VISHNU
UNIVERSAL LEARNING

R23

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

E-Mail: info@vishnu.edu.in Website: www.vishnu.edu.in

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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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

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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DEPARTMENT OF CIVIL ENGINEERING

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.

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.

VISHNU
UNIVERSAL LEARNING

VISHNU INSTITUTE OF TECHNOLOGY

(Autonomous)

BHIMAVARAM

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ACADEMIC REGULATIONS

for

B. Tech.(Regular-Full time)

(Effective for the students admitted into I year from the Academic Year **2023-24** onwards)

&

B.Tech.(Lateral Entry Scheme)

(Effective for the students admitted into II year through Lateral Entry Scheme from the Academic Year **2024 - 25** onwards)

Academic Regulations (R23) for B. Tech (Regular-Full time)

(Effective for the students admitted into I year from
the Academic Year **2023-24** onwards)

1. **Award of the Degree**

   (a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

   (i) Pursues a course of study for not less than four academic years and not more than eight academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Eight years).

   (ii) Registers for 160 credits and secures all 160 credits.

   (b) **Award of B.Tech. degree with Honors** if he/she fulfils the following:

   (i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 160 credits.

   (ii) Registering for Honors is optional.

   (iii) Honors is to be completed simultaneously with B.Tech. programme.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled. This clause shall be read along with clause 1 a) i).

3. **Admissions**

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

4. Program related terms

Credit: A unit by which the course work is measured. It determines the number of hours of instruction required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit Definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit
2 Hrs. Practical (Lab) per week	1 credit

a) Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.

b) Choice Based Credit System (CBCS): The CBCS provides a choice for students to select from the prescribed courses.

5. Semester/Credits:

i) A semester comprises 90 working days and an academic year is divided into two semesters.

ii) The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.

iii) Regular courses may also be completed well in advance through MOOCs satisfying prerequisites.

6. Structure of the Undergraduate Programme

All courses offered for the undergraduate program (B. Tech.) are broadly classified as follows:

S.No.	Category	Breakup of Credits (Total 160)	Percentage of total credits	AICTE Recommendation (%)
1.	Humanities and Social Science including Management (HM)	13	8 %	8– 9%
2.	Basic Sciences (BS)	20	13 %	12 - 16%

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3.	Engineering Sciences (ES)	23.5	14%	10 18%
4.	Professional Core (PC)	54.5	34 %	30– 36%
5.	Electives –Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)	33	21 %	19 - 23%
6.	Internships & Project work (PR)	16	10 %	8– 11%
7.	Mandatory Courses (MC)	Non-credit	Non-credit	-

7. Course Classification:

All subjects/ courses offered for the undergraduate programme in Engineering & Technology (B.Tech. degree programmes) are broadly classified as follows:

S.No.	Broad Course Classification	Course Category	Description
1.	Foundation Courses	Foundation courses	Includes Mathematics, Physics and Chemistry; fundamental engineering courses; humanities, social sciences and management courses
2.	Core Courses	Professional Core Courses (PC)	Includes subjects related to the parent discipline/department/branch of Engineering
3.	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering
		Domain specific skill enhancement courses (SEC)	interdisciplinary/job-oriented/domain courses which are relevant to the industry
4.	Project & Internships	Project	B.Tech. Project or Major Project
		Internships	Summer Internships-Community based and Industry Internships; Industry oriented Full Semester Internship
5.	Audit Courses	Mandatory non-credit courses	Covering subjects of developing desired attitude among the learners

8. Programme Pattern

i. Total duration of the of B. Tech (Regular) Programme is four academic years.

ii. Each academic year of study is divided into two semesters.

iii. Minimum number of instruction days in each semester is 90 days.

iv. There shall be mandatory student induction program for freshers, with a three-

week duration before the commencement of first semester. Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc., are included as per the guidelines issued by AICTE.

v. Health/wellness/yoga/sports and NSS /NCC /Scouts & Guides / Community service activities are made mandatory as credit courses for all the undergraduate students.

vi. Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the undergraduate students.

vii. Design Thinking for Innovation & Tinkering Labs are made mandatory as credit courses for all the undergraduate students.

viii. Increased flexibility for students through an increase in the elective component of the curriculum, with 05 Professional Elective courses and 04 Open Elective courses.

ix. Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses can lead to students specializing in emerging areas within the chosen field of study.

x. A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 160 credits by opting for the courses offered through various verticals/tracks under Open Electives.

xi. While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.

xii. A pool of inter disciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 05 skill-oriented courses offered during III to VII semesters. Among the fiveskill courses, four courses shall focus on the basic and advanced skills related tothe domain/interdisciplinary courses and the other shall be a soft skills course.

xiii. Students shall undergo mandatory summer internships, for a minimum of eight

weeks duration at the end of second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.

xiv. There shall also be mandatory full internship in the final semester of the programme along with the project work.

xv. Undergraduate degree with Honors is introduced by the University for the students having good academic record.

xvi. Each Department shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

xvii. Each Department shall assign a faculty advisor/mentor after admission to a group of students from same department to provide guidance in courses registration/career growth / placements/opportunities for higher studies/GATE/other competitive exams etc.

xviii. Preferably 25% of course work for the theory courses in every semester shall be conducted in the blended mode of learning.

9. Evaluation Process

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. Summer Internships shall be evaluated for 50 marks, Full Internship &Project work in final semester shall be evaluated for 200 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical, design, drawing subject or project etc. In case of a mandatory course, he/she should secure 40% of the total marks.

Theory Courses

Assessment Method	Marks
Continuous Internal Assessment	30

Semester End Examination	70
Total	**100**

i) For theory subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

ii) For practical subject, the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End- Examination.

iii) If any course contains two different branch subjects, the syllabus shall be written in two parts with 3 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.

iv) If any subject is having both theory and practical components, they will be evaluated separately as theory subject and practical subject. However, they will be given same subject code with an extension of 'T' for theory subject and 'P' for practical subject.

a) Continuous Internal Evaluation

i) For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination shall be evaluated for 30 marks of which 10 marks for objective paper (20 minutes duration), 15 marks for subjective paper (90 minutes duration) and 5 marks for assignment.

ii) Objective paper shall contain for 05 short answer questions with 2 marks each or maximum of 20 bits for 10 marks. Subjective paper shall contain 3 either or type questions (totally six questions from 1 to 6) of which student has to answer one from each either-or type of questions. Each question carries 10 marks. The marks obtained in the subjective paper are condensed to 15 marks.

Note:

- The objective paper shall be prepared in line with the quality of competitive examinations questions.
- The subjective paper shall contain 3 either or type questions of equal weightage of 10 marks. Any fraction shall be rounded off to the next higher mark.
- The objective paper shall be conducted by the respective institution on the day

of subjective paper test.

- Assignments shall be in the form of problems, mini projects, design problems, slip tests, quizzes etc., depending on the course content. It should be continuous assessment throughout the semester and the average marks shall be considered.

iii) If the student is absent for the mid semester examination, no re-exam shall be conducted and mid semester marks for that examination shall be considered as zero.

iv) First midterm examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.

v) Final mid semester marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage given to the better mid exam and 20% to the other.

For Example:

Marks obtained in first mid: 25
Marks obtained in second mid: 20
Final mid semester Marks: (25x0.8) + (20x0.2) = 24

If the student is absent for any one midterm examination, the final mid semester marks shall be arrived at by considering 80% weightage to the marks secured by the student in the appeared examination and zero to the other. For Example:

Marks obtained in first mid: Absent
Marks obtained in second mid: 25
Final mid semester Marks: (25x0.8) + (0x0.2) =20

b) End Examination Evaluation:

End examination of theory subjects shall have the following pattern:

i) There shall be 6 questions and all questions are compulsory.

ii) Question I shall contain 10 compulsory short answer questions for a total of 20marks such that each question carries 2 marks.

iii) There shall be 2 short answer questions from each unit.

a) In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

iv) The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.

End examination of theory subjects consisting of two parts of different subjects, for Example: Basic Electrical &Electronics Engineering shall have the following pattern:

i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.

ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1mark.

iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

iv) The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

Practical Courses

Assessment Method	Marks
Continuous Internal Assessment	30
Semester End Examination	70
Total	**100**

b) For practical courses, there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 70 marks.

c) Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the record/viva and 15 marks for the internal test.

d) The end examination shall be evaluated for 70 marks, conducted by the concerned

laboratory teacher and a senior expert in the subject from the same department.

- Procedure: 20 marks
- Experimental work & Results: 30 marks
- Viva voce: 20 marks.

In a practical subject consisting of two parts (Eg: Basic Electrical &Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours. Mid semester examination shall be evaluated as above for 30 marks in each part and final mid semester marks shall be arrived by considering the average of marks obtained in two parts.

e) For the subject having design and/or drawing, such as Engineering Drawing, the distribution of marks shall be 30 for mid semester evaluation and 70 for end examination.

Assessment Method	**Marks**
Continuous Internal Assessment	30
Semester End Examination	70
Total	**100**

Day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 15 marks with weightage of 80% to better mid marks and 20% for the other. The subjective paper shall contain 3 either or type questions of equal weightage of 5 marks. There shall be no objective paper in mid semester examination. The sum of day-to-day evaluation and the mid semester marks will be the final sessional marks for the subject.

The end examination pattern for Engineering Graphics, shall consists of 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing , multiple branches, etc is mentioned along with

the syllabus.

f) There shall be no external examination for mandatory courses with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates for 30 marks satisfying the conditions mentioned in item 1 & 2 of the regulations.

g) The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

10. Skill oriented Courses

i) There shall be five skill-oriented courses offered during III to VII semesters.

ii) Out of the five skill courses two shall be skill-oriented courses from the same domain. Of the remaining three skill courses, one shall be a soft skill course and the remaining two shall be skill-advanced courses from the same domain/Interdisciplinary/Job oriented.

iii) The course shall carry 100 marks and shall be evaluated through continuous assessments during the semester for 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the class / laboratory shall be evaluated for 30 marks by the concerned teacher based on the regularity/assignments/viva/mid semester test. The end examination similar to practical examination pattern shall be conducted by the concerned teacher and an expert in the subject nominated by the principal.

iv) The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall monitor the

evaluation process. The marks/grades shall be assigned to the students by the above committee based on their performance.

v) The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency. A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

vi) The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the University at the beginning of the semester. The principal of the respective college shall forward such proposals to the University for approval.

vii) If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the University.

11. Massive Open Online Courses (MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the College. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if

any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted by the university.

12. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020.
Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.
As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the University shall allow up to a maximum of 20% of the total courses being offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.

i) The University shall offer credit mobility for MOOCs and give the equivalent credit weightage to the students for the credits earned through online learning courses.

ii) Student registration for the MOOCs shall be only through the respective department of the institution, it is mandatory for the student to share necessary information with the department.

iii) Credit transfer policy will be applicable to the Professional & Open Elective courses only.

iv) The concerned department shall identify the courses permitted for credit transfer.

v) The College shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.

vi) The College shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.

vii) The College shall ensure no overlap of MOOC exams with that of theCollege examination schedule. In case of delay in results, the College will re-issue the marks sheet for such students.

viii) Student pursuing courses under MOOCs shall acquire the required credits only

after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.

ix) The Department shall submit the following to the examination section of the College:

a) List of students who have passed MOOC courses in the current semester along with the certificate of completion.

b) Undertaking form filled by the students for credit transfer.

x) The College shall resolve any issues that may arise in the implementation ofthis policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.

Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the College from time to time.

13. Academic Bank of Credits (ABC)

The College has implemented Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

i. Provide option of mobility for learners across the College of their choice
ii. Provide option to gain the credits through MOOCs from approved digital platforms.
iii. Facilitate award of certificate/diploma/degree in line with the accumulatedcredits in ABC.
iv. Execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

14. Mandatory Internships

Summer Internships : Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be

society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / University shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weightage each. It shall be evaluated for 50 external marks. There shall be no internal marks for Summer Internship. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted by the College.

