and channels.

SYLLABUS

UNIT – I

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 -atmospheric, gauge and vacuum pressures- measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.



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Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure.

UNIT – II

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

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line - Momentum equation and its application – forces on pipe bend.

UNIT – III

Laminar Flow and Turbulent Flows: Reynold's experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow between parallel plates, Flow through long tubes, hydro-dynamically smooth and rough flows.

Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart, Pipe network problems, Hazen-Williams formula, Hard-Cross Method.

UNIT – IV

Measurement of Flow: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and Stepped notches, Broad crested weirs and Ogee weirs.

UNIT – V

Boundary Layer Theory: Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviations)- BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

Text Books:

1. Modi P.N and Seth S.M. (2018), "Fluid mechanics", Standard book house, New Delhi



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2. A textbook of Fluid mechanics and hydraulic machines, R.K.Bansal-Laxmi Publications (P) Ltd., New Delhi.

References:

1. K.Subramanyam, Fluid mechanics and hydraulic machines Mcgraw hill education, IInd edition.
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.
3. Principle of fluid mechanics and fluid machines III edition, university press.



Subject	SURVEYING				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

Upon successful completion of the course, the student will be able:

1. To demonstrate the basic surveying skills
2. To use various surveying instruments.
3. To perform different methods of surveying
4. To compute various data required for various methods of surveying.

Course Outcomes:

Course will enable the student to:

1. Apply the knowledge to calculate angles, distances and level
2. Identify data collection methods and prepare field notes
3. Understand the working principles of survey instruments, measurement errors and corrective measures
4. Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies

SYLLABUS

UNIT – I

Introduction And Basic Concepts: Introduction, Objectives, classification and principles of surveying.

Measurement of Distances and Directions

Linear Distances- Approximate methods, Direct Methods-Accessories in chain surveying- Chains- Tapes, ranging, Tape corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – W.C.B systems and Q.B. system of locating bearings.

UNIT – II

Plane Table: Accessories and methods of plane table surveying.



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Levelling: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments- method of levelling.

Contouring: Characteristics and Uses of contours- methods of conducting contour surveys. And their plotting.

UNIT – III

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometric leveling when base is accessible and inaccessible.

Tacheometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT – IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves.

Computation Of Areas and Volumes: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two-level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT – V

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Total Station – Parts of a Total Station – Accessories, Advantages and Applications, Errors in Total Station Survey, Introduction to Global Positioning Systems- Principle - Advantages and Disadvantages- Applications – Segments.

Text Books:

1. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
2. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
3. B.C.Punmia, Surveying, Vol-I, II and III, Laxmi Publications.
4. Advance Surveying, Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.
5. Text book of Surveying, C. Venkataramaiah, University press, India Limited.
6. Surveying and levelling, R. Subramanian, Oxford University press.



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References:

1. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
2. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.
3. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
4. Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
5. Text book of Surveying, Arora (Vol No. 1&2), Standard Book House, Delhi.



Subject	HIGHWAY ENGINEERING				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

The objectives of this course are:

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements
3. To acquire design principles of Intersections

Course Outcomes:

Upon the successful completion of this 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 and design flexible and rigid pavements.

SYLLABUS

UNIT – I

Highway Planning and Alignment: 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: 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.



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UNIT – III

Traffic Engineering: 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: 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: 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.

Text Books:

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.



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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.



Subject	CONCRETE TECHNOLOGY LAB				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

1. To study basic properties ingredients of concrete, fresh and hardened concrete properties

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Determine consistency and fineness and setting times of cement and flakiness elongation index.
2. Determine specific gravity, soundness of cement and compressive strength of cement.
3. Determine workability of cement concrete by compaction factor, slump and Vee-Bee tests and non-destructive testing method.
4. Determine specific gravity of coarse aggregate and fine aggregate by Sieve analysis and bulking of sand.

List of Experiments:

At least 10 experiments must be conducted (at least one for each property)

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. Design a Concrete Mix for any one grade of Concrete
10. Determination of workability of concrete by compaction factor method.
11. Determination of workability of concrete by slump test
12. Determination of workability of concrete by Vee-bee test.
13. Determination of compressive strength of cement concrete and its young's modulus
14. Non-Destructive testing on concrete (for demonstration)



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List of Equipment:

1. Standard set of sieves for coarse aggregate and fine aggregate
2. Vicat's apparatus
3. Specific gravity bottle.
4. Lechatlier's apparatus.
5. Slump Test Apparatus.
6. Compaction Factor Test Apparatus.
7. Vee- Bee test apparatus
8. Longitudinal compresso-meter
9. Universal testing Machine (UTM)/Compression Testing Machine (CTM).
10. Rebound hammer, Ultrasonic pulse velocity machine, micro cover meter etc.

Reference:

1. Concrete Manual by M.L.Gambhir.



Subject	HIGHWAY ENGINEERING LAB				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

The objectives of this course are:

1. To 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. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bituminous mix
4. To carry out surveys for traffic volume, speed and parking.

Course Outcomes:

At the end of the course, the student will be able to

1. Test aggregates and judge the suitability of materials for the road construction
2. Test the given bitumen samples and judge their suitability for the road construction
3. Obtain the optimum bitumen content for Bituminous Concrete

SYLLABUS

I. ROAD AGGREGATES:

1. Aggregate Crushing value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption Test
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.



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5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine.
3. Pycnometers.
4. Los angles Abrasion test machine.
5. Deval's Attrition test machine.
6. Elongation and thickness gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus.
10. Viscometer.
11. Marshal Mix design apparatus.

Text Books:

1. "Highway Material Testing Manual" by S.K. Khanna, C.E.G Justo and A.Veeraraghavan, NemChand Brothers, New Chand Publications, New Delhi.
2. Highway Material Testing & Quality Control by Rao Wiley India pvt. Ltd., Noida, New Delhi.

Reference:

1. IRC Codes of Practice.
2. Asphalt Institute of America Manuals.
3. Code of Practice of B.I.S.



Subject	SURVEYING FIELD WORK (Lab)				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

1. To learn usage of different surveying instruments and methods of surveying.

Course Outcomes:

At the end of the course, the student will be able to

1. Apply the principles of surveying in field.
2. Identify data collection methods and prepare field notes
3. Handle basic survey instruments
4. Determine the area of a plot by using different methods

List of Field Works:

1. Measurement of distance by ranging and chaining.
2. Locating various objects by chain & cross staff surveying.
3. Determination of area of polygon by chain and cross staff survey.
4. Measurement of bearings of sides of traverse with prismatic compass and computation of correct included angle.
5. Correction for Local Attraction by Prismatic Compass.
6. Plane table survey; finding the area of a given boundary by the method of radiation.
7. Plane table survey; finding the area of a given boundary by the method of intersection.
8. Finding the area of the given boundary using compass (Closed Traverse).
9. Determination of elevation of various points with dumpy level by collimation plane method and rise & fall method.
10. Fly levelling: Height of the instrument method (differential levelling).
11. Fly levelling (differential levelling).
12. Two exercises on contouring.

Note: Any 10 field work assignments must be completed.



Subject	BUILDING AND EARTH SCIENCE				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	1	0	2	2

Course Objectives:

1. To study basic techniques of brick masonry, testing of bricks.
2. To study about minerals, rocks, topographical maps and geo-physical exploration.

Course Outcomes:

At the end of the course, the student will be able to

1. Apply various techniques of brick masonry.
2. Identify different tests required to assess the quality of bricks.
3. Understand physical properties of various minerals and rocks
4. Interpret topographical maps and various conventional signs in it.
5. Understand geophysical exploration techniques.

List of Experiments:

1. Brick Masonry: Masonry 3" height with the following bonds and different thickness.
 - a) Stretcher bond
 - b) Header bond
 - c) English bond and
 - d) Flemish bond
2. Tests on Bricks:
 - a) Shape and size of supplied brick.
 - b) Water absorption of brick.
 - c) Compressive strength of bricks.
3. Study and observations of physical properties of minerals.
4. Study and observations of physical properties of rocks.
5. Interpretation of Topographical maps.
6. Drawing of conventional signs of Topographical maps.
7. Electrical Resistivity method (Demo).
8. Seismic refraction method (Demo).



Subject	CONSTITUTION OF INDIA				
Year / Semester	II B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	2	0	0	0

Course Outcomes:

1. Examine salient features of Indian Constitution and live accordingly in society.
2. Interpret the meaning of Fundamental Rights and Directive Principles of State Policy.
3. Discover various aspects of Union Government legislation and live up to the expectations.
4. Critically examine State Government legislation and improve your living standards by following the rules strictly.
5. Examine powers and functions of local bodies such as Municipalities and Panchayats and take advantage of available resources for better living.

The Constitution of India is the supreme law of India. Parliament of India cannot make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the “basic structure” of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of “Constitutionalism” – a modern and progressive concept historically developed by the thinkers of “liberalism” – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. The historic revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of “constitutionalism” in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America.

The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India’s legacy of “diversity”. It has been said that Indian constitution reflects ideals of its freedom movement; however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be “static” and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments



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since the year 1950. The Indian judiciary and particularly the Supreme Court of India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it “as one of the strongest court in the world”.

Course content:

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India
3. Salient features and characteristics of the Constitution of India
4. Scheme of the fundamental rights
5. The scheme of the Fundamental Duties and its legal status
6. The Directive Principles of State Policy – Its importance and implementation
7. Federal structure and distribution of legislative and financial powers between the Union and the States
8. Parliamentary Form of Government in India – The constitution powers and status of the President of India
9. Amendment of the Constitutional Powers and Procedure
10. The historical perspectives of the constitutional amendments in India
11. Emergency Provisions: National Emergency, President Rule, Financial Emergency
12. Local Self Government – Constitutional Scheme in India
13. Scheme of the Fundamental Right to Equality
14. Scheme of the Fundamental Right to certain Freedom under Article 19
15. Scope of the Right to Life and Personal Liberty under Article 21



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Syllabus for

II B.Tech. - II Semester

(R20)



Subject	Mathematics – IV (Numerical Methods, Probability & Statistics)				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

To enable the students to

1. Know the standard numerical methods to find roots of functions in practical engineering problems and identify the concepts of interpolation, to estimate the unknown functional values.
2. Identify the methods for finding the values of derivatives and finite integrals using numerical techniques
3. Understand various statistical distributions
4. Decide the null or alternative hypotheses using the suitable test statistic

Course Outcomes:

After undergoing this course, students will be able to

1. Apply standard numerical methods to solve fundamental and practical engineering problems and understand the concepts of interpolation to estimate the unknown functional values.
2. Evaluate finite integrals and solving differential equations using numerical techniques.
3. Understand the discrete and continuous probability distributions and apply relevant engineering problems.
4. Perform inferential statistics to test hypothesis for large samples.
5. Apply the concept of testing hypothesis for small samples to draw the inferences and estimate the goodness of fit.

SYLLABUS

Unit - I Solution of Algebraic and Transcendental Equations & Interpolation

Introduction- algebraic function and transcendental function - Bisection method, Regula –Falsi Method, Iteration Method, Newton- Raphson method.



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Introduction, Finite Differences, Forward, Backward and Central Differences - Newton's forward and backward formulae –Gauss's forward and backward interpolation formulae Lagrange's Interpolation Formula.

Unit - II: Numerical Integration and Solution of Ordinary Differential Equations

Numerical Integration-Trapezoidal rule – Simpson's 1/3rd Rule –Simpson's 3/8th Rule. Solution by Taylor's method, Euler's & Modified Euler's method, Runge- Kutta Method (4th order)

Unit - III: Probability Distributions

Basic concepts on probability, random variables (discrete and continuous), probability distribution- Binomial, Poisson and Normal distributions and their properties

Unit - IV: Sampling Theory

Introduction – Population and samples – Sampling distribution of Means and Variance (definition only) – Central limit theorem (without proof) – Introduction to t , χ^2 and F distributions – Point and Interval estimations – Maximum error of estimate.

Unit - V: Tests of Hypothesis

Introduction – Hypothesis – Null and Alternative Hypothesis Type I and Type II errors – Level of significance – One tail and two-tail tests – Tests concerning one mean and two means (Large and Small samples) – Tests on proportions.

Text Books:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, reprint, 2008.
2. B. V. Ramana, Engineering Mathematics, 4th Ed., Tata McGraw Hill, New Delhi, 2009
3. S.C. Gupta, V.K. Kapoor Fundamentals of Mathematical Statistics a Modern Approach, 10th Edition 2000

References:

1. T.K.V.Iyengar, B. Krishna Ghandhi, S. Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I, 12th Ed., S. Chand Publishers, 2014
2. S.S.Sastry, Introductory methods of Numerical Analysis, Prentice Hall of India Pvt. Ltd., 4th Ed., 2006



Subject	STRENGTH OF MATERIALS - II				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To give concepts of Principal stresses and strains developed in cross section of the beams on the cross section and stresses on any inclined plane. To impart concepts of failures in the material considering different theories
2. To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.
3. To classify columns and calculation of load carrying capacity and to assess stresses due to axial and lateral loads for different edge conditions and to calculate combined effect of direct and bending stresses on different engineering structures.
4. Introduce the concept of unsymmetrical bending in beams Location of neutral axis Deflection of beams under unsymmetrical bending.

Course Outcomes:

Upon successful completion of this course,

1. The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
2. The student can assess stresses in different engineering applications like shafts, springs subjected to different loading conditions.
3. Determine the load-carrying capacity and stability of columns under axial and eccentric loading using Euler's, Rankine's, and other empirical formulas.
4. Analyze and determine stresses in structural elements under combined direct loading and bending moments, ensuring stability in structures like chimneys, retaining walls, and dams.
5. Understand and locate the shear center for symmetrical and unsymmetrical sections, and analyze stresses in beams subjected to unsymmetrical bending.



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UNIT – I

Principal Stresses and Strains and Theories of Failures: 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.

UNIT – II

Torsion of Circular Shafts and Springs: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N\phi/L$ – 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 – III

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

UNIT – IV

Direct and Bending Stresses: Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axes.

UNIT – V

Unsymmetrical Bending and Shear Centre Un-symmetrical Bending: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical



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bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

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

TEXT BOOKS:

1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi.
2. Strength of materials by R. K. Bansal, Lakshmi Publications.

REFERENCES:

1. Mechanics of Materials- by R. C. Hibbler, Pearson publishers.
2. Mechanics of Solids – E P Popov, Prentice Hall.
3. Strength of Materials by B. S. Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Press.
4. Mechanics of Structures Vol – I by H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.



Subject	HYDRAULICS AND HYDRAULIC MACHINERY				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To study about uniform and non-uniform flows in open channel and also to learn about the characteristics of hydraulic jump
2. To introduce dimensional analysis for fluid flow problems
3. To understand the working principles of various types of hydraulic machines and Pumps.

Course Outcomes:

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

1. Analyze and solve problems related to uniform and non-uniform open channel flows, including critical, subcritical, and supercritical flow conditions.
2. Apply the principles of dimensional analysis and similitude to develop hydraulic models and interpret experimental results effectively.
3. Understand the working principles, classification, and performance characteristics of hydraulic machines such as turbines and pumps.
4. Evaluate the efficiency and operational parameters of hydraulic turbines and centrifugal pumps through performance analysis.
5. Design hydraulic machinery considering real-world engineering applications.

SYLLABUS

UNIT – I

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

UNIT – II

Non-Uniform Flow in Open Channels: Steady Gradually Varied flow- Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.



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UNIT – III

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

UNIT – IV

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

UNIT – V

Hydraulic Turbines: Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks-unit and specific quantities, selection of turbines, performance characteristics-geometric similarity-cavitation.

Pumps: Centrifugal-Pumps: Pump installation details-classification-work done- Manometric head- minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps-characteristic curves- NPSH- Cavitation.

Reciprocating Pumps: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

Text Books:

1. Open Channel flow, K. Subramanya, Tata McGraw Hill Publishers
2. Fluid mechanics and hydraulic machines, Rajput, A.K.(2018) , S Chand, New Delhi
3. Fluid Mechanics, Modi and Seth, Standard book house.

References:

1. Fluid Flow in Pipes and Channels, G.L. Asawa, CB
2. Fluid Mechanics and Machinery, C.S.P. OJHA, R. BERNDTSSON and P. N. Chandramouli, Oxford Higher Education.
3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher education.
4. Fluid mechanics and Hydraulic machines, R.K. Bansal, Laxmi publications, New Delhi.



Subject	ENVIRONMENTAL ENGINEERING				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

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

1. Outline planning and the design of water supply systems for a community/town/city and selection of source based on quality and quantity
2. Design of water treatment plant for a village/city
3. Impart knowledge on design of water distribution network
4. Design of sewers and plumbing system for buildings
5. Design of Sewage Treatment Plant

Course Outcomes:

Course will enable the student 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 Storm water flow and plumbing system for buildings
4. Design a Sewage Treatment Plant for a town/city.

SYLLABUS

UNIT-I

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



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characteristics and WHO guidelines for drinking water - IS 10500 2012 - Water quality standards for Agriculture, Industries and Construction.

UNIT-II

Treatment of Water: Treatment methods: Theory and Design of Sedimentation, Coagulation, Filtration. Disinfection: Theory of disinfection-Chlorination and other Disinfection methods. Removal of colour and odours- Removal of Iron and Manganese - Adsorption- Fluoridation and defluoridation-Reverse Osmosis- Freezing.

UNIT-III

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. 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

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 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, Sewage sickness. Effluent standards.