Full Semester Internship and Project work: In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she 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 with an external examiner. The total marks for project work 200 marks and distribution shall be 60 marks for internal and 140 marks for external evaluation. The supervisor assesses the student for 30 marks (Report: 15 marks, Seminar: 15 marks). At the end of the semester, all projects shall be showcased at the department for the benefit of all students and staff and the same is to be evaluated by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD for 30 marks. The external evaluation of Project Work is a Viva-Voce

Examination conducted in the presence of internal examiner and external examiner appointed by the College and is evaluated for 140 marks.

The college shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

15. Guidelines for offering a Minor

To promote interdisciplinary knowledge among the students, the students admitted into B.Tech. in a major stream/branch are eligible to obtain degree in Minor in another stream.

i) The Minor program requires the completion of 12 credits in Minor stream chosen.

i) Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor degree, but maybe waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering for the electives.

ii) Electives (minimum of 2 courses) to complete a total of 12 credits.

Note: A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for Minor by opting for the courses offered through various verticals / tracks under Open Electives.

16. Guidelines for offering Honors

The objective of introducing B.Tech. (Hons.) is to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area in the UG level. The programme is a best choice for academically excellent students having good academic record and interest towards higher studies and research.

i) Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech (Regular and Lateral Entry)

students admitted in Engineering & Technology.

ii) A student shall earn additional 15 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 160 credits).

iii) A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors from V Semester onwards.

iv) The concerned Principal of the college shall arrange separate class work and timetable of the courses offered under Honors program.

v) Courses that are used to fulfil the student's primary major may not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major may not be counted towards the Honors.

vi) Students can complete the courses offered under Honors either in the college or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.

vii) The attendance for the registered courses under Honors and regular courses offered for Major degree in a semester are to be considered separately.

viii) A student shall maintain an attendance of 75% in all registered courses under Honors to be eligible for attending semester end examinations.

ix) **A student registered for Honors shall pass in all subjects that constitute the requirement for the Honors** degree program**.** No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Honors degree programme.

x) If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

xi) The Honors will be mentioned in the degree certificate as Bachelor of

Technology (Honors) in XYZ. For example, B.Tech. (Honors) in Mechanical Engineering

Enrolment into Honors:

i) Students of a Department/Discipline are eligible to opt for Honors program offered by the same Department/Discipline

ii) The enrolment of student into Honors is based on the CGPA obtained in the major degree program. CGPA shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students. Students having 7 CGPA without any backlog subjects will be permitted to register for Honors.

iii) If a student is detained due to lack of attendance either in Major or in Honors, registration shall be cancelled.

iv) Transfer of credits from Honors to regular B. Tech degree and vice-versa shall not be permitted.

v) Honors is to be completed simultaneously with a Major degree program.

Registration for Honors:

i) The eligible and interested students shall apply through the HOD of his/her parent department. The whole process should be completed within one week before the start of every semester. Selected students shall be permitted to register the courses under Honors.

ii) The selected students shall submit their willingness to the principal through his/her parent department offering Honors. The parent department shall maintain the record of student pursuing the Honors.

iii) The students enrolled in the Honors courses will be monitored continuously. An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.

iv) There is no fee for registration of subjects for Honors program offered in offline at the respective institutions.

17. Attendance Requirements:

i) A student shall be eligible to appear for the external examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

ii) Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.

iii) A stipulated fee shall be payable towards condonation of shortage of attendance to the College.

iv) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their registration shall stand cancelled.

v) A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester from the date of commencement of class work.

vi) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same class.

vii) If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.

viii) For induction programme attendance shall be maintained as per AICTE norms.

18. Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 16.

i) A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per College norms.

ii) A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any ***decimal*** fraction should be ***rounded off*** to ***lower*** digit) up to in the subjects that have been studied up to III semester.

iii) A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any ***decimal*** fraction should be ***rounded off*** to ***lower*** digit) in the subjects that have been studied up to V semester.

And in case a student is detained for want of credits for a particular academic year by ii) & iii) above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V semester or VII semester respectively as the case may be.

iv) When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfillment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

19. Grading:

As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points Assigned
90 & above	S (Superior)	10
80 - 89	A (Excellent)	9
70 - 79	B (Very Good)	8
60 - 69	C (Good)	7
50 - 59	D (Average)	6
40 - 49	E (Pass)	5
< 40	F (Fail)	0
Absent	Ab (Absent)	0

i) A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

ii) For non-credit audit courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The Semester Grade Point = Σ (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e., SGPA $(C_i \times G_i)/\Sigma C_i$

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

The Cumulative Grade Point Average = Σ(CGPA), Σ will be computed in the same manner considering all the courses undergone by a student over all the semesters of a program, i.e., CGPA$(C_i \times S_i)/C_i$

where "S_i" is the SGPA of the i^{th} semester and C_i is the total numberof credits up to that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

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

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.
Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by the letters S, A, B, C, D and F.

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/she shall be placed in one of the following four classes:

Class Awarded	**CGPA Secured**
First Class with Distinction	≥ 7.5
First Class	$6.5 < 7.5$
Second Class	$\geq 5.5 < 6.5$
Pass Class	$\geq 5.0 < 5.5$

CGPA to Percentage conversion Formula – (CGPA – 0.5) x 10

20. With–holding of Results

If the candidate has any dues not paid to the College or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld in such cases.

21. Multiple Entry / Exit Option

(a) Exit Policy:

The students can choose to exit the four-year programme at the end of first/second/third year.

i) **UG Certificate in (Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.

ii) **UG Diploma (in Field of study/discipline)** - Programme duration: First two years (first four semesters) of the undergraduate programme, 80 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6-credit job-specific internship/ apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.

iii) **Bachelor of Science (in Field of study/discipline)** i.e., **B.Sc. Engineering in (Field of study/discipline)**- Programme duration: First three years (first six semesters) of the undergraduate programme, 120 credits.

(b) Entry Policy:

Modalities on multiple entry by the student into the B.Tech. programme will be provided in due course of time.

Note: The College shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by JNTUK, UGC, AICTE and State government.

22. Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme / to establish startups. This period may be extended to two years at the mostand these two years would not be counted for the time for the maximum time for graduation. The principal of the respective college shall forward such proposals submitted by the students. An evaluation committee constituted by the College shall evaluate the proposal submitted by the student and the committee shalldecide whether to permit the student(s) to avail the Gap Year or not

23. Transitory Regulations

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section 2 and they will follow the academic regulations into which they are readmitted.

Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B. Tech from the date of commencement of class work, subject to Section **2** and they will follow the academic regulations into which they are readmitted.

24. Minimum Instruction Days for a Semester:

The minimum instruction days including exams for each semester shall be 90 days.

25. Medium of Instruction:

The medium of instruction of the entire B. Tech undergraduate programme in Engineering &Technology (including examinations and project reports) will be in English only.

26. Student Transfers:

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

27. General Instructions:

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

ii. Malpractices rules-nature and punishments are appended.

iii. where the words "he","him","his",occur in the regulations, they also include "she", "her","hers",respectively

iv. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

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

vi. In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Principal / Head of the institution is final.

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ACADEMIC REGULATIONS (R23)

FOR B.TECH. (LATERAL ENTRY SCHEME)

*(Effective for the students admitted into II year through Lateral Entry Scheme from the Academic Year **2024-25** onwards)*

1. Award of the Degree

(a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

(i) Pursues a course of study for not less than three academic years and not more than six academic years. However, for the students availing Gap year facility this period shall be extended by two years at the most and these two years would in addition to the maximum period permitted for graduation (Six years).

(ii) Registers for 120 credits and secures all 120 credits.

(b) **Award of B.Tech. degree with Honors** if he/she fulfils the following:

(i) Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 120 credits.

(ii) Registering for Honors is optional.

(iii) Honors is to be completed simultaneously with B.Tech. programme.

2. Students, who fail to fulfil the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

3. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.**2**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester evaluation and end examination taken together.

ii. A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to V semester.

And in case if student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of IV year I semester class work of next year.

4. Course Pattern

i) The entire course of study is three academic years on semester pattern.

ii) A student eligible to appear for the end examination in a subject but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

iii) When a student is detained due to lack of credits/shortage of attendance the student may be re-admitted when the semester is offered after fulfillment of academic regulations, the student shall be in the academic regulations into which he/she is readmitted.

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

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VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)

Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

I Year - I Semester

S. No.	Subject Code	Category	Course Title	L	T	P	C	IM	EM	TM
1	23BS1T01	BS&H	Communicative English	2	0	0	2	30	70	100
2	23BS1T02	BS&H	Engineering Chemistry	3	0	0	3	30	70	100
3	23BS1T05	BS&H	Linear Algebra & Calculus	3	0	0	3	30	70	100
4	23CE1T01	ES	Basic Civil & Mechanical Engineering	3	0	0	3	30	70	100
5	23CS1T01	ES	Introduction to Programming	3	0	0	3	30	70	100
6	23BS1P01	BS&H	Communicative English Lab	0	0	2	1	30	70	100
7	23BS1P02	BS&H	Engineering Chemistry Lab	0	0	2	1	30	70	100
8	23ME1P01	ES	Engineering Workshop	0	0	3	1.5	30	70	100
9	23CS1P01	ES	Computer Programming Lab	0	0	3	1.5	30	70	100
10	23BS1P06	BS&H	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5	30	70	100
Total				**14**	**0**	**11**	**19.5**	**300**	**700**	**1000**

I Year - II Semester

S. No.	Subject Code	Category	Course Title	L	T	P	C	IM	EM	TM
1	23BS2T02	BS&H	Engineering Physics	3	0	0	3	30	70	100
2	23BS2T05	BS&H	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
3	23EE2T01	ES	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
4	23ME2T01	ES	Engineering Graphics	1	0	4	3	30	70	100
5	23ME2T02	PC	Engineering Mechanics	3	0	0	3	30	70	100
6	23IT2P02	ES	IT Workshop	0	0	2	1	30	70	100
7	23BS2P04	BS&H	Engineering Physics Lab	0	0	2	1	30	70	100
8	23EE2P01	ES	Electrical and Electronics Engineering Workshop	0	0	3	1.5	30	70	100
9	23CE2P01	PC	Engineering Mechanics & Building Practices Lab	0	0	3	1.5	30	70	100
10	23BS2P05	BS&H	Health and wellness, Yoga and Sports	0	0	1	0.5	30	70	100
Total				**13**	**0**	**15**	**20.5**	**300**	**700**	**1000**

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

DEPARTMENT OF CIVIL ENGINEERING

II Year - I Semester

S. No.	Subject Code	Category	Course Title	L	T	P	C	IM	EM	TM
1	23BS3T01	BS&H	Numerical Techniques and Statistical Methods	3	0	0	3	30	70	100
2	23HS3T01	HSMC	Universal human values – understanding harmony and Ethical human conduct	2	1	0	3	30	70	100
3	23CE3T01	ES	Surveying	3	0	0	3	30	70	100
4	23CE3T02	PC	Strength of Materials	3	0	0	3	30	70	100
5	23CE3T03	PC	Fluid Mechanics	3	0	0	3	30	70	100
6	23CE3P01	PC	Surveying Laboratory	0	0	3	1.5	30	70	100
7	23CE3P02	PC	Strength of Materials Laboratory	0	0	3	1.5	30	70	100
8	23CE3P03	SEC	Building Planning and Drawing	0	1	2	2	30	70	100
9	23HS3A01	Audit Course	Environmental Science	2	0	0	0	0	0	0
			Total	**16**	**2**	**8**	**20**	**240**	**560**	**800**