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Text Books

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus Mc-Graw-Hill Book Company, New Delhi, 1985.
2. Rural Municipal and Industrial water management, KVSG Murali Krishna, Environmental Protection Society, Kakinada, 2021.
3. Industrial Water and Wastewater Management, K.V.S.G. Murali Krishna, Paramount Publications, Visakhapatnam, 2018.
4. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.

References

1. Water Supply Engineering – P. N. Modi.
2. Water Supply Engineering – B. C. Punmia
3. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie
4. Environmental Engineering (Vol. 1) Water Supply Engineering - Santosh Kumar Garg, Khanna Publishers.
5. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publishers.
6. Waste Water Engineering by BC Punmia, Lakshmi publications Pvt Ltd.



Subject	UNIVERSAL HUMAN VALUES - II				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	2	1	0	3

Course Objectives:

The objective of the course is:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes:

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

1. Self and Environmental Awareness – Develop a deeper understanding of themselves, their family, society, and nature, fostering a sense of responsibility towards their surroundings.
2. Responsible and Sustainable Problem-Solving – Cultivate the ability to handle life's challenges with sustainable solutions while considering human relationships and ethical values.
3. Enhanced Critical Thinking – Improve their analytical and reasoning skills to assess situations effectively and make informed decisions.
4. Commitment to Human Values – Become more sensitive and committed to ethical principles, human relationships, and societal responsibilities.



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5. Application in Real-Life Scenarios – Begin implementing the learned concepts in daily life, making conscious efforts to integrate human values and sustainable practices.

Course Topics:

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

7. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
8. Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
9. Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

Module 3: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship



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13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

Module 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
21. Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

22. Natural acceptance of human values
23. Definitiveness of Ethical Human Conduct
24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people



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friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

26. Case studies of typical holistic technologies, management models and production systems

27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

28. Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Book:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)



Subject	ENVIRONMENTAL ENGINEERING LAB				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Learning Objectives:

The course will address the following:

1. Estimation of important characteristics of water and wastewater in the laboratory
2. Inference with reference to the significance of the characteristics of the water and wastewater

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Estimate some important characteristics of water, wastewater and soil in the laboratory
2. Draw some conclusion and decide whether the water is suitable for Drinking / Construction /Agriculture/ Industry.
3. Estimate Chloride, EC and Salinity of Soil and suggest their suitability for Construction/Agriculture
4. 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
5. 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. Determination and estimation of Total Hardness–Calcium &Magnesium in water.
3. Determination of P&M Alkalinity/Acidity
4. Determination of Chloride in water and soil
5. Determination and Estimation of total solids, organic solids and inorganic solids and Settleable Solids by Imhoff Cone.
6. Determination of Dissolved Oxygen with D.O. Meter &Winklers Method and BOD.



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7. Physical parameters – Temperature, Colour, Odour, Turbidity and Taste.
8. Determination of C.O.D.
9. Determination of Optimum coagulant dose- with and without coagulant aids
10. Determination of Chlorine residue and demand
11. Presumptive Coliform test.
12. Desalination by Freezing and Boiling.
13. EC, TDs and Chloride in RO System- Raw water, Product water and Reject.
14. Suitability of water for construction
15. Evaporation, Rainfall, Humidity, Wind speed, Wind Direction

NOTE: At least 10 of the experiments enlisted are to be conducted. Values for different water and wastewater samples like Surface water, Ground water, Sea water, Municipal water, Bottled water, RO- Raw water, Product and Reject samples, Municipal sewage, Industrial waters etc.

List of Equipment's

1. pH meter
2. Turbidity meter
3. Conductivity meter
4. Hot air oven
5. Muffle furnace
6. Dissolved Oxygen meter
7. U–V visible spectrophotometer
8. COD Reflux Apparatus
9. Jar Test Apparatus
10. BOD Incubator
11. Autoclave
12. Laminar flow chamber
13. Hazen's Apparatus
14. Chloroscope
15. Weather Station



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Text Books

1. Standard Methods for Analysis of Water and Waste Water –APHA
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Environmental Protection Society, 4th Edition, 2021.

Reference

1. Relevant IS Codes.
2. Chemistry for Environmental Engineering by Sawyer and Mc.Carty.

Subject	STRENGTH OF MATERIALS LAB				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

The course will address the following:

1. To determine experimental data for spring testing machine, compression testing machine, impact tester, hardness tester.
2. To determine stress analysis and design of beams subjected to bending.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Analyze and design structural members subjected to tension & compression
2. Understand the basic concepts of stress, strain, deformation, and material behaviour under different types of loading
3. Calculate the stresses and strains in axially-loaded members
4. Ability to conduct tension tests.

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 wood or concrete
8. Impact test (Charpy and Izod impact test)
9. Shear test (on UTM)
10. Continuous beam – deflection test.
11. Use of Electrical resistance strain gauges
12. Verification of Maxwell's Reciprocal theorem on beams.



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List of Major Equipment:

1. Universal Testing Machine
2. Torsion testing machine
3. Brinnell's / Rock well's hardness testing machine
4. Setup for spring tests
5. Compression testing machine
6. Izod Impact machine
7. Shear testing machine
8. Beam setup for Maxwell's theorem verification.
9. Electrical Resistance gauge

Subject	FLUID MECHANICS AND HYDRAULIC MACHINERY LAB				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

1. To calibrate the various discharge measuring instruments for flow through pipes.
2. To determine the coefficient of discharge through small orifice and mouth piece
3. To calibrate the notches for discharge measurement for flow through open channels.
4. To determine the friction factor and losses for flow through pipes
5. To verify the Bernoulli's theorem.

Course Outcomes:

1. Understand calibration of flow measuring devices & apply the practical aspects of Bernoulli's principle.
2. Understand calibration of flow measuring devices & analyse the Manning's and Chezy's constants for Open channel flow.
3. Analyse the characteristics of turbine & analyse the characteristics of pumps.

List of Experiments

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



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List of Equipment:

1. Venturi meter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouth piece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel, Francis turbine and Kaplan turbines
11. Centrifugal and Reciprocating pumps.



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Subject	ADVANCED CONSTRUCTION PLANNING				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	1	0	2	2

Course Objectives:

By the end of this course the students are expected

1. To understand the fundamental principles and concepts of building by-laws planning and architecture for buildings.
2. To study about different views of layout plans within the field.
3. To gain knowledge on concepts of Vastu.

Course outcomes:

By the end of this course students will be able to

1. Understand the fundamentals of latest building by-laws.
2. Understand various Vastu concepts in construction practices.
3. Prepare working drawings and other executable drawings with proper details for Commercial buildings and execute drawings for Plots.
4. Prepare the blueprint models of residential building plans.

List of experiments:

1. Introduction to building by-laws as per latest G.O.
2. Concepts of Vastu landscape and interior design practices.
3. Evaluation, measurement and drawing of Commercial buildings.
4. Evaluation, measurement and drawing of Plots and layouts with in the given field.
5. Preparation of a blueprint model of G+1 storey residential building plan as per by-laws.



Subject	CRITICAL READING AND CREATIVE WRITING				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	0

Course Objectives

The students will have the ability to

1. Understand how to identify, analyze, interpret and describe critical ideas, themes, and values in literary texts.
2. List the elements of a Short Story.
3. Apply critical and theoretical approaches to the reading and analysis of literary texts in multiple genres.

Course Outcomes

Upon the completion of the course, the student will be able to:

1. Understand and explain the characteristics of a literary text
2. Critically analyze the quality of a Shorty Story
3. Produce essays like personal essay or descriptive essay applying the principles of good writing
4. Identify facts, themes and critical ideas in a passage
5. Articulate an awareness of the basic elements of a speech

SYLLABUS

UNIT – I

Essentials of Good Writing

1. Focus, Development, Unity, Coherence and Correctness
2. Imagery
 - A. Figurative Language- Simile, Metaphor, Personification, Hyperbole, Oxymoron, Paradox, Alliteration, Assonance
 - B. Sensory details
3. Point of View



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DEPARTMENT OF CIVIL ENGINEERING

UNIT – II

Elements of a Short story

1. Plot, Setting, Character, Theme
2. Analysis of given short stories: 2 stories
 - A. Good Sees the Truth but Waits by Leo Tolstoy
 - B. The Cop and the Anthem by O. Henry

UNIT – III

Prose Writing:

Reflective Writing – Personal Essay Descriptive Writing: Person/Place/Thing

UNIT – IV

Reading Comprehension

Reading for facts, contextual vocabulary, tone and inference

UNIT – V

Speech Analysis

- A. Tryst with Destiny- <https://www.youtube.com/watch?v=lrEkYscgbqE>
- B. Stay Hungry, Stay Foolish – <https://www.youtube.com/watch?v=UF8uR6Z6KLC>

References:

1. The Cambridge Companion to Creative Writing (South Asian Edition) Creative Writing: A Beginner's Manual (Paper Back Edition)
2. Teaching and Developing Reading Skills: Cambridge Handbooks for Language Teachers
3. Web References:
<https://www.skillsyouneed.com/learn/critical-reading.html>
<https://englishforeveryone.org>
<http://sixminutes.dlugan.com/speech-evaluation-1-how-to-study-critique-speech/>
<http://www.homeofbob.com/literature/genre/fiction/ficElmnts.html>



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DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

III B.Tech. - I Semester

(R20)



Subject	STRUCTURAL ANALYSIS				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To give preliminary concepts of assessment of bending moment and shear force in propped cantilevers, fixed beams and continuous beams due to various loading conditions.
2. The procedure for development of slope deflection equations and moment distribution method to solve application to continuous beams with and without settlement of supports.
3. Equip student with concepts of Arches.

Course Outcomes:

1. Understand the concepts of determinate and indeterminate structures and analyze propped cantilever beams.
2. Determine shear force and bending moment diagrams, as well as deflections for fixed beams.
3. Analyze continuous beams using Clapeyron's theorem of three moments.
4. Apply the slope-deflection and moment distribution methods to analyze continuous beams and portal frames.
5. Analyze the three hinged arches and its bending moment and shear moment.

SYLLABUS

UNIT – I

Introduction: Determinate and Indeterminate Structures, Static Indeterminacy, Degrees of freedom, Redundancy.

Propped Cantilever: Introduction to propped cantilever beam, Analysis of propped cantilevers - shear force and bending moment diagram - Deflection of propped cantilevers.

UNIT – II

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-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support.



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UNIT – III

Continuous Beams: Introduction- Clapeyron's theorem of three moments-Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans- Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT – IV

Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

Moment Distribution Method: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway- Substitute frame analysis by two cycle.

UNIT – V

Three Hinged Arches: Introduction to Arches, Arch Action, Advantage of Arches, Classification of Arches by Shape, Material, Number of hinges, 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.

Text Books:

1. C. S. Reddy, "Basic Structural Analysis", Tata Mc.Graw-Hill, New Delhi.
2. T.S. Thandavamoorthy, "Analysis of Structures", Oxford University Press, New Delhi
3. V. N. Vazirani and M. M. Ratwani, "Analysis of Structures" - Vol. I and II, Khanna Publishers, New Delhi.
4. R.C. Hibbeler, "Structural Analysis", Pearson Education, India.

References:

1. B. C Punmia, "Theory of Structures", A. K Jain & Arun K. Jain, Lakshmi Publications.
2. Ramamuratham, "Theory of structures", Dhanpatrai Publications.
3. William M.C. Mckenzie, "Examples in Structural Analysis", Taylor & francis.

Subject	GEOTECHNICAL ENGINEERING – I				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:



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The Objectives of this course are:

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

Course Outcomes:

Upon the successful completion of this course

1. Acquaint with physical properties and classification of soils.
2. Find coefficient of permeability and equivalent hydraulic conductivity in stratified soils and find critical hydraulic gradient.
3. Find vertical stresses in soils subjected to point, line, strip, circular, rectangular and irregular shape of loadings.
4. Perform laboratory compaction test to determine the maximum dry density and optimum moisture content of the soil and know field methods of compaction and their quality.
5. Find the time-dependent settlement of a soil deposit subjected to loads and Estimate shear parameters and shear strength of soils.

SYLLABUS

UNIT – I

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Phase diagram - Basic terms, Functional relationships based on index properties - 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.

UNIT – II



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Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy’s law- permeability – Factors affecting –laboratory determination of coefficient of permeability –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: Stresses induced by applied loads - Pressure Bulb, Stress distribution under a point load on horizontal and vertical planes – Boussinesq’s and Westergaard’s theories for point loads and areas of different shapes – Newmark’s influence chart – 2:1 stress distribution method.

UNIT – IV

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

Consolidation: Types of compressibility - Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves - Normally consolidated soil, over consolidated soil and under consolidated soil – Pre-consolidation pressure and its determination - Terzaghi's 1-D consolidation theory - Coefficient of consolidation: Square root time and Logarithm of time fitting methods - Computation of total settlement and time rate of settlement

UNIT – V

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



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Text Books:

1. Gopal Ranjan and A.S.R.Rao, “Basic and Applied Soil Mechanics”, New Age International Publishers.
2. V.N.S.Murthy, “Soil Mechanics and Foundation Engineering”, CBS publishers.
3. M.Palani Kumar, “Soil Mechanics”, PHI Learning

References:

1. D.W.Taylor, “Fundamentals of Soil Mechanics”, Wiley.
2. Holtz and Kovacs, “An introduction to Geotechnical Engineering” Prentice Hall.
3. Donald P. Coduto, “Geotechnical Engineering”, Second Edition, By Pearson



Subject	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	2	0	2	3

Course Objectives:

The objective of this course is:

1. To design structures using limit state analysis.
2. To know various elements of a reinforced concrete structures.
3. To design RC structural elements as per IS code provisions.

Course Outcomes:

At the end of this course the student will be able to

1. Work on different types of design methods.
2. Analysis and design of flexural members, design of structures subjected to shear, bond and torsion.
3. Distinguish and design the one-way and two-way slabs.
4. Design the axially loaded, uni-axial and bi-axial bending columns.
5. Classify the footings and design the isolated square, rectangular and circular footings.

SYLLABUS

UNIT – I

Working stress method: Introduction, 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: Introduction, 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: Introduction to beams, Design of singly reinforced beams- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beams- Minimum depth -



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Minimum and Maximum Flexural Tension Reinforcement - Design of Flanged Sections (T) - 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: Introduction to slabs, 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. Introduction to waist-slab staircase.

Limit state of serviceability: Deflection – long term & short term, cracking and IS code provisions for beams and slabs.

UNIT – IV

Design of Compression members: Introduction to compression members, Effective length, Braced and un-braced columns – Indian Standard Code provisions, Design of short and long columns under axial loads, uni-axial bending and bi-axial bending (Demonstration using Special Publication 16)

UNIT – V

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

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

1. Reinforcement detailing of T-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



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five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Text Books:

1. A. K.Jain, “Limit State Design”, Nem Chand Brothers.
2. N. Krishna Raju & R. N. Pranesh, “Reinforced Concrete Structures”, New Age Publications.
3. N.Krishna Raju, “Structural Design and Drawing”, Universities Press.

References:

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

IS Codes: (Permitted to use in examination hall)

1. Indian Standard - 456-2000 Code of practice for Plain & Reinforced Concrete Structures.
2. Indian Standard – 875 (Parts 1 and 2) Code of Practice for Design Dead Loads & Live Loads (Other than Earthquake) for Buildings and Structures.
3. Special Publication - 16, Design Aids for Reinforced Concrete to IS: 456-1978.
4. Special Publication – 34, Handbook on Functional Requirements of Industrial Buildings (Lighting and Ventilation)



Subject	OEC/JOE-I: (a) ELEMENTS OF CIVIL ENGINEERING				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To know the different fields of Civil Engineering, Building Materials and structural Elements.
2. To expose a wide range of concepts in steel connections and pre-stressed members.
3. To provide basic fundamental knowledge on Transportation Engineering, Environmental engineering.

Course Outcomes:

1. To impart basic knowledge on civil engineering materials.
2. To explore basic knowledge on building construction materials.
3. The students will be able to analyze the material on the basis of their properties and thus assigning different weight age to their use for technical purposes and to provide exposure on the fundamental elements of civil engineering structures.
4. To explore the knowledge on steel connections and pre-stressed members.
5. The student will be able to know about pavements and water treatment methods.

SYLLABUS

UNIT – I

Traditional materials: Stones-Bricks-Lime-Cement-Timber

Mortars: Sand -Cement Mortar-Lime Mortar-Mud Mortar-Special Mortar-Tests on Mortar
Concrete: Plain Concrete-Reinforced Cement Concrete (R.C.C.)-Reinforced Brick Concrete (RBC) - Pre-stressed Concrete (PSC) - Fibre-Reinforced Concrete (FRC) Cellular Concrete-Ferro-Cement

Metals as building materials: Ferrous Metals-Aluminium-Copper

Miscellaneous building materials: Glass-Plastics – Bitumen – Asbestos – Paints – Distempers – Varnishes - Solid and Hollow Concrete Blocks - Roofing and Flooring Tiles.



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UNIT – II

Building Construction:

Building planning: Elements of a Building-Basic Requirements of a Building-Planning-Planning Suitable Orientation-Planning for Energy Efficiency-Planning for Suitable Utility-Planning for Meeting Other Requirements

Foundations: Dimensions of Foundation - Conventional Spread Footings - R.C.C. Footings - Grillage Footing Arch Foundation - Pile Foundations - Foundations in Black Cotton Soil.

Super structures: Types of Super Structures Based on the Method of Load Transfers – Walls - Stone Masonry - Brick Masonry – Plastering – Pointing – Flooring – Roof - Doors and Windows – Lintels – Stairs.

UNIT – III

Concrete Structures: Introduction to RCC structures, Materials, permissible stresses and IS Specifications; Working stress methods; Limit State Method - Stress Blocks parameters.

UNIT – IV

Steel Structures: Introduction to steel structures, Properties of steel sections, permissible stresses, IS Specifications; Riveted and welded joints and bolted connections.

Pre-Stressed Concrete: Introduction to Pre-Stressed structures, Basic concepts, material for pre-stressing, losses in Prestress, classification of pre-stressing system.

UNIT – V

Roads: Benefits- Classifications - Traffic signs, Bridges-components of Bridges – Dams and its Types, Purpose of reservoir.

Environmental Engineering: Protected water supply, water treatment methods- sewage treatment- Pollution-Types-causes-remedial measures.

Text Books:

1. Dr. B.C. Punmia, “Basic Civil Engineering”, Ashok Kumar Jain, Arun Kr. Jain,/Laxmi Publications.
2. S Shanmugam/Ms Palanichamy, “Basic civil and Mechanical Engineering”, Mc Graw Hill

Reference Books:

1. SS Bhavikatti, “Basic civil Engineering” –. New Age International publishers
2. Nevile, “Properties of concrete”, Longman publishers

Subject	OEC/JOE-I: (b) ADVANCED CONCRETE TECHNOLOGY				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To understand the properties of ingredients of concrete.
2. To study the behavior of concrete at its fresh and hardened state.
3. To study about the concrete design mix and to know about the procedures in concrete at different stage.

Course Outcomes:

On completion of this course, the students will be able to

1. Identify quality control tests on concrete making materials.
2. Design concrete mixes as per IS and ACI codes.
3. Understand the behaviour of fresh and hardened concrete.
4. Design high strength concrete and their specific applications and use of admixtures.
5. Understand the need for special concretes

SYLLABUS

UNIT – I

Concrete Making Materials: Cement – Bogus Compounds – Hydration Process – Types of Cement – Aggregates – Gradation Charts – Combined Aggregate – Alkali Silica Reaction – Admixtures – Chemical and Mineral Admixtures.

UNIT – II

Mix Design: Factors influencing mix proportion, Mix design by ACI method and I.S. code method, Design of high strength concrete.

UNIT – III

Durability of concrete: Shrinkage and creep of concrete, permeability of concrete, Acid Attack, Thermal properties of concrete, Micro cracking of concrete, Corrosion Causes effects and remedial measures.

Properties of Concrete:

Fresh concrete: Workability, Compaction Factor, Vee Bee time.



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Hardened concretes: Cube Strength, Cylindrical Strength, Flexural Strength and Non-Destructive Testing.

UNIT – IV

High Strength Concrete: Microstructure – Manufacturing and Properties – Design of HSC Using Erintroy Shaklok method – Ultra High Strength Concrete. High Performance Concrete – Requirements and Properties of High-Performance Concrete – Design Considerations.

UNIT – V

Special Concretes: Self Compacting concrete, Polymer Concrete, Fibre Reinforced Concrete - Reactive Powder Concrete – Requirements and Guidelines – Advantages and Applications. Concrete Mix Design: Quality Control – Quality Assurance – Quality Audit – Mix Design Method – BIS Method – DOE Method – Light Weight Concrete, Self-Compacting Concrete.

Text Books:

1. Shetty, M.S., “Concrete Technology”, Theory & Practice, S.Chand and Co.
2. Gambhir, M.L., “Concrete Technology”, Tata McGraw Hill
3. Santakumar A.R., “Concrete Technology”, Oxford University Press, New Delhi.

References:

1. Neville, “Properties of Concrete”, Longman Publishers.
2. Indian Standard: 10262-2009 Code of Practice for concrete Mix Design.



Subject	PEC-I: (a) AIR POLLUTION AND CONTROL				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To study sources and classification of air pollution and understand fundamentals of meteorology and stability of atmosphere.
2. To learn about the different air pollutants and control.
3. To know the air pollution legislation and regulations.

Course Outcomes:

Upon successful completion of the course, the students will be able to

1. Identify sources and types of air pollutants.
2. Understand meteorological effect on air quality changes.
3. Choose the appropriate techniques for removal of particulate pollutants.
4. Choose the appropriate techniques for removal of gaseous pollutants.
5. Understand air pollution legislations and regulations.

SYLLABUS

UNIT - I

Sources And Classification of Air Pollution: Introduction; Definitions; Significance; Types of pollutants; Sources and impacts on plants, animals, materials; Classifications - natural and artificial, primary and secondary, point and non-point, linear and areal sources, stationary and mobile; Ambient air quality standards by World Health Organization (WHO) and Central Pollution Control Board (CPCB)

UNIT – II

Air Pollution Meteorology: Composition and structure of the atmosphere; Atmospheric dispersion- Pressure, Wind, Moisture; Meteorological factors influencing air - heat, pressure, wind forces, moisture and relative humidity; Lapse rates – Environmental Lapse rate, Adiabatic Lapse rate; Influence of terrain and meteorological phenomenon on plume behaviour and air quality; Wind rose diagrams.

UNIT – III



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Particulate Matter and Control: Sources; Emission factors; Control techniques - control at sources, process changes, equipment modifications; Control Equipment - Working Principles and Operation – Settling chambers, Cyclone separators, Fabric filters, Scrubbers, Electrostatic precipitators.

UNIT – IV

Gaseous Pollutants and Control: Control of gaseous pollutants – Modification of operating conditions, modification of design conditions; Effluent gas treatment methods – Combustion-Direct flame combustion, Thermal Combustion, Catalytic Combustion; Absorption – Spray towers, Packed towers; Adsorption – Types of adsorbents, Multiple Fixed bed adsorber, Fluidized adsorber bed, Condensation – Surface Condenser, Contact Condenser; Air-fuel Ratio.

UNIT – V

Air Pollution Legislation and Regulations: The Air (Prevention and Control of Pollution) Act, 1981 - Constitution of the Board, Functions of Central and State Board, Emission Standards, Penal Provisions of the Act; Case studies – Bhopal gas Tragedy, London Smog, and Present Scenario of Delhi.

Text Books:

1. Air Pollution, M.N. Rao and H.V.N. Rao, 1st Edition, McGraw Hill Education.
2. Air Pollution and Control, K.V.S.G. Murali Krishna, 1st Edition, University Science Press, Laxmi Publisher.
3. S.K. Garg, Sewage Disposal and Air Pollution Engineering, Environmental Engineering Vol. II, Khanna Publishers.

Reference Books:

1. Y. Anjaneyulu and V. Manickam, “Environmental Impact Assessment Methodologies”, 2nd edition, B.S. Publication.
2. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, Environmental Engineering, McGraw Hill Inc., New York, 2017.



Subject	PEC-I: (b) REMOTE SENSING AND GIS APPLICATIONS				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

The course is designed to

1. Introduce the basic principles of Remote Sensing and GIS techniques.
2. Learn various types of sensors and platforms and appreciate application of RS and GIS to Civil Engineering.
3. Learn concepts of visual and digital image analyses and understand the principles of spatial analysis

Course outcomes:

At the end of the course the student will be able to

1. Be familiar with ground, air and satellite-based sensor platforms.
2. Interpret the aerial photographs and satellite imageries
3. Create and input spatial data for GIS application
4. Apply RS and GIS concepts on land surfaces.
5. Apply RS and GIS concepts for Hydrology and Water Resources.

SYLLABUS

UNIT – I

Introduction to Remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, characteristics of remote sensing systems, types of resolutions - advantages & limitations

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, spaceborne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT & Recent satellite.

UNIT – II

Image analysis: Introduction, elements of visual interpretations, digital image processing-image pre-processing, image enhancement, image classification, supervised classification,



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unsupervised classification: Overlay function-vector overlay operations; raster overlay operations, network analysis.

UNIT – III

Geographic Information System: Basic Principles, components, application areas of GIS, map projections.

Data entry and preparation: spatial data structures, raster and vector data formats, data inputs, data manipulation, data retrieval, data analysis and data display.

UNIT – IV

RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban & transportation applications

UNIT – V

Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects, groundwater quality monitoring and potential recharge zones, watershed management.

Text Books:

1. Bhatta B (2008), Remote sensing and GIS, Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013), Remote Sensing and Image Interpretation, Wiley India Pvt. Ltd., New Delhi.
3. Schowenger, R. A (2006), Remote Sensing, Elsevier publishers.
4. Fundamentals of Remote Sensing, by George Joseph, Universities Press, 2013.
5. Fundamentals of Geographic Information Systems by Demers, M.N, Wiley India Pvt.Ltd, 2013.

References:

1. Narayan LRA, Remote Sensing and its Applications, Universities Press, 2012.
2. Concepts and Techniques of Geographical Information System, by Chor Pang Lo and AKW Yeung, Prentice Hall (India), 2006



Subject	PEC-I: (c) TRAFFIC ENGINEERING				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To introduce fundamental knowledge of traffic engineering so that students can understand and be able to deal with traffic issues including safety, planning and design.
2. To introduce fundamental knowledge of traffic engineering so that students can understand and be able to deal with traffic issues including operation and control.
3. Students will learn and be able to use software such as Highway Capacity Software and Synchro in traffic engineering projects.

Course Outcomes:

Students who successfully complete this course will be able to:

1. Use statistical concepts and applications in traffic engineering.
2. Identify traffic stream characteristics.
3. Understand elements of highway safety and approaches to accident Studies.
4. Design a pre-timed signalized intersection, and determine the signal splits.
5. Identify level of services for arterials.

SYLLABUS

UNIT – I

Introduction: Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Fundamentals of traffic flow, urban traffic problems in India. Components of Traffic Engineering- Road, Traffic and Land Use Characteristics.

UNIT – II

Traffic Surveys and Analysis: Surveys and Analysis - Volume, Capacity, Speed studies and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Problems, Statistical Applications in Traffic Engineering.



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UNIT – III

Traffic Control: Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design.

UNIT – IV

Geometric Design of Intersections: Conflicts at Intersections, Classification of Intersections at Grade, - Chanallised and Unchanallised Intersection - Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Chanallisation and Rotary design (Problems), Grade Separators.

UNIT – V

Traffic Management: Traffic Management- Traffic System Management (TSM) and Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)

Text Books:

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
2. Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.
3. Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student, Edition, 2009.

References:

1. YoderE.J., WitczakM.W., Principles of Pavement Design, John Wiley & Sons–Indian edition.2008
2. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management.
3. Guidelines of Ministry of Road Transport and Highways, Government of India.



Subject	PEC-I: (d) LOW COST HOUSING				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To provide the students with in-depth knowledge of various building materials, in low-cost Housing.
2. To provide the students with in-depth knowledge of various building constructions in low-cost Housing.
3. To provide the students with in-depth knowledge of various building execution techniques in low-cost Housing.

Course Outcomes:

1. Comprehend the current Housing Situation in India, various Developmental Programmes with the gained knowledge and understand the application of sustainable building material including their cost implications.
2. Understand the fundamentals of Modular coordination and its application in both in total & partial prefab construction technology, Analyze the merits & demerits of the impact of prefab/precast application in terms of employment and production.
3. Apply the cost reduction solutions developed by National Institutions for a given assignment.
4. Gain and understand the use of CPM & PERT in project management analyze the time cost relationship and its application to overcome the time overrun losses in the project management cycle.
5. Able to synthesize the knowledge gained in terms of material and techniques for optimum output of speedy construction and cost reduction. Knowledge of ongoing research in low-cost building materials and construction technologies at both the National & International level.



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SYLLABUS

UNIT – I

Introduction to Low Cost Housing: Introduction to low cost housing, building components influencing cost of buildings. Adobe, Cob, Rammed earth, Straw bale, Bamboo, earthen finishes, etc., their sustainability, adaptability to local climate, engineering considerations necessary for durability.

UNIT – II

Modular Coordination: Modular coordination in building design, total and partial prefabrication, impact of prefabrication on employment. Various methods of mass production of building components. Necessity of Massive Evacuation and Rehabilitation and rebuilding colonies with examples like major project sites, Earthquake effected colonies.

UNIT – III

Low Cost Construction Technologies: Building construction technology solutions for cost reduction. Available knowledge in low cost construction technologies, Institutions developing low cost construction technologies like BMTPC, CBRI, Auroville Building Center, etc.

UNIT – IV

Time Cost Management: Use of CPM and PERT methods in building construction management. Effect of time-cost relationship in low cost housing delivery mechanism.

UNIT - V

Building Cost Reduction: Application of low-cost building materials and various construction techniques, building cost control techniques, research and development by various organizations in the country and foreign countries to reduce the cost.

Text Books:

1. Davis, S. "Architecture of Affordable Housing", University of California Press, 1995.
2. Ruiz, F. P. "Building an Affordable House, Taunton Press, 1995.
3. Laul, A. K. "A Handbook of Low-Cost Housing", New Age International, 1995.
4. Mathur, G. C. "Low Cost Housing in Developing Countries", South Asia Book, 1999.

References:

1. Building materials for low –income houses – International council for building research studies and documentation.



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2. Light weight concrete- Academic Kiado- Rudhai. G – Publishing home of Hungarian Academy of Sciences 1963.
3. Modern trends in housing in developing countries – A.G. Madhava Rao- D.S. Ramachandra Murthy & G. Annamalai

Subject	GEOTECHNICAL ENGINEERING LABORATORY				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

The objective of this course is:

1. To determine the index properties for soil classification – Grain size distribution & Atterberg's limits.
2. To determine the engineering properties – Permeability, Compaction, consolidation, shear strength parameters & CBR value.
3. To teach how to determine compaction characteristics and consolidation behaviour from relevant lab tests; to determine permeability of soils.

Course Outcomes:

Upon successful completion of this course, student will be able to

1. Site specific field investigations including collection of soil samples for testing and observation of soil behaviour/building damage.
2. Identify and classify soil based on standard geotechnical engineering practice.
3. Determine the Relative Compaction based on field density and laboratory density and Permeability of the soil.
4. The strength of the soil depending on the drainage conditions and type of the soil
5. Determine co-efficient of consolidation and settlement of fine-grained soil.

List of Experiments:

1. Specific gravity, G & Differential free swell (DFS)
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 and Field CBR
8. Direct Shear test & Vane Shear test



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9. Triaxial Compression test
10. Unconfined Compression test

List of Equipment:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
 - a) Core cutter method
 - b) Sand replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Permeability apparatus for
 - a) Constant head test
 - b) Variable head test
6. Universal auto compactor for I.S light and heavy compaction tests.
7. Shaking table, funnel for sand raining technique.
8. Apparatus for CBR test
9. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
10. One dimensional consolidation test apparatus with all accessories.
11. Triaxial cell with provision for accommodating 38 mm dia specimens.
12. Box shear test apparatus
13. Laboratory vane shear apparatus.
14. Hot air ovens (range of temperature 50 – 150 °C)

References:

1. "Determination of Soil Properties" by J. E. Bowles.
2. IS Code 2720 – relevant parts.



Subject	REMOTE SENSING & GIS LABORATORY				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

The course is designed to

1. Understand the process Geo-referencing, Preparation of Base map from of Toposheet.
2. Digitization, creation of thematic maps from toposheets and to developing Digital Elevation model.
3. Interpretation and Estimation of features of Land Use/land cover details from satellite imagery and to apply GIS software to simple problems in water resources, transportation engineering and Agriculture.

Course Outcomes:

At the end of the course the student will be able to

1. Work comfortably on GIS software
2. Digitize and create thematic map and extract important features
3. Develop digital elevation model
4. Interpretation and Estimation of features from satellite imagery.
5. Analyze and Modelling using GIS software.

GIS SOFTWARES:

1. Arc GIS 10.1
2. ERDAS Imagine 13
3. MapInfo 6.5
4. ILWIS or any one or Equivalent.

EXERCISES IN GIS:

1. Geo-referencing of Toposheet.
2. Preparation of Base map from toposheet including legend, scale and annotation.
3. Digitization of Map/Toposheet.
4. Developing Digital Elevation model.
5. Interpretation of Land Use/land cover detail from satellite imagery.



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6. Creation of thematic maps.
7. Estimation of features and interpretation.
8. Simple applications of Remote Sensing & GIS in water Resources.
9. Simple applications of Remote Sensing & GIS in Transportation.
10. Simple applications of Remote Sensing & GIS in Agriculture.

Text Book:

1. Concept and Techniques of GIS by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers
2. Software Manuals



Subject	ADVANCED COMMUNICATION SKILLS LABORATORY				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	4	2

Course Objectives:

1. To expose students to different contexts through right vocabulary.
2. To inculcate the habit of reading and understanding any text.
3. To enable students to acquire the ability of writing for business purposes and to enable students to acquire interview skills and group discussion dynamics.

Course Outcomes:

Upon the completion of the course, the student will be able to:

1. Choose vocabulary contextually.
2. Comprehend, analyze and interpret the text in a definite time frame.
3. Write resumes cohesively and coherently.
4. Construct and elaborate on a given topic and comprehend and practice the dynamics of group discussion.
5. Comprehend the concept and process of interview; answering through mock interviews.

SYLLABUS

UNIT – I

Selected High GRE Words, Idioms & Phrases – Discourse Skills – using visuals – Synonyms and antonyms, word roots, one word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases, collocations.

UNIT – II

Reading Comprehension – General Vs Local Comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning.

UNIT – III

Writing Skills – Structure of Resume writing – Short Report Writing (Business/Technical)

UNIT – IV

Presentation Skills -Group Discussion – Dynamics of Group Discussion



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UNIT – V

Interview Skills – Concept and process – pre-interview planning, opening strategies, answering strategies, interview through teleconference & video-conference and mock interviews.