II Year - II Semester

S. No.	Subject Code	Category	Course Title	L	T	P	C	IM	EM	TM
1	23HS4T01	MC - I	Managerial Economics and Financial Analysis	2	0	0	2	30	70	100
2	23CE4T01	ES	Engineering Geology	3	0	0	3	30	70	100
3	23CE4T02	PC	Concrete Technology	3	0	0	3	30	70	100
4	23CE4T03	PC	Structural Analysis	3	0	0	3	30	70	100
5	23CE4T04	PC	Hydraulics & Hydraulic Machinery	3	0	0	3	30	70	100
6	23CE4P02	PC	Concrete Technology Laboratory	0	0	3	1.5	30	70	100
7	23CE4P01	PC	Engineering Geology Laboratory	0	0	3	1.5	30	70	100
8	23CE4P03	SEC	Remote Sensing & Geographical Information Systems	0	1	2	2	30	70	100
9	23ME4P03	ES	Design Thinking & Innovation	1	0	2	2	30	70	100
10	23CE4A01	Mandatory Course	Building materials and Construction	3	0	0	0	0	0	0
			Total	**18**	**1**	**10**	**21**	**270**	**630**	**900**

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

DEPARTMENT OF CIVIL ENGINEERING

III Year - I Semester

S. No.	Subject Code	Category	Course Title	L	T	P	C	IM	EM	TM
1	23CE5T01	PC	Design and Drawing of Reinforced Concrete Structures	2	0	2	3	30	70	100
2	23CE5T02	PC	Engineering Hydrology	3	0	0	3	30	70	100
3	23CE5T03	PC	Geotechnical Engineering - I	3	0	0	3	30	70	100
4	23CE5T04	PE - I	Advanced Structural Analysis	3	0	0	3	30	70	100
	23CE5T05		Architecture, Heritage and town planning							
	23CE5T06		Construction Technology and Management							
5	23OE5T01	OE - I	Green Buildings	3	0	0	3	30	70	100
	23OE5T02		Construction Technology and Management							
	23OE5T03		Climate Change Impact on eco system							
6	23CE5P01	PC	Geotechnical Engineering Lab	0	0	3	1.5	30	70	100
7	23CE5P02	PC	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5	30	70	100
8	23CE5P03	SEC	Estimation, Specifications & Contracts	0	1	2	2	30	70	100
9	23ME5P04	ES	Tinkering Lab	0	0	2	1	30	70	100
10	23CE5J01	Evaluation of Community Service Internship		0	0	0	2	0	50	50
			Total	**14**	**1**	**12**	**23**	**270**	**680**	**950**

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

DEPARTMENT OF CIVIL ENGINEERING

III Year - II Semester

S. No.	Subject Code	Category	Course Title	L	T	P	C	IM	EM	TM
1	23CE6T01	PC	Design and Drawing of Steel Structures	2	0	2	3	30	70	100
2	23CE6T02	PC	Highway Engineering	3	0	0	3	30	70	100
3	23CE6T03	PC	Environmental Engineering	3	0	0	3	30	70	100
4	23CE6T04	PE - II	Ground Improvement Techniques	3	0	0	3	30	70	100
	23CE6T05		Repair and Rehabilitation of Structures							
	23CE6T06		Valuation and Quantity Survey							
5	23CE6T07	PE - III	Finite element method	3	0	0	3	30	70	100
	23CE6T08		Bridge Engineering							
	23CE6T09		Water Resource Engineering							
	23CE6T10		Interior Design & Space Planning							
6	23OE6T01	OE - II	Disaster management	3	0	0	3	30	70	100
	23OE6T02		Sustainability in Engineering practices							
	23OE6T03		Water Supply Systems							
7	23CE6P01	PC	Environmental Engineering Lab	0	0	3	1.5	30	70	100
8	23CE6P02	PC	Highway Engineering Lab	0	0	3	1.5	30	70	100
9	23CE6P03	SEC	CAD Lab	0	1	2	2	30	70	100
10	23HS6A01	Audit Course	Technical paper writing & IPR	2	0	0	0	0	0	0
			Total	**19**	**1**	**10**	**23**	**270**	**630**	**900**

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

DEPARTMENT OF CIVIL ENGINEERING

IV Year - I Semester

S. No.	Subject Code	Category	Course Title	L	T	P	C	IM	EM	TM
1	23CE7T01	PC	Prestressed Concrete	3	0	0	3	30	70	100
2	23HS7T01	MC - II	Fundamentals of Economics	2	0	0	2	30	70	100
3	23CE7T02	PE - IV	Geotechnical Engineering - II	3	0	0	3	30	70	100
	23CE7T03		Advanced Environmental Engineering							
	23CE7T04		Design & drawing of Irrigation Structures							
4	23CE7T05	PE - V	Pavement Analysis and Design	3	0	0	3	30	70	100
	23CE7T06		Environmental Impact and Risk Assessment							
	23CE7T07		Foundations on Expansive Soils							
5	23OE7T01	OE - III	Building Technology for Engineers	3	0	0	3	30	70	100
	23OE7T02		Environmental Impact Assessment							
	23OE7T03		Ground Improvement Techniques							
6	23OE7T04	OE - IV	Geo-Spatial Technologies	3	0	0	3	30	70	100
	23OE7T05		Solid Waste Management							
	23OE7T06		Concrete Technology							
7	23CE7P01	SEC	Revit Lab	0	1	2	2	30	70	100
8	23CE7I01	Internship	Evaluation of Industry Internship	0	0	0	2	0	50	50
9	23CE7A01	AC	Constitution of India	2	0	0	0	0	0	0
			Total	**19**	**1**	**2**	**21**	**210**	**540**	**750**

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

DEPARTMENT OF CIVIL ENGINEERING

IV Year - II Semester

S. No.	Subject Code	Category	Course Title	L	T	P	C	IM	EM	TM
1	23CE8T01	PR	Project and Internship	0	0	24	12	60	140	200
			Total	**0**	**0**	**24**	**12**	**60**	**140**	**200**

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

DEPARTMENT OF CIVIL ENGINEERING

OPEN ELECTIVES TO OTHER BRANCHES

S. No.	Course Year	Category	Course Title	L	T	P	C
1	III B.Tech. I Sem.	OEC – I	Green Buildings	3	0	0	3
			Construction Technology and Management				
			Climate Change Impact on eco system				
2	III B.Tech. II Sem.	OEC – II	Disaster management	3	0	0	3
			Sustainability in Engineering practices				
			Water Supply Systems				
3	IV B.Tech. I Sem.	OEC – III	Building Technology for Engineers	3	0	0	3
			Environmental Impact Assessment				
			Ground Improvement Techniques				
4	IV B.Tech. I Sem.	OEC - IV	Geo-Spatial Technologies	3	0	0	3
			Solid Waste Management				
			Concrete Technology				

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

DEPARTMENT OF CIVIL ENGINEERING

MINOR COURSES OFFERED BY CIVIL ENGINEERING

S. No.	Course Title	L	T	P	C
1	12-Weeks duration NPTEL / SWAYAM Course				3
2	Construction planning and Management	3	0	0	3
3	Building Planning and drawing	0	0	3	1.5
4	Civil Engineering- Building Materials and Construction	3	0	0	3
5	Safety in Construction	3	0	0	3
6	Sustainable Materials and Green building	3	0	0	3
7	Estimation and Costing	0	0	3	1.5
In addition to the four subjects (12 credits) and two labs (3 credits), one MOOC / NPTEL Course for 03 credits is compulsory in the domain of Civil Engineering Total Credits = 18 (15 + 3)					

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

DEPARTMENT OF CIVIL ENGINEERING

HONORS COURSES OFFERED BY CIVIL ENGINEERING

S. No.	Course Title	L	T	P	C
1	12-Weeks duration NPTEL / SWAYAM Course				3
2	12-Weeks duration NPTEL / SWAYAM Course				3
3	MATLAB Applications for Civil Engineers	0	0	3	1.5
4	Introduction to Earthquake Engineering	3	0	0	3
5	Soil Dynamics	3	0	0	3
6	Seismic Analysis of Structures	3	0	0	3
7	Computer Aided Project Management Laboratory	0	0	3	1.5
In addition to the four subjects (12 credits), MOOC / NPTEL Courses for 06 credits (02 courses @ 3 credits each) are compulsory in the domain of Civil Engineering Total Credits = 18 (12 + 6)					

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

DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

I B.Tech. - I Semester

(R23)

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

DEPARTMENT OF CIVIL ENGINEERING

Subject	COMMUNICATIVE ENGLISH				
Year / Semester	I B.Tech. / I Sem	L	T	P	C
Regulation year	R - 23	2	0	0	2

Course Objectives:

The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

Course Outcomes:

1. Understand the context, topic, and pieces of specific information from social or Transactional dialogues.
2. Apply grammatical structures to formulate sentences and correct word forms.
3. Analyze discourse markers to speak clearly on a specific topic in informal discussions.
4. Evaluate reading / listening texts and to write summaries based on global comprehension of these texts.
5. Create a coherent paragraph, essay, and resume.

SYLLABUS

UNIT – I

Lesson: HUMAN VALUES: Gift of Magi (Short Story)

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

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

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

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT – II

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structure talks.

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

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

UNIT – III

Lesson: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations

UNIT – IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

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

Writing: Letter Writing: Official Letters, Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

UNIT – V

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3).
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/

5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING CHEMISTRY				
Year / Semester	I B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Objectives:

1. To familiarize engineering chemistry and its applications.
2. To impart the concept of soft and hard waters, softening methods of hard water.
3. To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.

Course Outcomes:

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

1. Understand the boiler troubles and different water treatment methods.
2. Distinguish between batteries, and fuel cells and describe the corrosion prevention methods.
3. Explain the properties and applications of plastics, elastomers and fuels.
4. Apply Composites, refractories, lubricants and cement materials in the field of engineering.
5. Summarize the concepts of colloids, micelle, and nanomaterials.

SYLLABUS

UNIT - I

Water Technology: Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Causticembrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

UNIT – II

Electrochemistry and Applications: Electrodes –electrochemical cell, Nernst equation, cell potential calculations. Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT – III

Polymers and Fuel Chemistry:

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization.

Thermoplastics and Thermo-setting plastics: Preparation, properties and applications of poly styrene. PVC Nylon 6, 6 and Bakelite.

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers.

Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

UNIT – IV

Modern Engineering Materials:

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Portland Cement, constituents, Setting and Hardening of cement.

UNIT – V

Surface Chemistry and Nanomaterials: Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and

Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	LINEAR ALGEBRA & CALCULUS				
Year / Semester	I B.Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Objectives:

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

Course Outcomes:

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

1. Develop and use of matrix algebra techniques that are needed by engineers for practical applications.
2. Utilize mean value theorems to real life problems.
3. Familiarize with functions of several variables which is useful in optimization.
4. Learn important tools of calculus in higher dimensions.
5. Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

SYLLABUS

UNIT – I

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT – II

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

UNIT – III

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT – IV

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT – V

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Textbooks:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition**.**
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha ScienceInternational Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, Pearson publishers, 9th edition.
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)

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DEPARTMENT OF CIVIL ENGINEERING

Subject	BASIC CIVIL & MECHANICAL ENGINEERING				
Year / Semester	I B.Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

PART A: BASIC CIVIL ENGINEERING

Course Objectives:

1. Familiarize students with the scope and significance of Civil Engineering sub-divisions, as well as basic construction materials and techniques.
2. Introduce students to fundamental surveying concepts and methods applicable to civil engineering.
3. Develop an understanding of the importance of transportation systems and water resources - including water quality, conveyance, and storage - in national development

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

1. Describe roles/disciplines of civil engineering and explain construction materials.
2. Apply surveying techniques to solve simple field problems.
3. Differentiate types of transportation/pavements and analyze water resources/ environmental engineering in infrastructure development.

SYLLABUS

UNIT - I

Basics of Civil Engineering:

Role of Civil Engineers in Society

Introduction to Various Disciplines of Civil Engineering: Structural Engineering - Geo-technical Engineering - Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering.

Construction Materials: Introduction & Types of Cement, Aggregate, Bricks, Cement concrete, Steel.

Introduction to building construction and planning: Types of building, Common Building Components, Principles of planning.

Prefabricated construction Techniques: Introduction to Prefabricated construction Techniques.

UNIT – II

Introduction to Surveying: Objectives of Surveying – Horizontal Measurements (Chain Survey): Principle – Accessories, Angular Measurements (Compass Survey): Principle - Introduction to Bearings – Bearing systems, Levelling: Instruments, Simple problems on levelling - Contour mapping.

UNIT – III

Introduction to Transportation Engineering: Importance of Transportation in Nation's economic development - Types of Highway Pavements - Flexible Pavements and Rigid Pavements - Simple Differences. Harbour & Dock: Classification, Tunnel: Requirement - Main purpose, Airport Engineering: Introduction - Types of airports, Railway Engineering: Introduction – Permanent way components.

Introduction to Environmental Engineering and Water Resources: Sources of water - Quality & Specifications of water - Introduction to Hydrology – Rainwater Harvesting - Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Textbooks:

1. Basic Civil Engineering, M.S.Palanisamy, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016**.**
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

Course Objectives: The students after completing the course are expected to

1. Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2. Explain different engineering materials and different manufacturing processes.
3. Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

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

1. Explain the role of Mechanical Engineering in various industries and describe different engineering materials and their properties.
2. Understand the fundamental manufacturing processes and explain the basics of thermal engineering and its applications.
3. Describe the working principles of power plants, mechanical power transmission systems, and the fundamentals of robotics.

SYLLABUS

UNIT – I

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials: Introduction and Applications of - ferrous alloys and non-ferrous alloys. Introduction to heat treatment – Annealing, Normalizing, Hardening. Introduction, Advantages and Applications of - Ceramics, Composites and Smart materials.

UNIT – II

Manufacturing Processes: Basic principles and applications of -Casting, Forming, Joining processes and Machining. Introduction to - CNC machines, 3D printing and Smart manufacturing.

Thermal Engineering: Working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components and working of Electric and Hybrid Vehicles.

UNIT – III

Power plants: Working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission: Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics: Joints & links, classification of robots based on coordinate system, configurations, and applications of robotics.

(**Note:** The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.)

Textbooks:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A text book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference Books:

1. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
2. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
3. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications.
4. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I

End examination pattern:

1. Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
2. In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
3. In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

4. The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	INTRODUCTION TO PROGRAMMING				
Year / Semester	I B.Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Objectives:

1. To introduce students to the fundamentals of computer programming.
2. To provide hands-on experience with coding and debugging.
3. To foster logical thinking and problem-solving skills using programming.
4. To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
5. To encourage collaborative learning and teamwork in coding projects.

Course Outcomes: A student after completion of the course will be able to

1. Understand basics of computers, the concept of algorithm and algorithmic thinking.
2. Analyse a problem and develop an algorithm to solve it.
3. Implement various algorithms using the C programming language.
4. Understand more advanced features of C language.
5. Develop problem-solving skills and the ability to debug and optimize the code.

SYLLABUS

UNIT - I

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.
Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT – II

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

UNIT – III

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT – IV

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT – V

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling.

Note: The syllabus is designed with C Language as the fundamental language of implementation.

Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988**.**
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition**.**
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	COMMUNICATIVE ENGLISH LAB				
Year / Semester	I B.Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	2	1

Course Objectives:

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

Course Outcomes:

1. Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit professionalism in participating in debates and group discussions.
5. Create effective Course Objectives

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

1. Walden Infotech
2. Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016.
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed), Kindle, 2013

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING CHEMISTRY LAB				
Year / Semester	I B.Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	2	1

Course Objectives:

To verify the fundamental concepts with experiments

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

1. Determine the cell constant and conductance of solutions.
2. Prepare advanced polymer materials.
3. Determine the physical properties like surface tension, adsorption and viscosity.
4. Estimate the Iron and Calcium in cement.
5. Calculate the hardness of water.

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method.
3. Determination of Strength of an acid in Pb-Acid battery.
4. Preparation of a polymer (Bakelite)
5. Determination of percentage of Iron in Cement sample by colorimetry
6. Estimation of Calcium in port land Cement.
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal.
9. Determination of percentage Moisture content in a coalsample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter

Reference:

1. "Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING WORKSHOP				
Year / Semester	I B.Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicle.

Course Outcomes:

1. Identify workshop tools and their operational capabilities.
2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
3. Apply fitting operations in various applications.
4. Apply basic electrical engineering knowledge for House Wiring Practice

SYLLABUS

1. Demonstration: Safety practices and precautions to be observed in workshop.
2. Wood Working: Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridle joint
3. Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b) Conical funnel
   c) Elbow pipe d) Brazing
4. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit
   c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre**.**
5. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections.

a) Parallel and series b) Two-way switch c) Godown lighting
d) Tube light e) Three phase motor f) Soldering of wires.

6. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. Welding Shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. Plumbing: Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
9. Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.

Textbooks:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition.
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	COMPUTER PROGRAMMING LAB				
Year / Semester	I B.Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Objectives:

The course aims to give students hands – on experience and train them on the concepts of the C- programming language.

Course Outcomes:

1. Read, understand, and trace the execution of programs written in C language.
2. Select the right control structure for solving the problem.
3. Develop C programs which utilize memory efficiently using programming constructs like pointers.
4. Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

SYLLABUS

UNIT - I

WEEK 1

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
ii) Exposure to Turbo C, gcc
iii) Writing simple programs using printf(), scanf()

WEEK 2

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3 numbers
ii) Conversion of Fahrenheit to Celsius and vice versa
iii) Simple interest calculation

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT – II

WEEK 4

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity:

Lab 4: Simple computational problems using the operator' precedence and associatively.

i) Evaluate the following expressions.
   a. A+B*C+(D*E) + F*G b. A/B*C-B+A*D/3
   c. A+++B---A d. J= (i++) + (++i)
ii) Find the maximum of three numbers using conditional operator
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be

used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

i) Write a C program to find the max and min of four numbers using if-else.
ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK 6

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers.

UNIT - III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7:1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array.

ii) Perform linear search on1D array.

iii) The reverse of a 1D integer array

iv) Find 2's complement of the given binary number.

v) Eliminate duplicate elements in an array.

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices

ii) Multiplication two matrices

iii) Sort array elements using bubble sort

iv) Concatenate two strings without built-in functions

v) Reverse a string using built-in and without built-in string functions

UNIT - IV

WEEK 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

i) Write a C program to find the sum of a 1D array using malloc()

ii) Write a C program to find the total, average of n students using structures

iii) Enter n students data using calloc() and display failed students list

iv) Read student name and marks from the command line and display the student details along with the total.

v) Write a C program to implement realloc()

WEEK 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists

Lab 10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

i) Create and display a singly linked list using self-referential structure.
ii) Demonstrate the differences between structures and unions using a C program.
iii) Write a C program to shift/rotate using bitfields.
iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT - V

WEEK 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent,

Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

i) Write a C function to calculate NCR value.
ii) Write a C function to find the length of a string.
iii) Write a C function to transpose of a matrix.
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

i) Write a recursive function to generate Fibonacci series.
ii) Write a recursive function to find the lcm of two numbers.
iii) Write a recursive function to find the factorial of a number.
iv) Write a C Program to implement Ackermann function using recursion.
v) Write a recursive function to find the sum of series.

WEEK 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

i) Write a C program to swap two numbers using call by reference.
ii) Demonstrate Dangling pointer problem using a C program.
iii) Write a C program to copy one string into another using pointer.
iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

i) Write a C program to write and read text into a file.
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file.
iv) Write a C program to merge two files into the third file using command-line arguments.
v) Find no. of lines, words and characters in a file

vi) Write a C program to print last n characters of a given file.

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India.
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	0	0	1	0.5

Course Objectives:

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

Course Outcomes:

After completion of the course the students will be able to

1. Understand the importance of discipline, character and service motto.
2. Solve some societal issues by applying acquired knowledge, facts, and techniques.
3. Explore human relationships by analyzing social problems.
4. Determine to extend their help for the fellow beings and downtrodden people.
5. Develop leadership skills and civic responsibilities.

SYLLABUS

UNIT - I

Orientation: General Orientation on NSS / NCC / Scouts & Guides / Community Service activities, career guidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course - knowing personal talents and skills

ii) Conducting orientations programs for the students – future plans-activities-releasing road map etc.

iii) Displaying success stories-motivational biopics - award winning movies on societal issues etc.

iv) Conducting talent show in singing patriotic songs – paintings - any other contribution.

UNIT - II

Nature & Care Activities:

i) Best out of waste competition.

ii) Poster and signs making competition to spread environmental awareness.

iii) Recycling and environmental pollution article writing competition.

iv) Organising Zero-waste day.

v) Digital Environmental awareness activity via various social media platforms.

vi) Virtual demonstration of different eco-friendly approaches for sustainable living.

vii) Write a summary on any book related to environmental issues.

UNIT - III

Community Service Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media- authorities- experts-etc.

ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,

iii) Conducting consumer Awareness. Explaining various legal provisions etc.

iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.

v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. Red Book - National Cadet Corps – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi.
3. Davis M. L. and Cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008.
4. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007.
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

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DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

I B.Tech. - II Semester

(R23)

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

DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING PHYSICS				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Objectives:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

Course Outcomes:

1. Analyze the intensity variation of light due to polarization, interference and diffraction.
2. Familiarize with the basics of crystals and their structures.
3. Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.
4. Summarize various types of polarization of dielectrics and classify the magnetic materials.
5. Explain the basic concepts of Quantum Mechanics and the band theory of solids.
6. Identify the type of semiconductor using Hall effect.

SYLLABUS

UNIT - I

Wave Optics

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

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT - II

Crystallography and X-ray diffraction

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

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

UNIT - III

Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT - IV

Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy.

UNIT – V

Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic

semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

Textbooks:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010**.**
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html

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DEPARTMENT OF CIVIL ENGINEERING

Subject	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Objectives:

1. To enlighten the learners in the concept of differential equations and multivariable calculus.
2. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

Course Outcomes:

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

1. Solve the differential equations related to various engineering fields.
2. Identify solution methods for partial differential equations that model physical processes.
3. Interpret the physical meaning of different operators such as gradient, curl and divergence.
4. Estimate the work done against a field, circulation and flux using vector calculus.

SYLLABUS

UNIT - I

Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT - II

Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT - III

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT - IV

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

UNIT - V

Vector integration: LWithoutegral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Textbooks:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition.
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017

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DEPARTMENT OF CIVIL ENGINEERING

Subject	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Objectives:

To expose to the field of electrical & electronics engineering, laws and principles of electrical/electronic engineering and to acquire fundamental knowledge in the relevant field.

Course Outcomes:

1. Describe fundamental laws, operating principles of motors/generators, MC/MI instruments (L2)
2. Demonstrate the working of electrical machines, measuring instruments and power generation stations. (L2)
3. Apply mathematical tools and fundamental concepts to derive various equations related to electrical circuits and machines. (L3)
4. Calculate electrical load and electricity bill of residential and commercial buildings. (L4)

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I: DC & AC Circuits:

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT – II: Machines and Measuring Instruments:

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT – III: Energy Resources, Electricity Bill & Safety Measures:

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition**.**
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013.
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:

1. Basic Electrical Engineering, D.P.Kothari and I.J.Nagrath, Mc Graw Hill, 2019, Fourth Edition**.**
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020.
3. Basic Electrical Engineering, T.K.Nagsarkar and M.S.Sukhija, Oxford University Press, 2017**.**
4. Basic Electrical and Electronics Engineering, S.K.Bhatacharya, Person Publications, 2018, Second Edition.

Web Resources:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

Course Outcomes:

1. Demonstrate the working and characteristics of semiconductor diodes and Transistors
2. Know the working principles of rectifier, filter, regulator and amplifier
3. Understand the number systems, Implement and apply the digital logic gates

UNIT – I

SEMICONDUCTOR DEVICES: Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction

Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT – II

BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION: Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT – III

DIGITAL ELECTRONICS: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

End examination pattern:

1. Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
2. In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
3. In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
4. The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING GRAPHICS				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	1	0	4	3

Course Objectives:

1. To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
2. To impart knowledge on the projection of points, lines and plane surfaces.
3. To improve the visualization skills for better understanding of projection of solids.
4. To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
5. To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

Course Outcomes:

1. Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
2. Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
3. Understand and draw projection of solids in various positions in first quadrant.
4. Explain principles behind development of surfaces.
5. Prepare isometric and perspective sections of simple solids.