Suggested Software:

1. K-Van solutions Software with CD
2. Oxford advanced learner's compass, 7th Edition

Suggested Reading:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
2. Business and Professional Communication: Keys for Workplace Excellence. Kelly
3. M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
4. English Vocabulary in Use Series, Cambridge University Press 2008.
5. Communication Skills by Leena Sen, PHI Learning Pvt. Ltd., New Delhi, 2009.
6. A Course Book of Advanced Communication Skills Lab published by University Press, Hyderabad.



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Syllabus for
III B.Tech. - II Semester
(R20)



Subject	DESIGN & DRAWING OF STEEL STRUCTURES				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	2	0	2	3

Course Objectives:

The objective of this course is to:

1. Familiarize Students with different types of Connections codes and concepts of design of flexural members
2. Understand Design of tension and compression members in trusses
3. Familiarize students with types of Columns, column bases, Plate girder and Gantry Girder their Design.

Course Outcomes:

At the end of this course the student 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

SYLLABUS

UNIT – I

Introduction: 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 - Beam to beam and Beam to column connection.

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.



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All units i.e., from unit II to unit-VI to be taught in Limit State Design and in welded connections only.

UNIT – II

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, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT – III

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.

Tension members: Calculation of Effective area- Design of Tension members.

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: Design of slab base and gusseted base. Column bases subjected moment.

UNIT – V

Design of Plate Girder: Design consideration – IS 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 – VI. The students should prepare the following plates.

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



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Plate 6: Detailing of Plate girder including curtailment, splicing and stiffeners.

Final Examination Pattern:

The end examination paper should consist of Part A and Part B. Part A consist 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%.

Text Books:

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
4. Limit State Design Steel Structures by V.L Shah and Veena Gore, Structures Publications

IS Codes:

1. Indian Standard: 800 - 2007, Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2. Indian Standard – 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: SP: 6-1(1964) Handbook for Structural Engineers.



Subject	WATER RESOURCES ENGINEERING				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. This course provides the description of hydrological cycle and derive various formulas used in estimation of different basic components of surface and Ground water cycle and its components.
2. Further it will explain the water requirement for irrigation and connectivity of hydrology to the field requirement.
3. To explain the Importance of Irrigation and methods of Irrigation and To understand dams, spillways, diversion head works and cross drainage works.

Course Outcomes:

At the end of the course the student will be able to

1. Understand the different concepts and terms used in engineering hydrology.
2. To identify and explain various formulae used in estimation of surface hydrology components.
3. Identify and explain various methods to estimate amount of rainfall.
4. To identify and explain various formulae used in estimation of Ground water hydrology components.
5. Demonstrate their knowledge to connect hydrology to the field requirement

SYLLABUS

UNIT – I

Introduction: Concepts of Hydrologic cycle, Global Water Budget, Applications in Engineering. Sources of data.

Precipitation: Forms of precipitation, characteristics of precipitation in India, measurement of precipitation; Recording and non-recording types, rain gauge network; mean precipitation over an area: Arithmetic, Theissen's and Isohyetal methods, Missing Rainfall Data – Estimation, Consistency of Rainfall records, depth area-duration relationships, maximum intensity/depth duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.



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UNIT – II

Abstractions from precipitation: Evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations: Penman and Blaney & Criddle Methods, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Runoff: Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff – Analysis.

UNIT – III

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

UNIT – IV

Groundwater Hydrology: Occurrence, movement and distribution of groundwater, aquifers – types, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. Well Hydraulics – Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants.

Crop Water Requirements: Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

UNIT – V

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



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Text Books:

1. Hydrology by K. Subramanya (Tata McGraw-Hill)
2. Irrigation Engineering and Hydraulic structures by Santhosh kumar Garg Khanna publishers
3. G L Asawa, Irrigation Engineering, Wiley Eastern

References:

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



Subject	GEOTECHNICAL ENGINEERING – II				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
2. To impart the principles of important field tests such as SPT and Plate bearing test.
3. To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes:

1. Understand the principles and methods of Geotechnical Exploration decide the suitability of soils and check the stability of slopes
2. Calculate lateral earth pressures and check the stability of retaining walls
3. The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
4. The student must be able to design Piles based on the principles of bearing capacity.
5. The student must be able to compute the magnitude of foundation settlement to decide the size of the foundation.

SYLLABUS

UNIT – I

Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – geo physical method, planning of Programme and preparation of soil investigation report.

Stability of Slopes: 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.



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UNIT – II

Earth Retaining Structures: Plastic equilibrium in soils, Earth pressure at rest, Active and Passive earth pressures, Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method – earth pressures in layered soils, Design of gravity retaining wall.

UNIT – III

Shallow Foundations: Introduction - The Ultimate Bearing Capacity of Soil, Types of Failure in Soil, Terzaghi's of Bearing Capacity Theory, Skempton's Bearing Capacity Factor, Effect of Water Table on Bearing Capacity , The General Bearing Capacity Equation, Ultimate Bearing Capacity of Footings Based on SPT Values (N) , The CPT Method of Determining Ultimate Bearing Capacity. Plate Load Test, Types of foundation settlements and their determination – allowable settlements of structures. Effect of Size of Footings on Settlement.

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. Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test.

UNIT – IV

Pile Foundations: Types of piles , Uses of piles, Selection of Pile – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests –Pile Group Efficiency, Vertical Bearing Capacity of Pile Groups Embedded in Sands and Gravels , Settlement of Piles and Pile Groups in Sands and Gravels, Settlement of Pile Groups in Cohesive Soils, Allowable Loads on Groups of Piles, Negative skin Friction, Uplift Capacity of a Pile Load carrying capacity of pile groups in sands and clays.

UNIT – V

Well Foundations: Types –shapes of wells, Components of well functions –Depth of well foundation, forces acting on well foundations – Design Criteria – Determination of steining thickness and plug – construction and sinking of wells – Tilt and shift.

Text Books:

1. Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengage learning



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2. Basic and Applied Soil Mechanics, Gopal Ranjan & A.S.R. Rao, New Age International Pvt. Ltd, (2004).

References:

1. Foundation Analysis and Design, Bowles, J.E., (1988), 4th Edition, McGraw-Hill Publishing Company, Newyork.
2. Analysis and Design of Substructures by Swami Saran, SaritaPrakashan, Meerut.



Subject	PEC-II: (a) ARCHITECTURE & TOWN PLANNING				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

The objectives of this course are:

1. Initiating the students to different architectures of the world. The distinctions between the eastern and western architecture styles are focused.
2. The salient features of Egyptian, Greek, Roman, Indian Vedic, Indus valley civilization, Buddhist, Hindu and Indo-Sarsanic Architecture are introduced.
3. Architectural design concepts, principles of planning and composition are imparted.

Course Outcomes:

Upon the successful completion of this course:

1. The student should be able to distinguish architectural styles of eastern and western world.
2. The student should understand the importance of Orders of architecture.
3. Should understand the historical town planning of the towns and the cities.
4. Should be able to compose spaces of buildings using design concepts, planning principles.
5. Should understand the landscaping features and regulations controlling expansion of the towns and the cities.

SYLLABUS

UNIT – I

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures- Orders.
Indian Architecture: Vedic age, Indus valley civilization.

Temples of religions: Buddhist period: Stambas, Stupas, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhuvaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace - Fort - Tomb.

UNIT – II

Principles of designing and Planning: Principles of planning a residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors.



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Post-classic Architecture: Introduction of post-classic architecture- contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wrigt, Walter Groping.

UNIT – III

Historical Back Ground of Town Planning: Town planning in India –Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT – IV

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning- Neighbourhood Planning.

Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation-planning regulations and limitations.

UNIT – V

Land Scaping and Expansion of Towns: Land scaping for the towns, horizontal and vertical expansion of towns- garden cities, satellite towns-floating towns- sky scrapers-pyramidal cities.

Text Books:

1. 'The great ages of World Architecture' by G.K. Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture' by Y. S. Sane.
3. 'Professional Practice' by G.K.Krishnamurthy, S.V.Ravindra, PHI Learning, New Delhi.
4. 'Indian Architecture – Vol. I & II' by Percy Brown, Taraporevala Publications, Bombay.
5. 'Fundamentals of Town Planning' by G.K.Haraskar.

References:

1. 'Drafting and Design for Architecture' by Hepler, Cengage Learning
2. 'Architect's Portable Handbook' by John Patten Guthrie –McGraw.Hill International Publications.
3. 'Mordern Ideal Homes for India' by R. S. Deshpande.
4. 'Town and County Planning' by A.J.Brown and H.M.Sherrard.
5. 'Town Design' by FederikGlbbard, Architectural press, London.



Subject	PEC-II: (b) ROAD SAFETY ENGINEERING				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. This module on the fundamental of traffic engineering & some of the statistics methods to analysis the traffic safety.
2. The accident interrogations risk involved with measures to identity the causes are dealt.
3. The role of road safety in planning the urban infrastructures design is discussed.

Course Outcomes:

The student is able to

1. To understand fundamental of Traffic Engineering.
2. To investigate & determine the collective factors & remedies of accident involved.
3. To design & planning various road geometrics.
4. To massage the traffic system from road safety point of view.
5. To examine the engineering factors for safety.

SYLLABUS

UNIT – I

Fundamentals of Traffic Engineering: Basic Characteristics of Motor-Vehicle Traffic, Highway Capacity, Applications of Traffic Control Devices, Traffic Design of Parking Facilities, Traffic Engineering Studies; Statistical Methods in Traffic Safety Analysis – Regression Methods, Poisson Distribution, Chi- Squared Distribution, Statistical Comparisons.

UNIT – II

Accident Investigations and Risk Management: Collection and Analysis of Accident Data, Condition and Collision Diagram, Causes and Remedies, Traffic Management Measures and Their Influence on Accident Prevention, Assessment of Road Safety, Methods to Identify and Prioritize Hazardous Locations and Elements, Determine Possible Causes of Crashes, Crash Reduction Capabilities and Countermeasures, Effectiveness of Safety Design Features, Accident Reconstruction.



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UNIT – III

Road Safety in Planning and Geometric Design: Vehicle And Human Characteristics, Road Design and Road Equipments, Redesigning Junctions, Cross Section Improvements, Reconstruction and Rehabilitation of Roads, Road Maintenance, Traffic Control, Vehicle Design and Protective Devices, Post Accident Care.

UNIT – IV

Role of Urban infrastructure design in safety: Geometric Design of Roads; Design of Horizontal and Vertical Elements, Junctions, At Grade and Grade Separated Intersections, Road Safety in Urban Transport, Sustainable Modes and their Safety.

UNIT – V

Traffic Management: Systems for Safety, Road Safety Audits and Tools for Safety Management Systems, Road Safety Audit Process, Approach to Safety, Road Safety Improvement Strategies, ITS and Safety.

Text Books:

1. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
2. Fundamentals of Transportation Engineering – C.S. Papacostas, Prentice Hall India.
3. Transportation Engineering – An Introduction, C.Jotinkhistry, B. Kent Lall.

References:

1. Fundamentals of Traffic Engineering, Richardo G Sigua
2. Handbook of Road Safety measures, second Edition, Rune Elvik, Alena Hoye, TrulsVaa, Michael Sorenson
3. Road Safety by NCHRP.



Subject	PEC-II: (c) ADVANCED STRUCTURAL ANALYSIS				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To acquire theoretical and working knowledge about frames, beams, matrices and multi-Storey frames.
2. To acquire theoretical and working knowledge about beams and matrices.
3. To acquiring theoretical and working knowledge about multi-Storey frames

Course Outcomes:

Students will be able to:

1. Analyse different indeterminate structures using Matrix methods.
2. Analyze the multistory building frames by various approximate methods.
3. Solve the continuous beams, portal frames by flexibility methods of analysis.
4. Solve the continuous beams, portal frames by stiffness methods of analysis.
5. Analyze and design of large frames with or without shear walls.

SYLLABUS

UNIT – I

Introduction to matrix methods of analysis: static indeterminacy and kinematic indeterminacy –degree of freedom – coordinate system – structure idealization stiffness and flexibility matrices – suitability element stiffness equations – elements flexibility equations – mixed force – displacement equations – for truss element, beam element and tensional element. Transformation of coordinates – element stiffness matrix – and load vector – local and global coordinates.

UNIT – II

Assembly of stiffness matrix: From element stiffness matrix – direct stiffness method – general procedure – band matrix – semi bandwidth – computer algorithm for assembly by direct stiffness matrix method.

UNIT – III

Analysis of plane by truss flexibility methods: Continuous beam – plane frame and grids by flexibility methods.



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UNIT – IV

Analysis of plane by truss stiffness methods: Continuous beam – plane frame and grids by stiffness methods.

UNIT – V

Introduction to Finite Element Method: General description of the finite element method. Engineering applications of finite element method. Boundary conditions: homogeneous and nonhomogeneous for structural, heat transfer and fluid flow problems. Potential energy method, Rayleigh Ritz method, Galerkin's method, Displacement method of finite element formulation. Convergence criteria, Discretization process, Types of elements: 1D, 2D and 3D, Node numbering, Location of nodes. Strain displacement relations, Stress strain relations, Plain stress and Plain strain conditions, temperature effects.

Text Books:

1. Matrix Analysis of Frames structures by William Weaver J.R and James M. Gere, CBS publications.
2. Advanced Structural Analysis by Ashok. K. Jain, Nem Chand Brothers.
3. A first course in the Finite Element Method Logan, D. L Cengage Learning 6th Edition 2016.

References:

1. Basic Structural Analysis by C.S. Reddy, Tata Mc-Graw hill
2. Matrix Structural Analysis by Madhu B. Kanchi, John Willey publishers
3. Indeterminate Structural Analysis by K.U. Muthuet al., I.K. International Publishing House Pvt. Ltd.
4. Matrix Methods of Structural Analysis by J.L. Meek, Mc-Graw hill.
5. Concepts and Application of Finite Elements Analysis Cook R. D., et al. Wiley & Sons 4th Edition 2003.



Subject	PEC-II: (d) PRECAST AND PREFABRICATED STRUCTURES				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objective:

1. To impart knowledge to students on modular construction.
2. To impart knowledge to students on industrialised construction.
3. To impart knowledge to students on design of prefabricated elements and construction methods.

Course Outcomes:

1. The student will have good knowledge about design principles, layout of factory and stages of loading in precast construction.
2. Acquire knowledge about panel systems, slabs, connections used in precast construction and they will be in a position to design the elements.
3. Acquire knowledge about types of floor systems, stairs and roofs used in precast construction.
4. Acquire knowledge about types of walls used in precast construction, sealants, design of joints.
5. Acquire knowledge about components in industrial building.

SYLLABUS

UNIT – I

Introduction: Need for prefabrication – Principles of prefabrication – Modular coordination – Standardization – Materials – Systems – Production – Transportation – Erection.

UNIT – II

Prefabricated Components: Behaviour and types of structural components – Large panel systems – roof and floor slabs – Walls panels - Beams - Columns - Shear walls.

UNIT – III

Design Principles: Design philosophy- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation - Demountable precast concrete systems.



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UNIT – IV

Joints and Connections in Structural Members: Types of Joints – based on action of forces - compression joints - shear joints - tension joints - based on function - construction, contraction, expansion. Design of expansion joints - Dimensions and detailing - Types of sealants - Types of structural connections - Beam to Column - Column to Column - Beam to Beam - Column to foundation.

UNIT – V

Design for Abnormal Loads: Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

Text Books:

1. Bruggeling A.S. G and Huyghe G.F. "Prefabrication with Concrete", A.A. Balkema Publishers, USA, 1991.
2. Lewitt, M. " Precast Concrete- Materials, Manufacture, Properties And Usage", Applied Science Publishers, London And New Jersey, 1982.
3. Bachmann, H. and Steinle, A. "Precast Concrete Structures", Ernst & Sohn, Berlin, 2011.

References:

1. Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 1976.
2. "Handbook on Precast Concrete Buildings", Indian Concrete Institute, 2016.
3. "Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 2009.



Subject	OEC/JOE-II: (a) BASICS OF ENVIRONMENTAL ENGINEERING				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To understand the basic of water borne diseases, drinking water standards and treatment of wastewater and disposal.
2. To expose the students to understand to treatment of wastewater and disposal.
3. To learn the basics of air pollution and effects, noise pollution and solid waste disposal

Course Outcomes:

Upon successful completion of the course, the students will be able to:

1. Demonstrate water sources, water borne diseases, water treatment and potable water standards
2. Understand basics of wastewater treatment and disposal methods
3. Identity air pollution sources and understand air pollution effects
4. Identity noise pollution sources and understand noise pollution effects
5. Understand sources and basic principles of solid waste

SYLLABUS

UNIT – I

Water: Introduction; Sources of water; Availability of fresh water; Water borne diseases; Brief explanation on ground and surface water treatment; Potable water standards as per IS and WHO standards; Water conservation; Role of public health engineering department in the prevention of the water borne diseases.

UNIT – II

Wastewater: Wastewater sources; Sewage characteristics; Brief explanation on treatment of sewage; Disposal of treated wastewater; Practise on reuse of treated wastewater; Effects of wastewater without treatment disposal in streams, on land.

UNIT – III

Air pollution sources and effects: Layers of atmosphere; Sources and classification of air pollutants – Man made, Natural sources; Type of air pollutants; Pollution due to automobiles;



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Effect of air pollution on health, vegetation and materials; Global warming; Worst environmental disasters caused by humans.

UNIT – IV

Noise Pollution: Sources of noise pollution - plane, point and line sources, multiple sources; Effect of noise pollution on humans; Control of noise pollution; Outdoor and indoor noise propagation; Intensity of noise pollution; Noise pollution permissible limits as per CPCB and WHO.