SYLLABUS

UNIT – I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: Construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

UNIT – II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes.

Projections of Planes: Regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT – III

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT – IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT – V

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

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (Not for end examination).

Textbook:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference Books:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	IT WORKSHOP				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	0	0	2	1

Course Objectives:

1. To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
2. To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS
3. To teach basic command line interface commands on Linux.
4. To teach the usage of Internet for productivity and self-paced life-long learning
5. To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

Course Outcomes:

After successful completion of the course, the student will be able to

1. Demonstrate the ability to identify, assemble, and configure computer hardware components and operating systems, including dual boot setups.
2. Apply basic Linux command-line operations, network configurations, and cyber hygiene practices for secure internet usage.
3. Utilize LaTeX, word processors, spreadsheets, and presentation tools for document creation, data analysis, and professional presentations.
4. Experiment with AI tools like ChatGPT for prompt engineering, creative writing, and language translation to enhance productivity and learning.

SYLLABUS

PC Hardware & Software Installation:

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go

through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:

Task 1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD:

Task 1: Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that

would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL:

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.

POWER POINT:

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT:

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition

7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING MECHANICS				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Objectives:

1. To get familiarized with different types of force systems.
2. To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
3. To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
4. To apply the Work-Energy method to particle motion.
5. To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

Course Outcomes: On Completion of the course, the student should be able to

1. Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.
2. Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.
3. Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.
4. Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.
5. Solve the problems involving the translational and rotational motion of rigid bodies.

SYLLABUS

UNIT - I

Introduction to Engineering Mechanics – Basic Concepts. Scope and Applications

Systems of Forces: Coplanar Concurrent Forces– Components in Space–Resultant–Moment of Force and its Application –Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.

UNIT - II

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorm, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses.

Principle of virtual work with simple examples

UNIT - III

Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures. Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems.

Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

UNIT - IV

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

UNIT - V

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

Textbooks:

1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., McGraw Hill Education 2017. 5th Edition.
2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.
3. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition.

Reference Books:

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L.G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition.
5. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING PHYSICS LAB				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	0	0	2	1

Course Objectives:

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

Course Outcomes:

The students will be able to

1. Operate optical instruments like travelling microscope and spectrometer.
2. Estimate the wavelengths of different colours using diffraction grating.
3. Plot the intensity of the magnetic field of circular coil carrying current with distance.
4. Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.
5. Calculate the band gap of a given semiconductor.
6. Identify the type of semiconductor using Hall effect.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.

11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

References:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources:

1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Objectives:

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

Course Outcomes:

After competition of this course, the student will be able to

1. Measure voltage, current and power in an electrical circuit. (L3)
2. Measure of Resistance using Wheat stone bridge (L4)
3. Discover critical field resistance and critical speed of DC shunt generators. (L4)
4. Investigate the effect of reactive power and power factor in electrical loads. (L5)

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   a. Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   a. Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
   a. Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.

b. Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

Course Outcomes:

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

1. Identify & testing of various electronic components.
2. Understand the usage of electronic measuring instruments.
3. Plot and discuss the characteristics of various electron devices.

4. Explain the operation of a digital circuit.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

References:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING MECHANICS & BUILDING PRACTICES LAB				
Year / Semester	I B.Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Objectives:

The students completing the course are expected to

1. Verify the Law of Parallelogram of Forces and Lami's theorem.
2. Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
3. Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.

Course Outcomes:

On completion of the course, the student should be able to:

1. Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.
2. Verify Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever.
3. Determine the Centre of gravity different configurations
4. Understand the Quality Testing and Assessment Procedures and principles of Non-Destructive Testing.
5. Exposure to safety practices in the construction industry.

Students have to perform any 10 of the following Experiments:

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.
8. Properties of fine and coarse aggregates.

9. Field-Visit to understand the Quality Testing – Construction Practice.
10. Safety Practices in Construction sites.
11. Manufacturing process of bricks and precast elements.
12. Concrete preparation - Ready Mix Plant (Demonstration).

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DEPARTMENT OF CIVIL ENGINEERING

Subject	HEALTH AND WELLNESS, YOGA AND SPORTS				
Year / Semester	I B.Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	1	0.5

Course Objectives:

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

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

1. Understand the importance of yoga and sports for Physical fitness and sound health.
2. Demonstrate an understanding of health-related fitness components.
3. Compare and contrast various activities that help enhance their health.
4. Assess current personal fitness levels.
5. Develop Positive Personality

SYLLABUS

UNIT – I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities: i) Organizing health awareness programmes in community

ii) Preparation of health profile

iii) Preparation of chart for balance diet for all age groups

UNIT – II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities: Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

ii) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.

iii) Practicing general and specific warm up, aerobics

iv) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022.
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice.
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993.
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014.
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

1. Evaluated for a total of 100 marks.
2. A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

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DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

II B.Tech. - I Semester

(R23)

VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
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DEPARTMENT OF CIVIL ENGINEERING

Subject	NUMERICAL TECHNIQUES AND STATISTICAL METHODS				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Objectives:

1. To elucidate the different numerical methods to solve nonlinear algebraic equations.
2. To disseminate the use of different numerical techniques for carrying out numerical integration.
3. To familiarize the students with the foundations of probability and statistical methods.
4. To equip the students to solve application problems in their disciplines.

Course Outcomes:

1. To evaluate the approximate roots of polynomial and transcendental equations by different algorithms. Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals (L3).
2. To apply numerical integral techniques to different Engineering problems. Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations (L3).
3. To apply discrete and continuous probability distributions (L3).
4. To design the components of a classical hypothesis test (L6).
5. To infer the statistical inferential methods based on small and large sampling tests (L4).

SYLLABUS

UNIT – I

ITERATIVE METHODS: Introduction – Solutions of algebraic and transcendental equations: Bisection method – Secant method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations)

Interpolation: Newton's forward and backward formulae for interpolation – Interpolation with unequal intervals – Lagrange's interpolation formula.

UNIT – II

NUMERICAL INTEGRATION, SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS WITH INITIAL CONDITIONS: Trapezoidal rule – Simpson's 1/3rd and 3/8th rule – Solution of initial value problems by Taylor's series – Picard's method of successive approximations – Euler's method – Runge-Kutta method (second and fourth order) – Milne's Predictor and Corrector Method.

UNIT – III

PROBABILITY AND DISTRIBUTIONS: Baye's theorem – Random variables – Discrete and Continuous random variables – Distribution functions – Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance – Binomial, Poisson, Uniform and Normal distributions.

UNIT – IV

SAMPLING THEORY: Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only) – Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof) – Estimation using t, χ^2 and F-distributions.

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 – Test of significance for large samples and Small Samples: Single and difference means – Single and two proportions – Student's t- test, F-test, χ^2 – test.

Text Books:

1. B. S. Grewal, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers.
2. Miller and Freund's, "Probability and Statistics for Engineers", 7/e, Pearson, 2008.

Reference Books:

1. Steven C. Chapra, "Applied Numerical Methods with MATLAB for Engineering and Science", Tata Mc. Graw Hill Education.
2. M. K. Jain, S.R.K. Iyengar and R.K. Jain, "Numerical Methods for Scientific and Engineering Computation", New Age International Publications.
3. Lawrence Turyn, "Advanced Engineering Mathematics", CRC Press.

4. S. C. Gupta and V.K. Kapoor, “Fundamentals of Mathematical Statistics”, 11/e, Sultan Chand & Sons Publications, 2012.
5. Shron L. Myers, Keying Ye, Ronald E Walpole, “Probability and Statistics Engineers and the Scientists”, 8th Edition, Pearson 2007.
6. Jay l. Devore, “Probability and Statistics for Engineering and the Sciences”, 8th Edition, Cengage.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	2	1	0	3

Course Objectives:

1. To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes:

1. To define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)
2. To identify one's self, and one's surroundings (family, society nature) (L1, L2)
3. To apply what they have learnt to their own self in different day-to-day settings in real life (L3)
4. To relate human values with human relationship and human society. (L4)
5. To justify the need for universal human values and harmonious existence (L5)
6. To develop as socially and ecologically responsible engineers (L3, L6)

SYLLABUS

UNIT - I

INTRODUCTION TO VALUE EDUCATION

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT – II

HARMONY IN THE HUMAN BEING

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT – III

HARMONY IN THE FAMILY AND SOCIETY

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT – IV

HARMONY IN THE NATURE/EXISTENCE

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT – V

IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfill Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

Text Books:

1. The Textbook R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1.
2. The Teacher's Manual R R Gaur, R Asthana, G P Bagaria,Teachers' "Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

Reference Books:

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, 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)

Web Resources:

1. https://fdp-si.aicteindia.org/UHVII%20Class%20Notes%20&%20Handouts/UHV%20Handout%20-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHVII%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte india.org/UHVII%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDPSI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicteindia.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf

8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-humanvalues/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385 https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
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DEPARTMENT OF CIVIL ENGINEERING

Subject	SURVEYING				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Objectives:

1. To know the principle and methods of surveying and measuring of horizontal and vertical-distances and angles
2. To identification of source of errors and rectification methods
3. To know surveying principles to determine areas and volumes
4. To setting out curves and use modern surveying equipment for accurate results
5. To know the basics of Photogrammetry Surveying

Course Outcomes:

1. To apply the principle and methods of surveying and measuring of horizontal and vertical-distances and angles (L2)
2. To identify the source of errors and rectification methods (L3)
3. To apply surveying principles to determine areas and volumes (L2)
4. To setting out curves and using modern surveying equipment (L3)
5. To apply the basics of Photogrammetry Surveying in field (L4)

SYLLABUS

UNIT - I

INTRODUCTION AND BASIC CONCEPTS: Introduction, Objectives, classification and principles of surveying, Surveying accessories. Introduction to Compass, leveling and Plane table surveying. Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections. Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip –systems and W.C.B and Q.B systems of locating bearings.

UNIT - II

LEVELLING: Types of levels, methods of levelling, and Determination of levels, Effect of Curvature of Earth and Refraction. Contouring- Characteristics and uses of Contours, methods of contour surveying. Areas - Determination of areas consisting of irregular boundary and

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

UNIT - III

THEODOLITE SURVEYING: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible. Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

UNIT - IV

CURVES: Types of curves and their necessity, elements of simple, compound, reverse curves. Introduction to Tacheometric Surveying. Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station advantages and Applications. Introduction to Global Positioning System. Introduction to Drone survey and LiDAR Survey (Light Detection And Ranging).

UNIT - V

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

Text Books:

1. "Surveying" (Vol – 1 & 2) by Duggal S K, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.
2. "Textbook of Surveying" by C Venkatramaiah, Universities Press 1st Edition, 2011.

Reference Books:

1. "Surveying (Vol – 1)", by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi, 18th edition 2024.
2. "Surveying (Vol – 2)", by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi 17th 2022.
3. "Surveying" (Vol – 3)", by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi 16th 2023.

4. "Plane Surveying and Higher Surveying" by Chandra A M, New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition, 2015.
5. "Surveying and Levelling" by N.Basak Tata McGraw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2014.
6. "Surveying (Vol 1, 2 & 3)", by Arora K R, Standard Book House, Delhi. Edition: 12th, 2015.