UNIT – V

Solid Waste: Sources of solid waste – classification solid waste - Basic principles of Solid Waste storage, collection, transportation, processing and Disposal.

Text Books:

1. S.K. Garg (2019), Water supply Engineering – Environmental Engineering (Vol.I) – Khanna Publishers.
2. S.K. Garg (2019), Sewage Disposal and Air Pollution Engineering – Environmental Engineering (Vol. II) – Khanna Publishers.
3. Punmia B.C., Ashok Jain & Arun Jain (2014) Water Supply Engineering, Laxmi Publication Pvt., Ltd., New Delhi
4. Punmia B.C., Ashok Jain & Arun Jain (2014) Wastewater Engineering, Laxmi Publication Pvt., Ltd., New Delhi

References Books:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous (2017), Environmental Engineering, McGraw Hill Inc., New York.

Subject	OEC/JOE-II: (b) INNOVATIVE CONSTRUCTION MATERIALS				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To understand the applications and properties of various building materials.
2. To know the various types of metals, Polymers, Bitumen in construction and to know the properties, usage of gypsum, adhesives, water proofing materials in construction industry.
3. To understand the potential applications of architectural materials and to obtain the knowledge about smart materials.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

1. Identify different types of modern materials, Paints, Enamels and Varnishes that are used in construction.
2. Explain the role of metals, Polymers, Bitumen in construction industry.
3. Identify the required architectural materials for various buildings.
4. Outline various smart materials suitable for structures.
5. Explain the usage of materials like gypsum, adhesives, water proofing materials in construction industry.

SYLLABUS

UNIT – I

Modern Building Materials: Ceramics, Sealants for joints, fibre glass reinforced plastic, refractories- composite materials, Geosynthetics, Concrete Canvas, Geotextile and its types. Paints, Enamels And Varnishes: Introduction, rubber paints, plastic emulsion paints, plastic paints, enamel paints, texture paints, varnish, wax polish.

UNIT – II

Metals, Plastics, Bitumen: Metals and Special Alloys of Steel - Water Jet Cut Stainless Steel, Mill Slab Steel, Tension Rods Assemblies and Cast Iron - Heat Treatment – Tendons - GI sheets, tubes and lightweight roofing materials - Aluminum and its products. Plastics, Bitumen:



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Composition, polymerization, Classification of plastics, biodegradable plastic, Grades of Bitumen, Unplasticized Polyvinyl Chloride (UPVC) and its materials.

UNIT – III

Architectural Materials:

Glass: Composition, classification, properties and types of glass, architectural glass. Wood and Wood Product, Floor Finishes, laminates.

Sound Absorbent Materials: Porous materials, porous-cum-elastic materials, perforated materials, Baffle materials – ceiling and walls panels.

UNIT – IV

Smart Materials: Neoprene, Bridge pads, thermocol, Smart and Intelligent Materials – Special features –Case studies showing the applications of smart and Intelligent Materials. Case studies showing the applications of smart and Intelligent Materials.

UNIT – V

Gypsum: Introduction, plaster of Paris, gypsum wall plasters, gypsum plaster boards, Non-load bearing Gypsum partition blocks.

Miscellaneous materials: Adhesives- advantages and disadvantages, properties, types of Adhesives; Different types of Building faced cladding materials; heat insulating materials; water proofing materials.

Text books:

1. Engineering Materials by S. C. Rangwala; Charotar Publishing House, 33 Edn 2017.
2. Building materials by S.K Duggal; New Age International publishers, 3rd Edn, 2009.

Reference books:

1. Building materials by P.C Varghese; PHI Learning, 2nd Edn 2005.
2. Kumar MehtaP. and Paulo J. M. Monteiro, (2014), Concrete: Microstructure, Properties and Materials, 4th Edition, McGraw-Hill, New Delhi.
3. George C. Sih, Alberto Carpinteri and Surace, G (Eds.) (2010), Advanced Technology for Design and Fabrication of Composite Materials and Structures: Applications to the Automotive, Marine, Aerospace and Construction Industry, in: Engineering Applications of Fracture Mechanics Series, Springer, Netherlands.



Subject	SURVEYING FIELD WORK- II (LABORATORY)				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

1. To impart the practical knowledge in the field- measuring distances, directions, angles.
2. To determining R.L.'s areas and volumes.
3. To set out Curves and to draw Plans and Maps.

Course Outcomes:

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

1. Master Theodolite for angles, distances, and height measurements.
2. Apply Tacheometric principles for height and distance problems.
3. Use Total station for area determination, traversing, and contouring.
4. Generate precise survey plans and technical reports.

List of Experiments:

1. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
2. Theodolite Survey: Finding the distance between two inaccessible points.
3. Theodolite Survey: Finding the height of far object.
4. Tacheometric survey: Heights and distance problems using tacheometric principles.
5. One Exercise on Curve setting.
6. One Exercise on contours.
7. Total Station: Introduction to total station and practicing setting up, levelling up and elimination of parallax error.
8. Total Station: Determination of area using total station.
9. Total Station: Traversing & Contouring
10. Total Station: Determination of Remote height & distance between two inaccessible points.



Subject	ESTIMATION, COSTING & CONTRACTS LABORATORY				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

The objective of this course is to enable the students 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.

Course Outcomes:

Upon the successful completion of this course:

1. Understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
2. Quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
3. Understand how competitive bidding works and how to submit a competitive bid proposal.
4. An idea of how to optimize construction projects based on costs.
5. An idea how construction projects are administered with respect to contract structures and issues.

List of Experiment:

1. Estimation of building (long wall method)
2. Estimation of building (center line method)
3. Analysis of rate for concrete work
4. Analysis of rate for brick work
5. Analysis of rate for plaster work
6. Estimate quantity of reinforcement
7. Preparation for approximate estimate for road project
8. Estimating cost of building on plinth area method
9. Estimation of building (short wall method)
10. Estimation of Steel Roof Trusses



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Text Books:

1. Estimating and Costing, B.N. Dutta, UBS publishers, 2000.
2. Civil Engineering Contracts and Estimates, B. S. Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. Construction Planning and Technology, Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. Estimating and Costing, G.S. Birdie.

References:

1. Standard Schedule of rates and standard data book, public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.
3. Estimation, Costing and Specifications, M. Chakraborti; Laxmi publications.
4. National Building Code



Subject	STAAD PRO LABORATORY				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	3	1.5

Course Objectives:

The objective of this course is to enable the students to:

1. Understand the Structural Analysis Software's
2. Understand the Various tools and commands used in the Software.
3. Learn various beam design and analysis of beams, trusses, frames and Retaining walls

Course Outcomes:

Upon the successful completion of this course:

1. The student should be able to get awareness on Structural Analysis Software.
2. The student should be in a position to design any structural Components.
3. The student should be in a position to analyse any structural Components.
4. The student should be capable of designing any Civil engineering simple Structures like beams, frames and trusses.
5. The student should be capable of designing any Civil engineering Structures like Towers, footings etc.,

Exercises:

1. Introduction to Staad Pro
2. Analysis of Continuous beam
3. Analysis of Single storey frame
4. Analysis of Multi-storey frame
5. Design of Multi-storey frame
6. Analysis of Multi-storeyed building
7. Design of Multi-storeyed building
8. Wind load analysis on RCC building
9. Analysis and design of Steel truss
10. Analysis and design of Isolated footing



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Software:

1. STAAD PRO / Equivalent
2. STRAAP
3. STUDDS



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Subject	BUILDING INFORMATION MODELLING (BIM) IN DESIGN CONSTRUCTION AND OPERATIONS LABORATORY				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	0	0	4	2

Course Objectives:

The objective of this course is to enable the students to:

1. Understand the Building Information Modelling Software.
2. Understand the Various tools and commands used in REVIT.
3. Learn various drawing components like doors, windows, Curtain walls etc.

Course Outcomes:

Upon the successful completion of this course:

1. The student should be able to get awareness on BIM Software.
2. The student can able to learn various drawing and editing tools.
3. The student should be capable of Modelling Interiors of any Buildings.
4. The student should be capable to design elevation of the structure.
5. The student should be in a position to create building components using REVIT.

Exercises:

1. Introduction to BIM & AUTODESK REVIT
2. Basic drawing and editing tools
3. Setting up Levels and Grids
4. Modelling Walls
5. Working with Doors and Windows
6. Working with Curtain Walls
7. Working with Views
8. Adding Components
9. Modelling Floors
10. Modelling Ceilings & Roofs, Modelling Stairs and Railing



Subject	EMPLOYABILITY SKILLS FOR CIVIL ENGINEERS				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	3	0	0	0

Course Objectives:

Enable the students to

1. Understand divisibility, concepts of LCM &HCF; understand divisibility concepts of CM& HCF, profit or loss incurred in a transaction.
2. Understand concepts of SI & CI and difference between them and understand the logic in series, concepts of clocks, identifying day of date.
3. Know the relation between time, speed &distance and combined work & wages paid forthe work and be familiar with family relations, the techniques of coding.

Course Outcomes:

After completing this course, the students will be able to adopt speed computation techniques and develop logical thinking which are essential for campus recruitment such as

1. Find least and greatest number divisible by given numbers and leaving some remainder(s). Identify the profit or loss incurred in a transaction and how cheating is possible by an unfair trader.
2. Able to calculate the simple and compound interest and the EMI repayment for a loan.
3. Evaluate the time taken by a train/car for crossing a static or a moving object and time taken by a person to a row a boat in a river, calculate the time required for individual or combined work, shares of amount for their work and time taken for a tank/cistern to get filled by inlets and outlet.
4. Identify the relation between given persons, Decode the given code patter and code given word in terms of alphabet, numbers, symbols and mixed.
5. Identify missing term in the pattern/series, find angle between hands at given time and vice-versa, find day of given date and vice-versa.



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UNIT – I

Number Systems -Profit& Loss: Basic number systems, Divisibility Rules LCM and HCF Cost Price- Selling Price- Marked Price, Discount- Successive Discounts, Profit or Loss Percentage, False Weights- Dishonest Dealer.

UNIT – II

Simple & Compound Interest: Principal-Interest Rate-Tenure, Simple Interest-Formula-Sum, Compound Interest-Formula-Relation between Simple & Compound Interest, loan-EMI, Investments-Shares.

UNIT – III

Time & Distance- Time & Work: Time-Distance-Speed-Relation, Conversion of Speed, Average Speed. Trains-Relative Speed-Same and Opposite -Platform, Races, Boats-Streams-Upstream and Downstream. Work- Time- Efficiency Combined Work – Partnership - Division of Wages, Chain Rule, Pipes and Cisterns - Inlet - Outlet.

UNIT – IV

Blood Relations, Coding & Decoding: Blood relations -family tree, first person narrating type coded relation-puzzle relation. Coding and decoding-letter coding, number coding, symbol coding, substitution and mixed type.

UNIT – V

Series, Clocks & Calendars: Series number, letter and word type, missing term, odd-man out Angle between hands - correct or incorrect time, day of a date repeated calendars.

Text Books:

1. Dr. RS Aggarwal. Quantitative Aptitude for competitive Examinations Sultan Chand Publications 2017.
2. Dr. R.S Aggarwal Modern Approach to Verbal & Non-Verbal Reasoning Sultan Chand Publications, 2018.

References:

1. Arum Sharma, How to Prepare for Quantitative Aptitude for the CAT, Tata McGraw Hill Publishing Company, 2016.



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2. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, Pearson India 2016.
3. BS Siwali and Indu Sijwali, A New Approach to Reasoning Verbal & Non-Verbal Arihant Publishers, 2016.
4. M.K. Pandey. Analytical Reasoning Bsc Publishing Co. Pvt. Ltd 2009



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Syllabus for

IV B.Tech. - I Semester

(R20)



Subject	PEC-III: (a) PRE-STRESSED CONCRETE				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

The objective of this course is:

1. Familiarize Students with concepts of prestressing
2. Equip student with different prestressing systems and devices
3. Understand losses of prestress including short- and long-term losses and to familiarize students with analysis and design of prestressed concrete members under flexure, shear and torsion

Course Outcomes:

After undergoing this course, students will be able to

1. At the end of this course the student will be able to 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. Analyze and design prestressed concrete beams under shear.
5. Understand the relevant IS Code provisions for prestressed concrete

SYLLABUS

UNIT – I

Introduction & Methods and Systems of pre-stressing: 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.



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UNIT – II

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: Types of failure – Code procedures - Design for flexure using IS Code (IS 1343 -2012) Cable profile in two span continuous members. Introduction to Transmission length and End block (no Design and Analytical problems).

UNIT – IV

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: 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.

Text Books:

1. N.Krishna Raju, —Prestressed Concrete, 6e Tata Mc Graw Hill Book co.
2. K.U.Muthu, —Prestressed Concrete, by PHI Learning Pvt. Ltd.
3. T.Y. Lin and Burn, —Design of prestress concrete structures, John Wiley, New York.

References:

1. N. Rajagopalan, —Prestressed Concrete, Narosa Publishing House.
2. S. Ramamrutham, —Prestressed concrete, Dhanpat Rai & Sons, Delhi.
3. Indian Standard 1343:2012 – Pre-stressed Concrete — Code of Practice.
4. Charles W. Dolan and H. R. (Trey) Hamilton, —Prestressed Concrete: Building, Design, and Construction, Springer; 1st ed. 2019 edition (14 November 2018).



Subject	PEC-III: (b) ADVANCED STRUCTURAL ENGINEERING				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

The objective of this course is:

1. Familiarize Students with Raft Foundations and Retaining walls.
2. Equip student with concepts of design of different types of RCC water tanks.
3. Understand Concepts of flat slabs and familiarize different types of Bunkers, Silos and Chimneys.

Course Outcomes:

At the end of this course the student will be able to

1. Design types of RCC retaining walls.
2. Carryout analysis and design of different types of RCC water tanks.
3. Design of flat slabs.
4. Solve the problems design of RCC Bunkers, Silos.
5. Solve the problems design of Chimneys.

SYLLABUS

UNIT – I

Design of Retaining walls: Types, failure modes, static pressure, acquisition of soil parameters, Backfilled walls Stability check, Compaction pressure, Lateral pressure due to external loads.

UNIT – II

Design of Over-Head Tanks: Design of over-head tanks: Design of RC domes and beams curved in plan, design of Cylindrical and rectangular tanks with different end conditions using IS: 3370 tables. Intze tank design based on membrane analysis with mention of continuity effects. Design of staging: Braces, Columns and Raft Foundation. Design of Rectangular and circular tanks – Approximate Methods and IS Methods – Design of underground tanks – Design of base slab and side wall – Check for uplift.



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UNIT – III

Design of Flat Slabs: Flat slabs and yield line based design, Design of flat slabs and flat plates according to IS method - Check for Punching shear.

UNIT – IV

Design of Bunkers and Silos: Introduction, Differences between bunker and silo, Design of square or rectangular bunkers, Design of circular bunkers, Design of silos, Silos for storage of cement.

UNIT – V

Design of Chimney: Introduction, Wind pressure, Stress in chimney shaft due to self weight and wind, Stress in horizontal reinforcement due to wind shear, Stresses due to temperature difference, Design of RC chimney.

Text Books:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, —Reinforced Concrete Structures, Vol-2, Laxmi, publications Pvt. Ltd., New Delhi.
2. N. Krishna Raju, —Design Drawing of Concrete and Steel Structures, University Press 2005.
3. Ramakrishna. V. Arthur P.D., —Ultimate Strength Design for Structural Concrete, Pitman, London.

References:

1. S. U, Pillai and D. Menon, —Reinforced concrete design, Tata Mc.Grawhill Publishing Company.
2. N. Subrahmanian, —Reinforced Concrete Structures, Oxford Publishers.
3. Wai-Fah Chen, —Plasticity, Limit Analysis, Stability and Structural Design: An Academic Life Journey from Theory to Practice, World Scientific Publishing (February 15, 2021).

Internal Examination Pattern:

The total internal marks (30) are distributed in two components as follows:

Descriptive (subjective type) examination : 25 Marks

Assignment : 05 Marks



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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%.



Subject	PEC-III: (c) URBAN TRANSPORTATION AND PLANNING				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

The objective of this course is:

1. To learn various procedures for travel demand estimation.
2. To various data collection techniques for OD data and to develop alternative urban transport network plans.
3. To know various models and techniques for trip generation, trip distribution, mode choice and traffic assignment.

Course Outcomes:

At the end of course, Student can

1. Design, conduct and administer surveys to provide the data required for transportation planning.
2. Supervise the process of data collection about travel behavior and analyze the data for use in transport planning.
3. Develop and calibrate modal split, trip generation rates for specific types of land use developments.
4. Develop and calibrate trip distribution for specific types of land use developments.
5. Adopt the steps that are necessary to complete a long-term transportation plan.

SYLLABUS

UNIT – I

Urban transport planning: Urbanization, urban class groups, transportation problems and identification, impacts of transportation, urban transport system planning process, modeling techniques in planning. Urban mass transportation systems: urban transit problems, travel demand, types of transit systems, public, private, para-transit transport, mass and rapid transit systems, BRTS and Metro rails, capacity, merits and comparison of systems, coordination, types of coordination.



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UNIT – II

Data Collection and Inventories: Collection of data – Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

UNIT – III

Trip Generation & Distribution: UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution by Growth Factor Methods. Problems on above.

UNIT - IV

Trip Distribution: Gravity Models, Opportunity Models, Time Function Iteration Models. Travel demand modeling: gravity model, opportunity models, Desire line diagram. Modal split analysis. Problems on above.