Web Resources:

1. https://koha.srmap.edu.in/cgi-bin/koha/opacdetail.pl?biblionumber=11522&shelfbrowse_itemnumber=23066

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DEPARTMENT OF CIVIL ENGINEERING

Subject	STRENGTH OF MATERIALS				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Objectives:

1. To impart Fundamental concepts of Strength of Material and Principles of Elasticity and Plasticity Stress.
2. To impart concepts of shear force and bending moment on various types of beams and loading conditions.
3. To impart concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
4. To the concepts above will be utilized in measuring deflections in beams under various loading and support conditions.
5. To classify cylinders and columns 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 basic materials behavior under the influence of different external loading conditions and the support conditions. (L2)
2. To draw the diagrams indicating the variation of the key performance features like axial forces, bending moment and shear forces in structural members. (L3)
3. To acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams (L2)
4. To analyze the deflections due to various loading conditions. (L3)
5. To assess stresses across section of the thin, thick cylinders and columns to arrive at optimum sections to withstand the internal pressure using Lame's equation (L4)

SYLLABUS

UNIT - I

SIMPLE STRESSES AND STRAINS: Elasticity and plasticity — Types of stresses and strains — Hooke's law — Factor of safety, Poisson's ratio - Relationship between Elastic constants — Bars of varying section — stresses in composite bars.

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 STRESSES: Theory of simple bending — Assumptions — Derivation of bending equation, Neutral axis — Determination of bending stresses — section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections — Design of simple beams.

SHEAR STRESSES: Derivation of formula — Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections. Torsion – circular shafts only.

UNIT - IV

DEFLECTION OF BEAMS: 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

COLUMNS: Introduction – Classification of columns – Axially loaded compression members – Euler 's crippling load theory – Derivation of Euler 's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler 's critical stress – Limitations of Euler 's theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry 's formula.

THIN AND THICK CYLINDRICAL SHELLS: Derivation of formula for longitudinal and circumferential stresses — hoop, longitudinal and volumetric strains — changes in diameter, and volume of thin cylinders. Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders distribution of stresses.

Text Books:

1. "Strength of Materials" by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2. "Strength of Materials" by B. S. Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010.
3. "Strength of Materials" by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition, 2024.

References Books:

1. "Advanced Mechanics of Solids", L.S Srinath, McGraw Hill Education, 2017, 3rd Edition
2. "Strength of Materials - Fundamentals and Applications", T.D.Gunneswara Rao and MudimbyAndal, Cambridge University Press, 2018, 1st Edition.
3. "Mechanics of Materials", Beer and Johnston, McGraw Hill India Pvt. Ltd., 2020, 8th Edition (SI Units).
4. "Mechanics of Solids" — E P Popov, Prentice Hall, 2nd Edition, 2015.
5. "A Textbook of Strength of Materials", by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi 7th edition 2022.
6. "Strength of Materials" by S.S.Ratan Tata McGrill Publications 3rd Edition, 2016.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	FLUID MECHANICS				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Objectives:

1. To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
2. To impart ability to solve engineering problems in fluid mechanics.
3. To enable the students measure quantities of fluid flowing in pipes, tanks and channels.
4. To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5. To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

Course Outcomes:

1. To Understand the principles of fluid statics, kinematics and dynamics (L2)
2. To Apply the laws of fluid statics and concepts of buoyancy (L3)
3. To Understand the fundamentals of fluid kinematics and differentiate types of fluid flows (L2)
4. To Apply the Principle of conservation of energy for flow measurement (L3)
5. To Analyze the losses in pipes and discharge through pipe network (L4)

SYLLABUS

UNIT - I

BASIC CONCEPTS AND DEFINITIONS: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility

UNIT – II

FLUID STATICS:

FLUID PRESSURE: Pressure at a point, Pascal 's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer. Pressure gauges.

HYDROSTATIC PRESSURE AND FORCE: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT - III

FLUID KINEMATICS:

CLASSIFICATION OF FLUID FLOW: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three - Dimensional continuity equations in Cartesian coordinates.

UNIT - IV

FLUID DYNAMICS: Surface and body forces; Equations of motion - Euler 's equation; Bernoulli 's equation – Derivation; Energy Principle

PRACTICAL APPLICATIONS OF BERNOULLI 'S EQUATION: Venturi meter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number.

UNIT - V

ANALYSIS OF PIPE FLOW: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Text Books:

1. P. M. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics", Standard Book House 22nd, 2019.
2. K. Subrahmanya, "Theory and Applications of Fluid Mechanics", Tata McGraw Hill, 2nd edition 2018.

Reference Books:

1. R. K. Bansal, A text of "Fluid mechanics and hydraulic machines", Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. N. Narayana Pillai, "Principles of Fluid Mechanics and Fluid Machines", Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. "Fluid Mechanics" by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition , 2022.
4. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, "Fluid Mechanics and Machinery", Oxford University Press, 2010.
5. "Introduction to Fluid Mechanics & Fluid Machines" by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

Web Resources:

1. https://archive.nptel.ac.in/courses/112/105/112105269/
2. https://nptel.ac.in/courses/112104118
3. https://nptel.ac.in/courses/105103192

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DEPARTMENT OF CIVIL ENGINEERING

Subject	SURVEYING LABORATORY				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	0	0	3	1.5

Course Objectives:

1. To know about various linear and angular measuring instruments.
2. To take Measurements in the linear and angular view
3. To determine the area and volume by interpreting the data obtained from surveying activities.
4. To know modern equipment such as total station.
5. To draft field notes from survey data.

Course Outcomes:

1. To handle various linear and angular measuring instruments.
2. To measure the linear and angular measurements.
3. To calculate the area and volume by interpreting the data obtained from surveying activities.
4. To handle modern equipment such as total station.
5. To prepare field notes from survey data.

List of Field Works:

1. Chain survey of road profile with offsets in case of road widening.
2. Determination of distance between two inaccessible points by using compass.
3. Plane table survey; finding the area of a given boundary by the method of Radiation.
4. Fly levelling: Height of the instrument method (differential leveling)
5. Fly levelling: rise and fall method.
6. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
7. Theodolite survey: finding the distance between two in accessible points.
8. Theodolite survey: finding the height of far object.
9. Determination of area perimeter using total station.
10. Determination of distance between two inaccessible point by using total station.

11. Setting out a curve
12. Determining the levels of contours.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	STRENGTH OF MATERIALS LABORATORY				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	0	0	3	1.5

Course objectives:

1. To determine the tensile strength and yield parameters of mild steel
2. To find out flexural strengths of Steel/Wood specimens and measure deflections
3. To determine the torsion parameters of mild steel bar
4. To determine the hardness numbers, impact and shear strengths of metals.
5. To determine the load-deflection parameters for springs

Course Outcomes:

1. To conduct tensile strength test and draw stress-strain diagrams for ductile metals
2. To perform bending test and determine load-deflection curve of steel/wood
3. To able to conduct torsion test and determine torsion parameters
4. To perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths
5. To able to conduct tests on closely coiled and open coiled springs and calculate deflections

List of Experiments:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Hardness test.
6. Compression test on Open coiled springs
7. Tension test on Closely coiled springs
8. Compression test on wood/ concrete
9. Izod / Charpy Impact test on metals
10. Shear test on metals
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	BUILDING PLANNING AND DRAWING				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	0	1	2	2

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.
4. Giving training exercises on different building units.
5. Imparting the skills and methods of planning of various buildings.

Course Outcomes:

1. To plan various buildings as per the building by-laws.
2. To distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
3. To draw signs and bonds
4. To draw different building units
5. To learn the skills of drawing building elements and plan the buildings as per requirements.

List of Drawings:

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors & Windows.
5. Detailing & Drawing of Staircase.
6. Detailing & Drawing of Ventilators & Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

Text Books:

1. "Planning, designing and Scheduling", Gurcharan Singh and Jagdish Singh
2. "Building planning and drawing" by M. Chakraborti.
3. "Building drawing", M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

Reference Books:

1. "National Building" Code 2016 (Volume- I & II).
2. "Principles of Building Drawing", M G Shah and C M Kale, Trinity Publications, New Delhi.
3. "Civil Engineering drawing and House planning", B. P. Verma, Khanna publishers, New Delhi.
4. "Civil Engineering Building practice", Suraj Singh: CBS Publications, New Delhi, and Chennai
5. "Building Materials and Construction", G. C Saha and Joy Gopal Jana, McGrawHill Education (P) India Ltd. New Delhi.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENVIRONMENTAL SCIENCE				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation year	R - 23	2	0	0	0

Course Objectives:

1. To make the students to get awareness on environment
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
3. To save earth from the inventions by the engineers.

Course Outcomes:

1. To grasp multi-disciplinary nature of environmental studies and various renewable and non-renewable resources. (L2)
2. To understand flow and bio-geo- chemical cycles and ecological pyramids. (L2)
3. To understand various causes of pollution and solid waste management and related preventive measures. (L2)
4. To understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation. (L2)
5. To illustrate the causes of population explosion, value education and welfare programs. (L3)

SYLLABUS

UNIT – I

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

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

agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

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

UNIT – III

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

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

UNIT – IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

Human Population and The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies. Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain –Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Text Books:

1. Erach Bharucha, “Text book of Environmental Studies for Undergraduate Courses”, Universities Press (India) Private Limited, 2019.
2. Palaniswamy, “Environmental Studies”, 2/e, Pearson education, 2014.
3. S. Azeem Unnisa, “Environmental Studies”, Academic Publishing Company, 2021.
4. K. Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd, 2010.

Reference Books:

1. Deeksha Dave and E. Sai Baba Reddy, “Textbook of Environmental Science”, 2/e, Cengage Publications, 2012.

2. M. Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, 2014.
3. J.P. Sharma, "Comprehensive Environmental studies", Laxmi publications, 2006.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice Hall of India Private limited, 1988.
5. G.R. Chatwal, "A Text Book of Environmental Studies", Himalaya Publishing House, 2018.
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science", 1/e, Prentice Hall of India Private limited, 1991.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc23_hs155/preview
2. https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-83881b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science+art+3%3A+Pollution+and+Resources&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science
3. http://ecoursesonline.iasri.res.in/Courses/Environmental%20ScienceI/Data%20Files/pdf/lec07.pdf
4. https://www.youtube.com/watch?v=5QxxaVfgQ3k

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DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

II B.Tech. - II Semester

(R23)

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

DEPARTMENT OF CIVIL ENGINEERING

Subject	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R – 23	2	0	0	2

Course Objectives:

1. To inculcate the basic knowledge of microeconomics and financial accounting.
2. To make the students learn how demand is estimated for different products, input output relationship for optimizing production and cost.
3. To Know the Various types of market structure and pricing methods and strategy.
4. To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5. To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

1. Define the concepts related to Managerial Economics, financial accounting and management (L2)
2. Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets (L2)
3. Apply the Concept of Production cost and revenues for effective Business decision (L3)
4. Analyze how to invest their capital and maximize returns (L4)
5. Evaluate the capital budgeting techniques. (L5)
6. Develop the accounting statements and evaluate the financial performance of business entity (L5)

SYLLABUS

UNIT – I

Managerial Economics: Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT – II

Production and Cost Analysis: Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT – III

Business Organizations and Markets: Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT – IV

Capital Budgeting: Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT – V

Financial Accounting and Analysis: Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Text Books:

1. Varshney & Maheswari: “Managerial Economics”, Sultan Chand.
2. Aryasri: “Business Economics and Financial Analysis”, 4/e, MGH.

Reference Books:

1. Ahuja Hl “Managerial economics” Schand.

2. S.A. Siddiqui and A.S. Siddiqui: "Managerial Economics and Financial Analysis", New Age International.
3. Joseph G. Nellis and David Parker: "Principles of Business Economics", Pearson, 2/e, New Delhi.
4. Domnick Salvatore: "Managerial Economics in a Global Economy", Cengage.

Web Resources:

1. https://www.slideshare.net/123ps/managerial-economics-ppt
2. https://www.slideshare.net/rossanz/production-and-cost-45827016
3. https://www.slideshare.net/darkyla/business-organizations-19917607
4. https://www.slideshare.net/balarajbl/market-and-classification-of-market
5. https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
6. https://www.slideshare.net/ashu1983/financial-accounting

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING GEOLOGY				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R – 23	3	0	0	3

Course Objectives:

1. To know the importance of Engineering Geology to the Civil Engineering.
2. To enable the students, understand what minerals and rocks are and their formation and identification.
3. To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.
4. To enable the students, realize its importance and applications of Engineering Geology in Civil Engineering constructions.
5. Concepts of Groundwater and its geophysical methods

Course Outcomes:

1. To understand the significance of geological agents on Earth surface and its significance in Civil Engineering.
2. To identify and understand the properties of Minerals and Rocks.
3. To understand the concepts of Groundwater and its geophysical methods.
4. To classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.
5. To investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels.

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT - V

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

Text Books:

1. "Engineering Geology" by N. ChennaKesavulu, Laxmi Publications. 2nd Edn 2014.
2. "Engineering & General Geology" by Parbin Singh Katson educational series 8th 2023

References:

1. "Engineering Geology" by SubinoyGangopadhay Oxford University press 1st edition, 2012.
2. "Engineering Geology" by D. Venkat Reddy, Vikas Publishing, 2nd Edn, 2017.
3. "Geology for Engineers and Environmental Society" Alan E Kehew, 3rd edn., 2013, Pearson publications.
4. "Environmental Geology" (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications.

Web Resources:

1. http://nptel.iitm.ac.in/video.php?subjectId=105105106
2. http://nptel.iitm.ac.in/video.php?courseId=1055&p=1
3. http://nptel.iitm.ac.in/video.php?courseId=1055&p=3
4. http://nptel.iitm.ac.in/video.php?courseId=1055&p=4

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DEPARTMENT OF CIVIL ENGINEERING

Subject	CONCRETE TECHNOLOGY				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R – 23	3	0	0	3

Course Objectives:

1. Learn materials and their properties used in the production of concrete.
2. Learn the behavior of concrete at fresh stage.
3. Learn the behavior of concrete at hardened stage.
4. Learn the influence of elasticity, creep and shrinkage on concrete.
5. Learn the mix design methodology and special concretes.

Course Outcomes:

1. To familiarize the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.
2. To test the fresh concrete properties and the hardened concrete properties, understand the basic concepts of concrete, design the concrete mix by BIS method.
3. To evaluate the ingredients of concrete through lab test results, realize the importance of quality of concrete.
4. To understand the behaviour of concrete in various environments.
5. To familiarize the basic concepts of special concrete and their production and applications.

SYLLABUS

UNIT - I

CEMENTS: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substances – Soundness – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading

curves – Grading of fine & coarse Aggregates – Maximum aggregate size- Quality of mixing water

UNIT - II

FRESH CONCRETE: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete

UNIT – III

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gel/space ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete: Compression test – Tension test – Factors affecting strength – Flexure test –Splitting test – Non-destructive testing methods – Codal provisions for NDT.

UNIT – IV

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

UNIT – V

MIX DESIGN AND SPECIAL CONCRETES: Ready mixed concrete, Fibre reinforced concrete – Different types of fibres – Factors affecting properties of FRC, High performance concrete – Self consolidating concrete, Self healing concrete. Factors in the choice of mix proportions –Quality control of concrete- Statistical methods- Acceptance Criteria-Concepts Proportioning of concrete mixes by ACI method and IS Code method

Text Books:

1. "Properties of Concrete" by A.M. Neville – PEARSON – 4th edition
2. "Concrete Technology" by M.L. Gambhir. – Tata Mc.Graw Hill Publishers, New Delhi 5th edition 2013.
3. "Concrete Technology" by Job Thomas, Cengagae Publications, 1st edition, 2015

Reference Books:

1. "Concrete Microstructure, Properties of Materials" by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014.
2. "Concrete Technology", J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition.
3. "Concrete Technology" by M. S. Shetty. – S. Chand & Co.; 2004
4. "Concrete Technology" by A.R. Santha Kumar, Oxford University Press, New Delhi

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DEPARTMENT OF CIVIL ENGINEERING

Subject	STRUCTURAL ANLAYSIS				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R – 23	3	0	0	3

Course Objectives:

1. To learn energy theorems
2. To learn the analysis of indeterminate structures
3. To analysis of fixed and continuous beams
4. To learn about slope-deflection method
5. To learn about Moment – distribution method

Course Outcomes:

1. Apply energy theorems to analyze trusses
2. Analyze indeterminate structures by using Castigliano ‘s–II theorem
3. Analysis of fixed and continuous beams
4. Analyze continuous beams and portal frames by using slope-deflection method
5. Analyze continuous beams and portal frames by using Moment – distribution method

SYLLABUS

UNIT – I

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano ‘s first theorem Deflections of simple beams and pin jointed trusses.

UNIT – II

ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis - Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano‘s–II theorem.

UNIT – III

FIXED BEAMS & CONTINUOUS BEAMS: Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment

diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway.

UNIT – V

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method-Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway.

Text Books:

1. "Analysis of Structures – Vol-I & II" by V. N. Vazirani & M. M. Ratwani, Khanna Publications, New Delhi.
2. "Basic Structural Analysis" by C. S. Reddy., Tata McGraw Hill Publishers. 3rd edition 2017.
3. "Structural Analysis" – D.S.Prakasarao -Univeristy press.

Reference Books:

1. "Structural analysis" by Aslam Kassimali Cengage publications 6th edition 2020.
2. "Structural analysis Vol.I and II" by Dr.R.Vaidyanathan and Dr.PPerumal– Laxmi publications. 3rd 2016.
3. "Introduction to structural analysis" by B.D.Nautiyal, New Age international publishers, New Delhi.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	HYDRAULICS AND HYRAULIC MACHINERY				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R – 23	3	0	0	3

Course Objectives:

1. To Introduce concepts of laminar and turbulent flows
2. To teach principles of uniform flows through open channel.
3. To teach principles of non-uniform flows through open channel.
4. To impart knowledge on design of turbines.
5. To impart knowledge on design of pumps.

Course Outcomes:

1. Understand the characteristics of laminar and turbulent flows. (L2)
2. Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels. (L3)
3. Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows. (L3)
4. Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine (L5)
5. Understand the principles, losses and its efficiencies of centrifugal pumps (L2)

SYLLABUS

UNIT – I

LAMINAR & TURBULENT FLOW IN PIPES: Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke ‘s law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody ‘s diagram – Introduction to boundary layer theory.

UNIT – II

UNIFORM FLOW IN OPEN CHANNELS: Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section.

Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors

UNIT – III

NON-UNIFORM FLOW IN OPEN CHANNELS: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity - Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

UNIT – IV

IMPACT OF JETS: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency Hydraulic

TURBINES: Classification of turbines; pelton wheel and its design. Francis turbine and its design- efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects**.**

UNIT – V

PUMPS: Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies.

Text Books:

1. P. M. Modi and S. M. Seth, “Hydraulics and Fluid Mechanics”, Standard Book House 22nd, 2019.
2. K. Subrahmanya, “Theory and Applications of Fluid Mechanics”, Tata McGraw Hill, 2nd edition 2018.

Reference Books:

1. R. K. Bansal, A text of “Fluid mechanics and hydraulic machines”, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. N. Narayana Pillai, “Principles of Fluid Mechanics and Fluid Machines”, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. “Fluid Mechanics” by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition, 2022.

4. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, "Fluid Mechanics and Machinery", Oxford University Press, 2010.
5. "Introduction to Fluid Mechanics & Fluid Machines" by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

Web Resources:

1. https://nptel.ac.in/courses/105105203
2. https://archive.nptel.ac.in/courses/112/106/112106300/
3. https://archive.nptel.ac.in/courses/112/103/112103249/

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DEPARTMENT OF CIVIL ENGINEERING

Subject	CONCRETE TECHNOLOGY LABORATORY				
Year / Semester	II B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Objectives:

1. To test basic properties of ingredients of concrete fresh and hardened concrete properties.

Course Outcomes:

1. Outline importance of testing cement and its properties.
2. Assess different properties of Aggregates.
3. Assess fresh concrete properties and their relevance to hardened concrete.
4. Assess hardened concrete properties

List of Field Works:

1. Tests on Cement
    a. Normal Consistency and Fineness of cement.
    b. Initial setting time and Final setting time of cement.
    c. Specific gravity and soundness of cement.
    d. Compressive strength of cement.
2. Tests on Fine Aggregates
    a. Grading and fineness modulus of Fine aggregate by sieve analysis.
    b. Specific gravity of fine aggregate
    c. Water absorption and Bulking of sand.
3. Tests on Coarse Aggregates
    a. Grading of Coarse aggregate by sieve analysis.
    b. Specific gravity of coarse aggregate
    c. Water absorption of Coarse aggregates
4. Tests on fresh Concrete
    a. Workability of concrete by compaction factor method
    b. Workability of concrete by slump test
    c. Workability of concrete by Vee-bee test.

5. Tests on Hardened Concrete
    a. Compressive strength of cement concrete and Modulus of rupture
    b. Young's Modulus and Poisson's Ratio
    c. Split tensile strength of concrete.
    d. Non-Destructive testing on concrete (for demonstration)

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING GEOLOGY LABORATORY				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R – 23	0	0	3	1.5

Course objectives:

1. To identify the Megascopic types of Ore minerals & Rock forming minerals.
2. To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
3. To identify the topography of the site & material selection

Course Outcomes:

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

List of Experiments:

1. Physical properties of minerals: Mega-scopic identification of
    a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc.
    b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc.
2. Megascopic description and identification of rocks.
    a. Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
    b. Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
    c. Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.

4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, Geomorphology& Structural Geology.

Lab Examination Pattern:

1. Description and identification of FOUR minerals.
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Question on Interpretation of a Geological map along with a geological section.
4. TWO Questions on Simple strike and Dip problems.
5. Bore hole problems.
6. Project report on geology.

References:

1. "Applied Engineering Geology Practicals" by M T Mauthesha Reddy, New Age International Publishers, 2nd Edition.
2. "Foundations of Engineering Geology" by Tony Waltham, Spon Press, 3rd edition, 2009.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	REMOTE SENSING & GEOGRAPHICAL INFORMATION SYSTEMS				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R – 23	0	1	2	2

Course Objectives:

1. Introduce the basic principles of Remote Sensing and GIS techniques and its application to Civil Engineering.
2. Learn various types of sensors and platforms and understand the principles of spatial analysis techniques in GIS.
3. Introduce GIS software to understand the process of digitization, creation of thematic map from toposheets and maps.

Course Outcomes:

1. Acquire knowledge about concepts of remote sensing, sensors and their characteristics.
2. Familiarize with data models and data structures to introduce various Raster and Vector Analysis capabilities in GIS.
3. Digitize and create thematic map and extract important features to calculate geometry.
4. Perform surface analysis over Contour to develop digital elevation model.
5. Use GIS software to perform simple analysis in water resources and transportation engineering.

SYLLABUS

UNIT – I

INTRODUCTION TO REMOTE SENSING: History of Remote Sensing, Electromagnetic Radiation, Electromagnetic Spectrum, Energy Interaction with Atmosphere, Energy Interaction with the Earth Surfaces - Characteristics of Remote Sensing Systems, Sensor Resolutions, Advantages & Limitations - Platforms: Types of Sensors, Airborne Remote Sensing, Spaceborne Remote Sensing - IRS, LANDSAT, SPOT & Recent satellite.

UNIT – II

DIGITAL IMAGE ANALYSIS: Digital Image Characteristics, Digital Image Data Formats, Band Interleaved by Pixel (BIP), Band Interleaved by Line (BIL), Band Sequential (BSQ) –

Visual Interpretation Elements, Preprocessing, Enhancement, Classification, Supervised classification, Unsupervised classification.

UNIT – III

INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEM: Principles, Components and Applications of GIS - Map projections, Spatial Data Structures, Raster and Vector Data Formats, Data Inputs, Data Manipulation, Data Retrieval, Data Analysis - Spatial data analysis: Overlay Function-Vector Overlay Operations, Raster Overlay Operations, Arithmetic Operators, Comparison and Logical Operators, Conditional Expressions - Network Analysis: Components of network, Transportation network - Optimum path analysis.