UNIT - V

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment. Introduction to land use planning models, land use and transportation interaction.

Text Books:

1. Hutchinson, B.G., —Introduction to Urban System Planning, McGraw Hill.
2. Khisty C.J., —Transportation Engineering - An Introduction, Prentice Hall.
3. Papacostas, —Fundamentals of Transportation Planning, Tata McGraw Hill.

References:

1. Mayer M and Miller E, —Urban Transportation Planning: A decision-oriented Approach, McGraw Hill.
2. Bruton M.J., —Introduction to Transportation Planning, Hutchinson of London.
3. Dicky, J.W., —Metropolitan Transportation Planning, Tata McGraw Hill.
4. Kadiyali.L.R., —Traffic Engineering and Transportation Planning, Khanna Publishers, New Delhi.



Subject	PEC-III: (d) BRIDGE ENGINEERING				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

The objective of this course is:

1. Familiarize Students with different types of Bridges and IRC standards.
2. Equip student with concepts and design of Slab Bridges, T Beam Bridges, Box Culverts.
3. Understand concepts of design of Plate Girder Bridges and familiarize with different methods of inspection of bridges and maintenance.

Course Outcomes:

At the end of this course the student will be able to

1. Explain different types of Bridges with diagrams and Loading standards
2. Carryout analysis and design of Slab bridges and suggest structural detailing.
3. Carryout analysis and design of T Beam bridges.
4. Carryout analysis and design of Plate girder bridges
5. Carryout analysis and design of Box culvers and suggest structural detailing.

SYLLABUS:

UNIT – I

Introduction: Bridges- Types- 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

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- Jaeger Methods- Courbon's theory- Pigeaud's method.



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UNIT – III

T-Beam Bridges: Analysis and design of various elements of bridge –Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing.

UNIT – IV

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

Box Culverts: Loading – Analysis and Design- Reinforcement detailing.

Sub Structure: Abutments-Stability analysis of abutments-piers-loads on piers, Analysis of piers-Wing Walls-Design problems.

Text Books:

1. Jhonson Victor D, —Essentials of Bridge Engineeringl.
2. T. R. Jagadeesh, M.A. Jayaram, —Design of Bridge Structuresl, PHI
3. N. Krishna Raju, —Design of Bridgesl, Tata McGraw Hill.

References:

1. Aswini, Vazirani, Ratwani, —Design of concrete bridgesl.
2. B. C. Punmai, Jain & Jain, —Design of steel structuresl, Lakshmi Publications.
3. B. C. Punmai, Jain & Jain, —Design of R C structuresl, Lakshmi Publications.
4. Dr. Wai-Fah Chen & Dr. Lian Duan, —Bridge Engineering Handbook: Fundamentals 2nd Editionl, CRC Press; 2nd edition (24 January 2014).
5. Indian Road Congress: 6-2014 Standard specifications and code of practice for road bridges.
6. Indian Road Congress: 7-2017 Recommended practice for numbering culverts, bridges and tunnels.
7. Indian Road Congress: 5-2015 Standard specifications and code of practice for road bridges.

Subject	PEC-IV: (a) GROUND IMPROVEMENT TECHNIQUES				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

The objective of this course is:

1. To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
2. To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
3. To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils and to make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:

1. Understand the principles of various ground improvement techniques.
2. Prefer suitable ground improvement techniques based on the Soil conditions and local available Materials.
3. Understand the principles and suitability of various stabilization techniques.
4. Select suitable stabilization techniques based on the Soil conditions and local available materials.
5. Understand the Principles of dewatering techniques and to apply suitable dewatering technique in the field depending on the requirement.

SYLLABUS:

UNIT – I

Introduction: Need for Engineering Ground – Classifications of Ground Modification Techniques – Suitability, Feasibility and Desirability. Densification of cohesionless soils – Deep Compaction – Vibrofloation – Vibro Composer method - Blasting – Densification at Ground. - Vibrocompaction - Heavy Tamping



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UNIT - II

Improvement of Cohesive soils: Preloading - Soil Replacement – Radial Consolidation – Vertical and Radial Consolidation - Vertical Drains – Sand Drains – Effect of Smear – Sandwicks – Band drains – Dynamic Compaction.

UNIT- III

Stabilisation: Mechanical Stabilisation, Lime Stabilisation, Cement Stabilisation, Bitumen Stabilisation, Thermal Stabilisation, Chemical Stabilisation and Stabilisation with Different Admixtures.

UNIT - IV

Dewatering: Dewatering methods – open sumps and ditches – gravity flow wells – Vacuum dewatering – Electro – kinetic dewatering – Electrosmosis Grouting: Overview of grouting - Suspension grouts – Solution grouts – Emulsion grouts- Categories of grouting – Grouting Techniques – ascending stage, descending stage and stage grouting – Grouting Plant - Grout control - Grouting applications – Dams, Tunnels, Shafts and drifts, excavations.

UNIT - V

Stone Columns: Methods of installation of Stone Columns – Load shared by stone columns and the stabilized ground – uses of stone columns Lime columns and granular trenches – Installation – In situ ground reinforcement – ground anchors – types – Components and applications – uplift capability- Stability of foundation trenches and surrounding structures through soil Nailing, tie backs.

Text Books:

1. Purushotham Raj, —Ground Improvement Techniques, Laxmi Publications, New Delhi.
2. Nihar Ranjan Patro, —Ground Improvement Techniques, Vikas Publishing House (p) limited, New Delhi.
3. RM Koerner, —Designing with Geosynthetics, Prentice Hall.

References:

1. MP Moseley, —Ground Improvement, Blackie Academic and Professional, USA.
2. G.L.Siva Kumar Babu, —An introduction to Soil Reinforcement and Geosynthetics, Universities Press.



Subject	PEC-IV: (b) GEO- SPATIAL TECHNOLOGIES				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. Understand the various spatial and non-spatial data types, and data base management techniques
2. Develop the concepts and professional skills in utility of geospatial techniques
3. Improve the working knowledge of geospatial techniques in field problems

Course Outcomes:

1. Understand the geospatial technology relating to the data acquiring and processing that is associated with geographic locations.
2. Apply Geospatial techniques in the decision support systems useful for decision makers and community services.
3. Ability to solve the problems related to the natural resource management, environment, urban planning and Infrastructure development, etc.
4. Able to generate the thematic maps using Geospatial techniques.
5. Apply the concept of Geospatial Techniques to the Civil Engineering problems

SYLLABUS:

UNIT – I

Introduction: Basic concepts, socioeconomic challenges, fundamentals of geographical information systems (GIS), history of geographical information system, components of geographical information systems.

Projections and Coordinate Systems: Map definitions, representations of point, line, polygon, common coordinate system, geographic coordinate system, map projections, transformations, map analysis.

UNIT – II

Data Acquisition: Data Types, Spatial, Non-Spatial (Attribute) Data, Data Format – Vector and Raster Data, Manual Digitizing, Scanner, Aerial Photographic Data, Remotely Sensed Data, Digital Data, Cartographic Database, Digital Elevation Data.



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Data Management: Data Storage and Maintenance, Data Compression, Data Quality and Standards, Precision, Accuracy, Error – Geometric errors and corrections, Radiometric errors and corrections, types of Systematic and Non-systematic errors.

UNIT – III

Data Modelling: Spatial Data Analysis, Data Retrieval Query, Simple Analysis, Recode Overlay, Vector Data Model, Raster Data Model, Digital Elevation Model, Cost and Path Analysis, Knowledge Based System.

GIS Analysis and Functions: Organizing data for analysis, analysis function, maintenance and analysis of spatial data, buffer analysis, overlay analysis, transformations, conflation, edge matching and editing, maintenance and analysis of spatial and non-spatial data.

UNIT – IV

Applications of GIS: Environmental and Natural Resource Management, Soil and Water Resources, Agriculture, Land Use Planning, Geology and Municipal Applications, Urban Planning and Project Management, GIS for decision making under Uncertainty, standard GIS packages, Introduction to Global Positioning Systems (GPS) and its applications.

UNIT – V

Introduction to Remote Sensing: General background of Remote Sensing Technology, Objectives and Limitations of Remote Sensing, Electro-Magnetic Radiation, Characteristics, Interaction with Atmosphere and Earth Surface, Remote Sensing Platforms and Sensors, Satellite Characteristics, Digital Image Processing, IRS Series and High Resolution Satellites, Remote Sensing Applications to Watershed Modelling, Environmental Modelling, Urban Planning and Management.

Text Books:

1. Demers, M.N, (2013), —Fundamentals of Geographic Information Systems| Wiley India Pvt.Ltd,
2. Burrough, P. A., and McDonnell R. A. (1998), —Principles of Geographical Information Systems|, Oxford University Press, New York.
3. Kang-tsung Chang. (2006), —Introduction to Geographical Information Systems| Tata McGraw- Hill Publishing Company Ltd., Third Edition, New Delhi.
4. George Joseph, (2013), —Fundamentals of Remote Sensing| Universities Press.



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References:

1. Sabins F.F. Jr. (1978), —Remote Sensing Principles and Interpretations, W.H. Freeman and Company, San Francisco.
2. Tor Bernhardsen. (2002), —Geographical Information System, Wiley India (P) Ltd., Third Edition, New Delhi.
3. Hoffman-Wellenhof, B, et al. (1997), —GPS Theory and Practice, Fourth Edition, Springer Wein, New York.
4. Lilysand T.M., and Kiefer R.W. (2002), Remote Sensing and Image Interpretation, John Wiley and Sons, Fourth Edition, New York.
5. Choudhury S., Chakrabarti, D., and Choudhury S. (2009), —An Introduction to Geographic InformatGeorge Joseph, (2013), —Fundamentals of Remote Sensing, Universities Press.



Subject	PEC-IV: (c) REINFORCED SOIL STRUCTURES				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

This course will enable students to:

1. Create an understanding of the latest technique such as reinforcing the soil.
2. Analyze the concept of RE so as to ascertain stability of RE structures.
3. Understand the different reinforcing materials that can be used efficiently in soils and to understand design concepts of different RE structures including introductory concepts of Foundations resting of RE soil bed.

Course Outcomes:

After studying this course, students will be able to:

1. Identify, formulate reinforced earth techniques that are suitable for different soil sand in different structures.
2. Understand the laboratory testing concepts of Geosynthetics
3. Design RE retaining structures and Soil Nailing concepts.
4. Determine the load carrying capacity of Foundations resting on RE soil bed.
5. Asses the use of Geosynthetics in drainage requirements and landfill designs

SYLLABUS:

UNIT – I

Basics of Reinforced Earth Construction: Definition, Historical Background, Components, Mechanism and Concept, Advantages and Disadvantage of reinforced earth Construction, Sandwich technique for clayey soil.

Geosynthetics and Their Functions: Historical developments, Recent developments, manufacturing processwoven & non-woven, Raw materials – Classification based on materials type – Metallic and Non-metallic, Natural and Man-made, Geosynthetics.

Properties and Tests on Materials Properties: Physical, Chemical, Mechanical, Hydraulic, Endurance and Degradation requirements, Testing & Evaluation of properties.



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UNIT – II

Design of Reinforced Earth Retaining Walls: Concept of Reinforced earth retaining wall, Internal and external stability, Selection of materials, Typical design problems.

Soil Nailing Techniques: Concept, Advantages & limitations of soil nailing techniques, comparison of soil nailing with reinforced soil, methods of soil nailing, Construction sequence, Components of system, Design aspects and precautions to be taken

UNIT – III

Design of Reinforced Earth Foundations: Modes of failure of foundation, Determination of force induced in reinforcement ties – Location of failure surface, tension failure and pull out resistance, length of tie and its curtailment, Bearing capacity improvement in soft soils, General guidelines.

UNIT – IV

Geosynthetics for Roads and Slopes: Roads - Applications to Temporary and Permanent roads, Role of Geosynthetic in enhancing properties of road, control of mud pumping, Enhancing properties of subgrade, Design requirements Slopes – Causes for slope failure, Improvement of slope stability with Geosynthetic, Drainage requirements, Construction technique. Simple Numerical Stability Checking Problems on Reinforced Slopes

UNIT – V

Geosynthetics - Filter, Drain And Landfills: Filter & Drain – Conventional granular filter design criteria, Geosynthetic filter design requirements, Drain and filter properties, Design criteria – soil retention, Geosynthetic permeability, anticlogging, survivability and durability (No Numerical Problems) Landfills – Typical design of Landfills – Landfill liner & cover, EPA Guidelines, Barrier walls for existing landfills and abandoned dumps (No Numerical Problems)

Text Books:

1. Koerner. R.M, —Design with Geosynthetics, Prince Hall Publications
2. Koerner. R.M. & Wesh, J.P, —Construction and Geotechnical Engineering using synthetic fabrics, Wiley Inter Science, New York.
3. Sivakumar Babu G. L., —An introduction to Soil Reinforcement and Geosynthetics, Universities Press, Hyderabad.
4. Swami Saran, —Reinforced Soil and its Engineering Applications, I. K. International Pvt. Ltd, New Delhi.



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5. Venkattappa Rao, G., & Suryanarayana Raju., G. V.S, —Engineering with Geosynthetics, Tata McGraw Hill publishing Company Limited., New Delhi.

Reference Books:

1. Jones, —Earth reinforcement and Soil structure, CJEP Butterworths, London
2. Ingold, T.S. & Millar, K.S, —Geotextile Hand Book, Thomas, Telford, London.
3. Hidetoshi Octial, Shigenori Hayshi & Jen Otani, —Earth Reinforcement Practices, Vol. I,
4. A.A. Balkema, Rotterdam
5. Bell F.G, —Ground Engineer's reference Book, Butterworths, London
6. Ingold, T.S, —Reinforced Earth, Thomas, Telford, London.
7. Sarsby R W- Editor, —Geosynthetics in Civil Engineering, Wood head Publishing Ltd & CRC Press, 2007

Subject	PEC-IV: (d) INDUSTRIAL WASTEWATER TREATMENT				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To study Characteristics and primary treatment methods for industrial wastewater
2. To learn physic-chemical and biological treatment techniques
3. To understand food and material industries waste treatment

Course Outcomes:

Upon successful completion of the course, the students will be able to

1. Identify the characteristics of Industries wastewater
2. Describe the required primary treatment methods for industrial wastewater
3. Illustrate the required advanced treatment methods for industrial wastewater
4. Suggest food industries wastewater treatment techniques
5. Propose material industries wastewater treatment techniques.

SYLLABUS:

UNIT – I

Industrial Wastewater Characteristics: Introduction; Characteristics - Physical, Chemical and Biological; Differences between industrial and municipal wastewater; Difficulty to generalize industrial waste characteristics; Direct, Separate, combined treatment; Effects of industrial effluents on sewers and treatment plants.

UNIT – II

Primary Treatment: Equalization-objectives, parameters that could be treated by equalization; Proportioning; Dilution with other effluents; Neutralization; Mixing wastes – Oil Separation by Floatation, quiescent floatation and mechanically aerated floatation, types of solids that can be removed by floatation; Waste reduction – volume reduction, strength reduction, recirculation of industrial waste.



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UNIT – III

Advanced Treatment: Nitrification and De-nitrification by biological method; Rotating biological contactor; Phosphorous removal by chemical precipitation; Heavy metal removal by chemical precipitation; Precipitation reactions; Air Stripping; Adsorption; Ion exchange.

UNIT – IV

Food Industries: Manufacturing Processes, sources of waste, characteristics and Composition of waste, and waste treatment method (Chemical or Biological or Chemical and Biological)- Dairy, Sugar, Fermentation, Brewery, Distillery, and Meat.

UNIT – V

Material Industries: Manufacturing Processes, sources of waste, characteristics and Composition of waste, and waste treatment method (Chemical or Biological or Chemical and Biological) – Paper and pulp, Tannery, Textile, Steel, Cement, Mining.

Text Books:

1. M. N. Rao and A.K. Datta, —Waste water Treatment, Oxford & IBH Publishing Co, Private Ltd. 3rd Edition, 2017.
2. S.K. Garg, —Sewage Disposal and Air Pollution Engineering, Environmental Engineering Vol. II, Khanna Publishers.

Reference Books:

1. Eckenfelder W. Jr., —Industrial Water Pollution Control, 3rd ed., New York, Mc Graw Hill, 1999.
2. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, —Environmental Engineering, McGraw Hill Inc., New York, 2017.



Subject	PEC-V: (a) DESIGN AND DRAWING OF IRRIGATION STRUCTURES				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	1	0	3

Course Objectives:

1. To understand design principle of Surplus weir and Tank sluice with a tower head.
2. To understand design principle of Canal drop-Notch type and Canal regulator.
3. To understand design principle of Under tunnel and Syphon aqueduct type III.

Course Outcomes:

At the end of the course the student will be able to

1. Design principle of Surplus weir.
2. Design principle of Tank sluice with a tower head.
3. Design principle of Canal drop-Notch type and Canal regulator.
4. Design principle of Under tunnel.
5. Design principle of Syphon aqueduct type III

SYLLABUS:

Design and drawing of

1. Surplus weir
2. Tank sluice with a tower head
3. Canal drop-Notch type
4. Canal regulator
5. Under tunnel
6. Syphon aqueduct type III

Final Examination pattern: Any two question of the above six designs may be asked out of which the candidate has to answer one question. The duration of the examination is three hours.

Text Books:

1. C. Satyanarayana Murthy, —Water Resources Engineering – Principles and Practicel, New age International Publishers.



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Reference:

1. S. K. Garg, —Irrigation Engineering and Hydraulic Structures|, Standard Book House.
2. B. C Punmia & Lal, —Irrigation and Water Power Engineering|, Lakshmi Publications Pvt. Ltd., New Delhi.



Subject	PEC-V: (b) SOLID WASTE MANAGEMENT				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R – 20	3	0	0	3

Course Objectives:

1. To understand sources and characteristics and acquire an understanding reduction, storage, recycling of solid waste.
2. To familiarize the different waste collection systems, transfer and transport, and study the importance of processing techniques.
3. To describe different disposal methods.

Course Outcomes:

At the end of the course the students will be able to

1. Identify sources and characteristics of solid waste.
2. Understand reduction, storage and recycling of solid waste
3. Analyze the collection route and transfer and transport
4. Select suitable waste processing techniques
5. Design a suitable sanitary landfill for disposal of solid waste

SYLLABUS:

UNIT - I

Sources and Characteristics: Introduction; Sources and types of municipal solid waste; Public health and environmental impacts of improper disposal of solid waste; Properties of solid waste – Physical and chemical composition, changes in composition; Factors affecting waste generation rate; Elements of integrated solid waste management; Requirements and salient features of solid waste management rules (2016).

UNIT - II

Source Reduction, Waste Storage And Recycling: Waste Management Hierarchy – Reduction – source reduction, Reuse and Recycling; Storage - On-site storage methods, effect of storage, materials used for containers; Segregation of solid wastes – manual, mechanical; Public health and economic aspects of open storage; Case studies under Indian conditions; Recycling



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UNIT - III

Collection, Transfer and Transport: Collection- services, types of collection systems, factors considered for laying routes; Transfer and transport – economic comparison of transport alternatives, transfer station- selection, location, transfer means and methods; Pneumatic transport.

UNIT - IV

Processing of Wastes: Objectives of waste processing; Processing techniques – Factors considered for onsite processing equipment, Mechanical volume reduction, thermal volume reduction, manual components separation; Resource recovery from solid waste- composting - aerobic and anaerobic, Thermal processing – Combustion, Incineration, Pyrolysis; Energy Recovery Systems – Options with steam turbine generator and gas turbine generator.

UNIT - V

Waste Disposal: Land disposal of solid waste - Sanitary landfills – factors considered for site selection, Land filling methods and operations – Area method, trench method; Design and operation of landfills - important factors that must be considered; Capacity of disposal site

Text Books:

1. Metcalf and Eddy, —Wastewater engineering - Treatment & Reusel, TATA Mc Graw Hill.
2. S.K. Garg, —Sewage Disposal and Air Pollution Engineering, Environmental Engineering Vol. II, Khanna Publishers.
3. B.C. Punmia, —Waste water Engineering, Environmental Engineering.

Reference Books:

1. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, —Environmental Engineering, McGraw Hill Inc., New York, 2017.
2. Frank Kreith and George Tchobanoglous, —Handbook of Solid Waste Management, McGraw-Hill, 1994.



Subject	PEC-V: (c) URBAN HYDROLOGY				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. Appreciate the impact of urbanization on catchment hydrology
2. Understand the importance of short duration rainfall runoff data for urban hydrology studies.
3. Learn the techniques for peak flow estimation for storm water drainage system design.

Course Outcomes:

At the end of the course the student will be able to

1. Develop intensity duration frequency curves for urban drainage systems.
2. To analyse the precipitation analysis.
3. Develop design storms to size the various components of drainage systems.
4. Apply best management practices to manage urban flooding.
5. Prepare master drainage plan for an urbanized area.

SYLLABUS:

UNIT - I

Introduction: Urbanisation and its effect on water cycle – urban hydrologic cycle – trends in urbanisation – Effect of urbanisation on hydrology.

UNIT - II

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration - Frequency (IDF) curves, design storms for urban drainage systems.

UNIT - III

Approaches to urban drainage: Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse, major and minor systems.



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UNIT - IV

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping and source control.

Analysis and Management: Storm water drainage structures, design of storm water network-Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for storm water management.

UNIT - V

Master drainage plans: Issues to be concentrated upon – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning and use of models in planning.

Text Books:

1. Geiger W. F., J Marsalek, —Manual on Drainage in Urbanised area, W. J. Rawls and F. C. Zuidema, (1987 – 2 volumes), UNESCO,
2. Hall M J (1984), —Urban Hydrology, Elsevier Applied Science Publisher.
3. Wanielista M P and Eaglin (1997), —Hydrology – Quantity and Quality Analysis, Wiley and Sons.
4. Akan A.O and R.L. Houghtalen (2006), —Urban Hydrology, Hydraulics and Storm water Quality: Engineering Applications and Computer Modelling, Wiley International.

References:

1. Stahre P and Urbonas B (1990), —Stormwater Detention for Drainage, Water Quality and CSO Management, Prentice Hall.
2. Marsalek et al (2006), —Urban water cycle processes and interactions, Publication No. 78, UNESCO, Paris
3. Maksimovic C and J A Tejada-Guibert (2001), —Frontiers in Urban Water Management – Deadlock or Hopel, IWA Publishing.

Subject	PEC-V: (d) EARTH RETAINING STRUCTURES				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To understand lateral earth pressure theories and pressure theories and design of retaining walls.
2. To design anchored bulkheads by different methods.
3. To understand pressure envelopes and design of various components in braced cuts and cofferdams.

Course Outcomes:

1. Quantify the lateral earth pressures associated with different earth systems.
2. Evaluate the mechanical properties of geosynthetics used for soil reinforcement.
3. Identify the merits and demerits of different earth retaining systems.
4. Select the most technically appropriate type of retaining wall for the application from a thorough knowledge of available systems.
5. Design of retaining structures using appropriate design methods, factors of safety, earth pressure diagrams and field verification methods.

SYLLABUS:

UNIT - I

Lateral Pressure: Basic concepts, Rankine and Coulomb earth pressure theories, graphical methods. Determining active and passive pressures: Culmann's, Rebhan's, logarithmic spiral methods, friction circle method. Consideration of surcharge, seepage, earth quake, wave effect, stratification, type of backfill, wall friction and adhesion. Retaining walls: Uses, types, stability and design principles of retaining walls, backfill drainage, settlement and tilting.

UNIT - II

Anchored bulkheads: Classification of anchored bulkheads, free and fixed earth support methods. Rowe's theory for free earth supports and equivalent beam methods for fixed earth supports. Design of anchored rods and dead man.



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UNIT - III

Braced cuts and Cofferdams: Braced excavations and stability of vertical cuts, lateral pressures in sand and clay, Braced and cellular cofferdams: uses, types, components, stability, piping and heaving. Stability of cellular cofferdams, cellular cofferdams in rock and in deep soils.

UNIT - IV

Earth dams- Stability analysis: Classification, seepage control in embankments and foundations, seepage analysis, stability analysis: upstream and down stream for steady seepage, rapid draw down, end of construction, method of slices and Bishop's method.

UNIT - V

Earth dams -Protection & Construction: Slope protection, filters, embankment construction materials and construction, quality control, grouting techniques. Instrumentation and performance observations in earth dams.

Text Books:

1. Gopal Ranjan & ASR Rao, —Basic & Applied soil mechanics, New Age International Publishers, 2011.
2. Sharma Hd , —Embankment Dams, Publisher: India Book House(IBH) Limited,1991
3. B. Singh & R. S. Varshney, —Engineering for Embankment Dams, A ABalkema Publishers, 1995
4. W. C. Teng, —Foundation design, Prentice Hall, 1962.

References:

1. Bowles. J. W McGraw Hill, —Analysis and design of foundations, 4th edition, 1955.
2. Bowles. J. W McGraw Hill, —Earth and Rock-Fill Dams: General Design and Construction Considerations, University Press of the Pacific,2004
3. Karl Terzaghi, Ralph B. Peck, —Soil mechanics in engineering and practice, Gholamreza Mesri, 3rd Edition. Wiley India Pvt Ltd, 2010.



Subject	OEC/JOE-III: (a) REPAIR & REHABILITATION OF STRUCTURES				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objective:

1. Study the assessment, maintenance and repair techniques of concrete structures.
2. Different case studies are analyzed to define the best strategy to maintain and repair the structure.
3. Identify scope of rehabilitation work for dilapidated / obsolete buildings.

Course Outcomes:

Upon completion of the course, the student will be able to

1. Recognize the mechanisms of degradation of concrete structures and to design durable concrete structures.
2. Conduct field monitoring and non-destructive evaluation of concrete structures.
3. Design and suggest repair strategies for deteriorated concrete structures including repairing with composites.
4. Understand the methods of strengthening methods for concrete structures
5. Assessment of the serviceability and residual life span of concrete structures by Visual inspection and in situ tests

SYLLABUS:

UNIT - I

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.

UNIT - II



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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

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

Techniques for Repair: Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Guniting and shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning. Repairs to Masonry Structures & Temples: Damages to masonry structures – Repairing techniques, Damages to temples – Repairing techniques. Foundation Problems: Settlement of soils – Repairs, Sinking of piles – Repairs.

UNIT - V

Corrosion of Reinforcement: Preventive measures – Coatings – Use of SBR modified cementitious mortar, Epoxy resin mortar, Acrylic modified cementitious mortar, Flowing concrete.

Text Books:

1. Neville & Brooks, —Concrete technology.
2. Rafat Siddique , —Special Structural concrete.

References:

1. Peter H Emmons, —Concrete repair and maintenance illustrated.
2. M S Shetty, —Concrete Technology.



Subject	OEC/JOE-III: (b) DISASTER MANAGEMENT & MITIGATION				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To impart knowledge of causes of various disaster and its impact
2. To understand the concept of Disaster Management Cycle and Framework
3. To explain the Applications of Science and Technology for Disaster Management & Mitigation.

Course Outcomes:

After learning the course the students should be able to:

1. Understand disasters, disaster preparedness and apply the mitigation measures.
2. Understand role of IT, remote sensing, GIS and GPS in risk reduction.
3. Apply knowledge of disaster management acts and guidelines.
4. Get to know natural as well as manmade disaster and their extent and possible effects on the economy.
5. Plan of national importance structures based upon the previous history.

SYLLABUS:

UNIT – I

Introduction: Understanding the Concepts and definitions of Disaster and its types, Hazard, Vulnerability, Risk, Capacity, Disaster and Development, and disaster management.

UNIT - II

Consequences and Control of Disasters: Geological, Hydro-Meteorological, Biological, Technological and Man- made Disasters, Global Disaster Trends, Emerging Risks of Disasters, Climate Change and Urban Disasters.

UNIT - III

Disaster Management Cycle and Framework: Disaster Management Cycle, Paradigm Shift in Disaster Management Pre-Disaster Risk Assessment and Analysis, Risk Mapping, zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness,



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Capacity Development, Awareness During Disaster Evacuation, Disaster Communication, Search and Rescue, Emergency Operation Centre, Incident Command System, Relief and Rehabilitation, Damage and Needs Assessment, Restoration of Critical Infrastructure, Early Recovery, Reconstruction and Redevelopment, IDNDR, Yokohama Strategy, Hyogo Framework of Action.

UNIT - IV

Disaster Management in India: Disaster Profile of India, Mega Disasters of India and Lessons Learnt, Disaster Management Act 2005, Institutional and Financial Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management, Role of Government, Non-Government and Inter-Governmental Agencies.

UNIT – V

Applications of Science and Technology for Disaster Management & Mitigation: Geo-informatics in Disaster Management, Disaster Communication System, Land Use Planning and Development Regulations, Structural and Non Structural Mitigation of Disasters, S&T Institutions for Disaster Management in India.

Text Books:

1. Disaster Management Guidelines, GOI-UND Disaster Risk Program (2009-2012)
2. Damon, P. Copola, (2006), —Introduction to International Disaster Management, Butterworth Heineman.
3. Gupta A.K., Niar S.S and Chatterjee S. (2013), —Disaster management and Risk Reduction, Role of Environmental Knowledge, Narosa Publishing House, Delhi.

Reference:

1. Murthy D.B.N. (2012), —Disaster Management, Deep and Deep Publication PVT. Ltd. New Delhi.
2. Modh S. (2010), —Managing Natural Disasters, Mac Millan publishers India LTD.



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Subject	OEC/JOE-IV: (a) SMART CITY PLANNING AND DEVELOPMENT				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

Students will be able to

1. To develop overall city strategy to become contemporary and competitive with smart system and to understand risk and feasibility to ensure the economic health of the city through smart technology implementations.
2. To understand smart community, smart transportation and smart buildings and to identify smart system to city water supply and drainage network issues.
3. To apply smart technologies across the spectrum of infrastructure, E-Governance and IOT enabled services.

Course Outcomes:

Students shall be able to

1. Explore and understand the fundamental concepts of smart and sustainable cities.
2. Explain the component of smart cities and study current technological advancements.
3. Plan smart solutions for present Urban Transport problems
4. Develop smart solutions for water supply and drainage problems
5. Identify and recognize the role of E-governance and IoT solutions

SYLLABUS:

UNIT – I

Introduction: Understanding – Dimensions – Global experience, Global standards and performance benchmarks, Practice codes. India 100 smart cities policy and mission, Smart city planning and development, Financing smart cities development, Governance of smart cities.

UNIT – II

Smart Cities Planning and Development: Introduction to smart community – smart community concepts: concept of smart community – smart transportation – smart building and home



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devices – smart health – smart government – smart energy and water – cyber security, safety and privacy – Internet of Things, Blockchain, Artificial Intelligence, Virtual Reality.

UNIT – III

Smart Urban Transport Systems: Elements of Infrastructure (Physical, Social, Utilities and services), Basic definitions, concepts, significance and importance; Data required for provision and planning of urban networks and services; Resource analysis, Provision of infrastructure. Role of transport, types of transport systems, evolution of transport modes, transport problems and mobility issues. Urban form and Transport patterns, land use – transport cycle, concept of accessibility. Hierarchy, capacity and geometric design elements of roads and intersections. Basic principles of Transport infrastructure design. Urban transport planning process – Transport, environment and safety issues. Principles and approaches of Traffic Management, Transport System Management.

UNIT – IV

Smart water supply and drainage:

Water Supply: sources of water, treatment and storage, transportation and distribution, quality, networks, distribution losses, water harvesting, recycling and reuse, norms and standards of provision, institutional arrangements, planning provisions and management issues.

Drainage and Wastewater: Wastewater Collection and Conveyance, Design of Waste stabilization Ponds, Lagoons, Root Zone Treatment Systems, Membrane bioreactors, fluidized bed reactors, Hybrid Systems, Anaerobic systems for wastewater treatment, Design of Septic tank, Sludge Treatment and Disposal, Design of Digester Tank, Sludge Dewatering and Ultimate Disposal.

UNIT – V

E-Governance and IoT: The concept of management, concept of e-management & e-business, e-Government Principles, Form e-Government to e-governance, e-governance and developing countries, Designing and Implementing e-Government Strategy, E governance: Issues in implementation. IOT fundamentals, protocols, design and development, data analytics and supporting services, case studies.



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Text Books:

1. Katherine S. Willis, —The Routledge Companion to Smart Cities, Alessandro Aurigi, Routledge International Handbooks, 2020.
2. Society 5.0: A People-centric super-smart society, Hitachi-Tokyo Laboratory (H-Tokyo lab), Springer, 2020.
3. G.R. Kangachidambarsan, R. Maheswar, V. Manikandan, K. Ramakrishnan, —Internet of Things in Smart Technologies for Sustainable Urban Development, Springer, 2020.

References:

1. Allen G. Noble, (Eds), —Regional Development and Planning for the 21st Century: New Priorities and New Philosophies, Aldershot, USA, 1988.
2. Andy Pike, Andres Rodriguez-Pose, John Tomaney, —Handbook of Local and Regional Development, Taylor & Francis, 2010.
3. Daniel G. Parolek, AIA, Karen Parolek, Paul C. Crawford, FAICP, Form Based Codes: A Guide for Planners, Urban Designers, Municipalities, and Developers, John Wiley & Sons, 2008.



Subject	OEC/JOE-IV: (b) GREEN BUILDING TECHNOLOGIES				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. To learn about the environmental Implications of building construction materials.
2. To learn about suitable Industrial waste materials including Biomass materials that can be used as construction material for various Infra Projects and to understand Thermal characteristics and heat flow characteristics of building materials.
3. To study about non-conventional energy resources like solar energy and different case studies and to learn about management of water, solid waste and sewage.

Course Outcomes:

Upon completion of this course, students should be able to

1. Explain environmental Implications of building construction materials.
2. Understand various concepts of building materials, alternative materials, biomass resources and recycling of Industrial and Building wastes.
3. Understand the impact of continued use of non-renewable energy resources.
4. Investigate renewable energy systems.
5. Understand energy consumption, efficiency and waste management.

SYLLABUS:

UNIT – I

Introduction: Environmental implications of buildings energy, carbon emissions, water use, waste Disposal. Building materials: sources, methods of production and environmental Implications. Green cover and built environment

UNIT - II

Implications of Resources: Implications of resources for Building Materials and alternative concepts. Recycling of Industrial and Buildings Wastes. Biomass Resources for buildings

UNIT – III



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DEPARTMENT OF CIVIL ENGINEERING

Comforts in Building: Comforts in Building: Thermal Comfort in Buildings- Issues; Heat Transfer Characteristic of Building Materials and Building Techniques. Incidence of Solar Heat on Buildings.

UNIT - IV

Energy Conservation: Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.

UNIT – V

Green Composites for Buildings and Waste Management: Green Composites for buildings: Concepts of Green Composites. Water Utilization in Buildings Waste Management: Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage.

Text Books:

1. K.S.Jagadish, B. U. Venkataramareddy and K. S. Nanjundarao, —Alternative Building Materials and Technologies, New Age International, 2007.
2. Michael Bauer, Peter Mösle and Michael Schwarz, —Green Building - Guidebook for Sustainable Architecture, Springer, 2010

References:

1. Osman Attmann, —Green Architecture Advanced Technologies and Materials, McGraw Hill, 2010.
2. Michael F. Ash, —Materials and the Environment, Elsevier, 2009.
3. Jerry Yudelson, —Green building Through Integrated Design, McGraw Hill, 2009.
4. Mili M. Ajumdar (Ed), —Energy Efficient Building in India, Teri and Mnes, 2001/2002.
5. Low Energy Cooling For Sustainable Buildings. John Wiley and Sons Ltd, 2009.
6. Green My Home!: 10 Steps to Lowering Energy Costs and Reducing Your Carbon Footprint, by Dennis C. Brewer, ISBN:9781427798411, Publisher: Kaplan Publishing, Publication Date: October 2008.
7. B. Givoni, Man, —Climate and Architecture, Elsevier, 1969.
8. T. A. Markus and E. N. Morris, —Buildings Climate and Energy, Pitman, London, 1980.
Arvind Kishan et al (Ed)



Subject	HSSE: (a) FUNDAMENTALS OF ENTREPRENEURSHIP				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objective:

The objective of the course is to make students understand the fundamentals of entrepreneurship and make students to take their career in entrepreneurship.

Course Outcomes:

1. Understand the concept and importance of entrepreneurship.
2. Know the various means of generating business ideas.
3. Know the various legal aspects involved in forming the business.
4. Able to write a business plan.
5. Know the role of Government and Various Agencies in promoting entrepreneurship.

SYLLABUS

UNIT - I

Fundamentals of Entrepreneurship: Entrepreneurship; Entrepreneurial Traits, Types of Entrepreneurs; Evolution of Entrepreneurship; Myths of Entrepreneurship; Difference between Inventors & Entrepreneurs; Role of Entrepreneurship; Entrepreneurial Ethics & Social Responsibilities & Ease of doing business in India.

UNIT - II

Creativity, Innovation & Start-Ups: Introduction; Creativity & Entrepreneurship; Components of Creativity; Characteristics of Creative People; Sources of New Ideas; Techniques for Generating Ideas. Innovation & the Entrepreneur: The innovation Process; Types of Innovation; Major Misconceptions of Innovation; Principles of Innovation.

Start-Ups: Start-Ups; Types of Start-Ups; Start-Ups in India; start-Ups failures & reasons; Managing start-Ups during down turn.



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UNIT - III

Legal Aspects of Business: Procedures for setting up a Business in India; Legal Aspects governing businesses in India-IP law, labor law, safety law, contract law, corporate law & taxation law.

UNIT - IV

Business Plan: Business plan; Drivers of Business plan; Basics of Business plan; Reasons for Failure of Business plans; Growth strategies for Ventures: Franchising, Licensing, Joint Ventures, Mergers & Acquisitions.

UNIT - V

Institutions that facilitate Entrepreneurship & Entrepreneurship Development: National Institute for MSME, NIESBUD; Ministry of MSME; EDI; National Entrepreneurship Network (NEN); National science & Technology Entrepreneurship Development Board (NSTEDB); ISB: Wadhvani Centre for Entrepreneurship Development (WCED).

Text Books:

Arya Kumar: —Entrepreneurship, Pearson, Publishing House, New Delhi, 2012.

VSP Rao, Kuratko: —Entrepreneurship, Cengage Learning, New Delhi.

References:

Rajeev Roy: —Entrepreneurship, Oxford University Press, New Delhi, 2012.

The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya House, 2015.

Subject	HSSE: (b) MANAGERIAL ECONOMICS & MANAGEMENT SCIENCE				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

1. The purpose of this course is to apply micro economic concepts and techniques in evaluating business decisions.
2. To familiarize with the process of management and to provide basic insight into management practices.

Course Outcomes:

1. Gain knowledge in basic economic tools in managerial economics and demand analysis.
2. Analyze the production, cost concepts of a firm.
3. Understand the relationship of pricing, markets and capital budgeting in big industries.
4. Students will acquire the knowledge on management functions.
5. To familiarize with the process of management and to provide basic insights into contemporary management practices.

SYLLABUS

UNIT – I

Introduction to Managerial Economics and demand Analysis: 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

UNIT – II

Production and Cost Analysis: Concept of Production function- Cobb-Douglas 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(simple problems)Managerial significance and limitations of Breakeven point.



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UNIT – III

Introduction to Markets & Pricing Policies: Market structures: Perfect competition, Monopoly and Monopolistic and oligopoly – Features -Price-Output Determination. Methods of Pricing- Limit Pricing, Market Skimming Pricing and Internet Pricing Models.

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital – Capitalization – Meaning of Capital budgeting - need for capital budgeting- Techniques of Capital budgeting – Traditional and Modern methods.

UNIT – IV

Introduction to Management: Concept –nature and importance of Management –Functions of Management – Henry Fayol's 14 principles of management- F.W.Taylor Management Principles-Theories of Motivation – Decision making process— Types of Organizational structure.

UNIT – V

Contemporary Management Practices: Basic concepts of MRP, Total Quality Management (TQM), Six sigma, Business process Re-engineering and Bench Marking, Balanced Score Card.

Text Books:

1. L.M.Prasad- Principles and Practice of Management, Sultan Chand & Sons, New Delhi
2. Koontz & Wehrich: 'Essentials of management' TMH 2011
3. Managerial Economics-Theory & Applications-D.M.Mithani, HPH, New Delhi
4. Financial Management-G.Sudharsan Reddy-HPH, New Delhi

References:

1. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
2. Prof. J.V.Prabhakararao, Prof. P. Venkatrao. 'Managerial Economics and Financial Analysis', Ravindra Publication
3. Dr. A. R. Aryasri, Management Science' TMH 2011



Subject	HSSE: (c) BUSINESS ENVIRONMENT				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	0	3

Course Objectives:

Student should be able to outline how an entity operates in a business environment.

Course Outcomes:

1. To understand the overall business environment and evaluate its various components in business decision making.
2. To improve the students ability in recognizing and managing legal risks in business decision making.
3. The course is designed to expose the student to the career fields in the area of business.

SYLLABUS

UNIT – I

Business Environment: Importance at national and international level – problems and challenges– factors both internal and external influencing business environment, Industrial policies since independence and their significance.

UNIT – II

Structure of Indian economy: Nature and significance – Economic systems – structure of Indian industry – nature – challenges – social justice –competition Act 2002.

Fiscal Policy: Nature and significance – public revenues – Critical analysis of the recent fiscal policy of Government of India.

UNIT – III

India’s Trade Policy: Nature–bilateral and multilateral trade agreements, International business environment: Nature – significance– challenges and mechanisms-Overview of IMF, WTO-disputes settlement mechanism – dumping and antidumping measures.



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UNIT – IV

Legal Frame: special features of the SICA (special provisions) 1985, BIFR, Consumer protection act 1986, Environmental laws (pertaining to the control and prevention of Air and Water pollution), the Essential Commodities Act 1955 & GST Act 2017.

UNIT – V

Disinvestment mechanism: problems and procedures- new industrial policy 1991- NITI Ayog- Balance of Payments – Causes for disequilibrium in Balance of Payments – Correction measures.

Text Books:

1. Aswathappa K:|Essentials of business environment| Himalaya Publishing House, New Delhi,2011
2. Francis Cherunilam|Business Environment: Text&Cases|HPH, 2012
3. Shaikh Saleem: —Business Environment|, Pearsons, New Delhi
4. Veena Keshav Pailwar: —Economic Environment of Business|, PHI Learning, New Delhi, 2012.

References:

1. Vivek Mittal: —Business Environment Text and Cases|, Excel Books New Delhi, 2011.
2. Sundaram and Black: —International Business Environment Text and Cases|, PHI PrivateLimited, New Delhi.
3. Avid W Conklin: —Cases in Environment of Business|, Sage Publication India Private Ltd, New Delhi.
4. Raj Kumar: —International Business Environment|, Excel Publication, New Delhi, 2012.
5. Palle Krishna Rao: —WTO-Text and Cases|, Excel Publication, New Delhi.



Subject	COMPUTER AIDED PROJECT MANAGEMENT LABORATORY				
Year / Semester	IV B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	0	0	4	2

Course Objectives:

1. The main objective of this Microsoft Project training is to empower project management professionals with:
2. A complete skill set, confidence and knowledge required to manage projects using Microsoft Project.
3. The necessary confidence, experience and knowledge to train other stakeholders and professionals about using Microsoft Project.
4. The adequate capability to design and plan projects using Microsoft Project.

Course Outcomes:

At the end of this course the student will be able to

1. In this Microsoft Project training course, you'll learn about how to use this Microsoft Project software. It is the most popular project management software in the world developed and sold by Microsoft. It has been designed to help project managers in developing plans, assigning resources to specific tasks, tracking progress, managing costing and budgets and analysing workload.
2. It encourages project managers to follow industry-standard best practices related to project management.
3. Microsoft Project has various features through which all critical aspects of project management can be addressed, such as planning and scheduling, collaboration, reporting, resource management, etc.
4. Different classes of users have differing access levels to different features of the software and stages of the project, including different views and data.
5. In the present scenario with the advance in technology in all fields of work, using software to manage projects is the most effective choice. It not only saves time but also eliminates the chances of manual error.



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List of Experiments:

1. Introduction of project planning and scheduling.
2. Setting out non-working days in the project calendar.
3. Assigning job and plan's title and other properties.
4. To prepare a task list of a project entering task names.
5. Building a task list; Enter task durations, and start and finish values.
6. Building a task list; entering a milestone task.
7. Building a task list; creating summary tasks to outline the plan.
8. Building a task list; creating task dependencies with links.
9. Formatting and sharing the plan; customizing a Gantt chart view.
10. Formatting and sharing the plan; Customizing reports, Copying views and reports.



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Syllabus for

MINORS

(R20)



Subject	CONCRETE TECHNOLOGY				
Year / Semester	II B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	4	0	0	4

Course Objectives:

1. To understand the properties of ingredients of concrete and to study the behavior of concrete at its fresh and hardened state.
2. To study about the concrete design mix and to know about the procedures in concrete at different stage.
3. To understand special concrete and their uses.

Course Outcomes:

1. To identify suitable materials to be used in the cement concrete by conducting various tests as per BIS code.
2. Test all the concrete materials as per BIS code and design the concrete mix using ACI and BIS code methods.
3. Determine the properties of fresh and hardened of concrete.
4. Design special concretes and their specific applications and use of admixtures.
5. Ensure quality control while testing/ sampling and acceptance criteria for pre and post construction work and use of non-destructive testing equipment.

SYLLABUS

UNIT – I

Introduction: Concrete materials, Cement: Field and laboratory tests on cement, Types of cement and their uses, different tests for aggregates. Methods for manufacturing of cement- Wet and dry process. Hydration of cement, Bogue's compound.

UNIT – II

Admixtures: Accelerating admixtures, Retarding admixtures, water reducing admixtures, Air entraining admixtures, colouring agent, Plasticizers. Batching, Mixing, Transportation, Placing of concrete, curing of Concrete.



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UNIT – III

Behaviour of Concrete: Strength of concrete, Shrinkage and temperature effects, creep of concrete, permeability of concrete, durability of concrete, Corrosion, Causes and effects, remedial measures, Thermal properties of concrete, Micro cracking of concrete.

UNIT – IV

Mix Design: Factors influencing mix proportion, Mix design by ACI method and I.S. code method, Design of high strength concrete.

UNIT – V

Special Concrete: Light-weight concrete, Fibre reinforced concrete, Polymer modified concrete, Ferro cement, Mass concrete, Ready-mix concrete, Self-compacting concrete, Quality control, Sampling and testing, Acceptance criteria.

Text books:

1. Shetty, M.S., Concrete Technology, Theory & Practice, S.Chand and Co.
2. Gambhir, M.L., Concrete Technology, Tata McGraw Hill.
3. Santakumar A.R., Concrete Technology, Oxford University Press, New Delhi.

References:

1. Neville, Properties of Concrete, Longman Publishers.



Subject	BUILDING PLANNING				
Year / Semester	III B.Tech. / I Sem	L	T	P	C
Regulation year	R - 20	3	0	2	4

Course Objectives:

1. Initiating the student to different building bye-laws and regulations.
2. Imparting the planning aspects of residential buildings and public buildings.
3. Giving training exercises on various signs and bonds and different building units.

Course Outcomes:

Upon successful completion of the course, the students will be able to:

1. Prepare, read and interpret the drawings in a professional set up.
2. Prepare line plans of residential and public buildings using principles of planning.
3. Prepare submission and working drawing from the given requirement for Load Bearing Structure.
4. Prepare submission and working drawing from the given requirement for Framed Structure.
5. Draw Two point perspective drawing for given small objects.

SYLLABUS

UNIT – I

To prepare working drawing of component of buildings i) Stepped wall footing and isolated RCC column footing, ii) Fully paneled and flush doors, iii) Half paneled and half-glazed window, iv) RCC dog legged and open well stairs, v) Steel truss.

UNIT – II

Functional design of building (Residential, Public and Industrial, positioning of various components of buildings, orientation of buildings, building standards, bye laws, set back distances and calculation of carpet area, plinth area and floor area ratio.

UNIT – III

Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings, i) Two bed room building, ii) Two storeyed building.



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UNIT – IV

Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following building i) Primary health centre, ii) Primary school building, iii) College canteen iv) Office building

UNIT – V

For a given single line diagram, preparation of water supply, sanitary and electrical layouts.

Text Books:

1. MG Shah, CM Kale, SY Patki, "Building drawing with an integrated approach to Built Environment Drawing", Tata McGraw Hill Publishing co. Ltd., New Delhi.
2. Gurucharan Singh, "Building Construction", Standard Publishers, & distributors, New Delhi.
3. Malik R S and Meo G S, "Civil Engineering Drawing", Asian Publishers/Computech Publications Pvt Ltd.

References Books:

1. Time Saver Standard by Dodge F. W., F. W. Dodge Corp.
2. IS: 962-1989 (Code of practice for architectural and building drawing).
3. National Building Code, BIS, New Delhi.



Subject	SURVEYING				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	4	0	0	4

Course Objectives:

Upon successful completion of the course, the student will be able:

1. To demonstrate the basic surveying skills
2. To use various surveying instruments and to perform different methods of surveying
3. To compute various data required for various methods of surveying.

Course Outcomes:

Course will enable the student to:

1. Apply the knowledge to calculate angles, distances and level.
2. Identify data collection methods and prepare field notes.
3. Understand the working principles of survey instruments, measurement errors and corrective measures.
4. Interpret survey data and compute areas and volumes.
5. Levels by different type of equipment and relate the knowledge to the modern equipment and methodologies.

SYLLABUS

UNIT – I

Introduction And Basic Concepts: Introduction, Objectives, classification and principles of surveying.

Measurement of Distances and Directions

Linear Distances- Approximate methods, Direct Methods-Accessories in chain surveying- Chains- Tapes, ranging, Tape corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – W.C.B systems and Q.B. system of locating bearings.

UNIT – II

Plane Table: Accessories and methods of plane table surveying.



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Levelling: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments- method of levelling.

Contouring: Characteristics and Uses of contours- methods of conducting contour surveys. And their plotting.

UNIT – III

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometric leveling when base is accessible and inaccessible.

Tacheometric Surveying: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT – IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves. Computation Of Areas and Volumes: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two-level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT – V

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Total Station – Parts of a Total Station – Accessories, Advantages and Applications, Errors in Total Station Survey, Introduction to Global Positioning Systems- Principle - Advantages and Disadvantages- Applications – Segments.

Text Books:

1. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
2. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
3. B.C.Punmia, Surveying, Vol-I, II and III, Laxmi Publications.
4. Advance Surveying, Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.
5. Text book of Surveying, C. Venkataramaiah, University press, India Limited.
6. Surveying and levelling, R. Subramanian, Oxford University press.



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References:

1. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
2. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001.
3. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
4. Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
5. Text book of Surveying, Arora (Vol No. 1&2), Standard Book House, Delhi.



Subject	STRENGTH OF MATERIALS				
Year / Semester	III B.Tech. / II Sem	L	T	P	C
Regulation year	R - 20	4	0	0	4

Course Objectives:

The objective of this course is:

1. To impart preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress conditions and to develop diagrams of variation of various stresses across the length.
2. To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
3. The concepts above will be utilized in measuring deflections in beams under various loading and support conditions and to classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

Course Outcomes:

1. The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions.
2. The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.
3. The student will have knowledge of bending concepts.
4. Calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions.
5. The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lamé's equation.

SYLLABUS

UNIT – I

Simple Stresses and Strains: Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain,



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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: 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 in beams: 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

Deflection of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic curve of a beam – Double integration and Macaulay's methods – Determination of slope and deflection 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. Mohr's theorems – Moment area method – application to simple cases of cantilever.

UNIT – V

Thin cylindrical shells: Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders.

Thick cylinders: Introduction: Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders-distribution of stresses.



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Text books:

1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi.
2. Strength of materials by R. K. Bansal, Lakshmi Publications.

References:

1. Mechanics of Materials- by R. C.Hibbler, Pearson publishers
2. Mechanics of Solids – E P Popov, Prentice Hall.
3. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Press
4. Mechanics of Structures Vol – I by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.