Text Books:

1. BasudebBhatta (2021). "Remote sensing and GIS", 3rd edn., Oxford University Press.
2. S. Kumar, (2016) "Basics of Remote sensing & GIS", Laxmi Publications.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2022) "Remote Sensing and Image Interpretation", 7th edn., Wiley India Pvt. Ltd.
4. Demers, M.N, (2013) "Fundamentals of Geographic Information Systems", 4th edn., Wiley India Pvt. Ltd.

List of Experiments:

1. Georeferencing a Toposheet or Map
2. Digitization and Attribute table creation.
3. Creation of Thematic Map
4. Calculation of Feature geometry – Length, Area & Perimeter.
5. Contour map – developing TIN & DEM from Contour.
6. Stream network – Stream ordering map.
7. Watershed - calculate Hydro-geomorphological parameters.
8. Transportation Network Map – Route analysis.

GIS Software:

1. QGIS / ArcGIS

Text Books:

1. QGIS User Guide
2. ArcGIS User Manual by ESRI

References:

1. Schowengerdt, R. A (2006) 'Remote Sensing', Elsevier publishers.
2. Burrough P A and R.A. McDonnell, (1998) 'Principals of Geographical Information Systems', Oxford University Press.
3. George Joseph (2013) 'Fundamentals of Remote Sensing', Universities Press.

Web references:

1. https://nptel.ac.in/courses/10510319

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DEPARTMENT OF CIVIL ENGINEERING

Subject	DESIGN THINKING & INNOVATION				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	1	0	2	2

Course Objectives:

1. Bring awareness on innovative design and new product development.
2. Explain the basics of design thinking.
3. Familiarize the role of reverse engineering in product development.
4. Train how to identify the needs of society and convert into demand.
5. Introduce product planning and product development process.

Course Outcomes:

1. Define the concepts related to design thinking. (L1)
2. Explain the fundamentals of Design Thinking and innovation. (L2)
3. Apply the design thinking techniques for solving problems in various sectors. (L3)
4. Analyse to work in a multidisciplinary environment. (L4)
5. Evaluate the value of creativity. (L5)

SYLLABUS

UNIT – I

INTRODUCTION TO DESIGN THINKING: Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT – II

DESIGN THINKING PROCESS: Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT – III

INNOVATION: Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT – IV

PRODUCT DESIGN: Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT – V

DESIGN THINKING IN BUSINESS PROCESSES: Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Text Books:

1. Tim Brown, “Change by design”, 1/e, Harper Bollins, 2009.
2. Idris Mootee, “Design Thinking for Strategic Innovation”, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, “Design Thinking in the Classroom”, Ulysses press, 2018.
2. Shrrutin N Shetty, “Design the Future”, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, & Jill butter, “Universal principles of design”, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, “The era of open innovation”, 2003.

Web Resources:

1. https://nptel.ac.in/courses/110/106/110106124/
2. https://nptel.ac.in/courses/109/104/109104109/
3. https://swayam.gov.in/nd1_noc19_mg60/preview
4. https://onlinecourses.nptel.ac.in/noc22_de16/preview

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DEPARTMENT OF CIVIL ENGINEERING

Subject	BUILDING MATERIALS AND CONSTRUCTION				
Year / Semester	II B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	0

Course Objectives:

1. List the construction material.
2. Explain different construction techniques
3. Understand the building bye-laws
4. Highlight the smart building materials

Course Outcomes:

1. To define the Basic terminology that is used in the industry
2. To categorize different building materials, properties and their uses
3. To understand the Prevention of damage measures and good workmanship
4. To explain different building services

SYLLABUS

UNIT – I

STONES AND BRICKS, TILES: Building stones – classifications and quarrying – properties – structural requirements – dressing. Bricks – Composition of Brick earth – manufacture and structural requirements, Fly ash, Ceramics.

UNIT – II

TIMBER, ALUMINUM, GLASS, PAINTS AND PLASTICS: Wood - structure – types and properties – seasoning – defects; alternate materials for Timber – GI / fibre – reinforced glass bricks, steel & aluminum, Plastics.

UNIT – III

BUILDING COMPONENTS: Lintels, Arches, walls, vaults – stair cases – types of floors, types of roofs – flat, curved, trussed; foundations – types; Damp Proof Course; Joinery – doors – windows – materials – types.

BUILDING SERVICES:

PLUMBING SERVICES: Water Distribution, Sanitary – Lines & Fittings

VENTILATIONS: Functional requirements systems of ventilations. Air-conditioning - Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire Hazards – Classification of fire-resistant materials and constructions

UNIT – IV

MORTARS, MASONRY AND FINISHING'S MORTARS: Lime and Cement Mortars Brick masonry –types – bonds; Stone masonry – types; Composite masonry – Brick-stone composite; Concrete, Reinforced brick.

FINISHERS: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.

FORM WORK: Types, Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

UNIT – V

BUILDING PLANNING: Principles of Building Planning, Classification of buildings and building bye laws.

Text Books:

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

Reference Books:

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

VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
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DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

III B.Tech. - I Semester

(R23)

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

DEPARTMENT OF CIVIL ENGINEERING

Subject	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	2	0	2	3

Course Learning Objectives:

The objective of this course is

1. Familiarize Students with different types of design philosophies.
2. Equip student with concepts of design of flexural members.
3. Understand Concepts of shear, bond and torsion.
4. Familiarize students with different types of compressions members and design.
5. Understand different types of footings and their design.

Course Outcomes:

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

1. Apply working stress and limit state design principles to analyze and design singly and doubly reinforced concrete beams as per relevant codes.
2. Design singly reinforced, doubly reinforced, and flanged (T) beams for flexure using limit state methods and IS code provisions.
3. Design reinforced concrete beams for shear, torsion, and bond, ensuring compliance with serviceability requirements and IS code standards.
4. Design short and long reinforced concrete columns and isolated footings for axial loads and bending moments according to IS code provisions.
5. Design one-way, two-way, and continuous slabs, as well as waist-slab staircases, using conventional methods and IS code coefficients.

SYLLABUS:

UNIT – I

Introduction: Working stress method Design codes and handbooks, loading standards – Dead, live, wind and earthquake loads, elastic theory, design constants, modular ratio, neutral axis depth

and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly and doubly reinforced beams.

Limit State Design: Concepts of limit state design – Basic statistical principles – Characteristic loads –Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance.

UNIT – II

Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T)- Effective width of flange –Behavior- Analysis and Design.

UNIT – III

Design for Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion for L Beam – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

Limit state design for serviceability: Deflection, cracking and code provision.

UNIT – IV

Design of Compression members: Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending – Braced and un-braced columns – IS Code provisions.

Footings: Different types of footings – Design of isolated footings, Square footings – Rectangular footings – circular footing – spread & sloped footings - subjected to axial loads.

UNIT – V

Slabs: Classification of slabs, design of one - way slabs, two - way slabs, and continuous slabs using IS Coefficients (conventional), design of waist-slab staircase.

NOTE: All the designs to be taught in Limit State Method. Drawing classes must be conducted every week and the Following plates should be prepared by the students.

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

FINAL EXAMINATION PATTERN:

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

TEXTBOOKS:

1. 'Limit State Design' by A. K. Jain.
2. 'Reinforced Concrete Structures' by S. Unnikrishna Pillai &Devdas Menon, Tata Mc.Graw Hill, New Delhi.

REFERENCES:

1. 'Design of concrete structures' by N. Krishna Raju.
2. 'Reinforced Concrete Structures' by Park and Pauley, John Wiley and Sons.

IS Codes:

1. IS - 456-2000 (Permitted to use in examination hall)
2. IS – 875
3. SP – 16

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENGINEERING HYDROLOGY				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The course is designed to make the students,

1. Understand hydrologic cycle and its relevance to Civil engineering.
2. Learn physical processes and their interactions in hydrology.
3. Learn measurement and estimation of the components of hydrologic cycle.
4. Have an overview and understanding of Hydrographs.
5. Learn flood frequency analysis, design flood and flood routing methods.
6. Study the concepts of groundwater movement and well hydraulics.

Course Outcomes:

At the end of the course the students are expected to

1. Understand the basic principles of hydrology and quantify components of the hydrologic cycle such as precipitation, evaporation, infiltration, and runoff.
2. Analyze rainfall data and develop design tools like Intensity-Duration-Frequency (IDF) and Depth-Area-Duration (DAD) curves for hydrologic design.
3. Apply hydrograph analysis, develop unit hydrographs and synthetic hydrographs for estimating direct runoff and designing water resources projects.
4. Estimate flood magnitudes using frequency analysis methods and perform flood routing for channels and reservoirs.
5. Determine groundwater parameters, analyze aquifer behavior, and estimate well yield using Darcy's law and related formulas.

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS:

UNIT - I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

Precipitation: Types and forms, measurement, introduction to radar measurement of rain fall, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm

UNIT - II

Abstractions: Initial abstractions, Evaporation: factors affecting, measurement, estimation, reduction, Evapotranspiration: factors affecting, measurement, estimation, control, Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT - III

Runoff: Factors affecting runoff, components, empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, dimensionless unit hydrograph, synthetic unit hydrograph, introduction to IUH.

UNIT - IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.

Flood Routing: Hydrologic routing, channel and reservoir routing-Muskingum and Puls methods of routing.

UNIT - V

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's

equation- steady radial flow to wells in confined and unconfined aquifers, yield of an open well-recuperation test.

TEXTBOOKS:

1. 'Engineering Hydrology' by Subramanya, K, Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi.
2. 'Engineering Hydrology' by Jayarami Reddy, P, Laxmi Publications Pvt. Ltd., (2013), New Delhi.
3. 'Applied hydrology' by Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi.
4. 'Engineering Hydrology' by Ojha C.S.P, R. Berndtsson and P. Bhunya, Oxford University Press, (2010).

REFERENCES:

1. 'Water Resources Engineering', Mays L.W, Wiley India Pvt. Ltd, (2013).
2. 'Hydrology' by Raghunath. H.M., New Age International Publishers, (2010)
3. 'Engineering Hydrology – Principles and Practice' by Ponce V.M., Prentice Hall International, (1994)
4. 'Hydrology and Water Resources Engineering' by Patra K.C., Narosa Publications, (2011).

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DEPARTMENT OF CIVIL ENGINEERING

Subject	GEOTECHNICAL ENGINEERING - I				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To enable the student to determine the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the discharge of water through soils.
3. To impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
4. 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 successful completion of this course, student will be able to:

1. Understand the process of soil formation and classify soils based on index properties; evaluate their engineering suitability using standardized soil classification systems.
2. Analyze soil water systems and evaluate the capillarity and permeability of soil systems under various field conditions.
3. Compute stress distribution in soils using classical theories and evaluate their impact on geotechnical design.
4. Determine the compaction and consolidation characteristics of soils and assess settlement behavior under different loading and saturation conditions.
5. Evaluate and compare the shear strength behavior of different soils under various drainage and loading conditions.

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS:

UNIT – I

Introduction: Soil formation – Structure of Soils – Texture of Soils – Three phase system and phase relationships

Index Properties and Classification Tests of Soils: Index properties – Density Index - Grain size analysis – Sieve and Hydrometer methods – Consistency of Clay Soils – Activity of Clays – Thixotropy of clays - soil Classification – Unified soil classification and I.S. Soil classification - Relative suitability of soils for engineering works based on soil classification

UNIT – II

Soil moisture and Capillarity: Soil moisture and modes of occurrence – Total, Neutral and Effective Pressures – Capillary Rise in soils.

Permeability: Flow of water through soils –- One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting – laboratory determination of coefficient of permeability –Permeability of layered systems - Field determination of permeability – Seepage velocity

UNIT – III

Seepage and Flow Nets: Flow net for one-dimensional flow – two-dimensional flow – Basic equation for Seepage – Flow nets & Characteristics and Uses – Quicksand condition – Seepage forces - Critical hydraulic gradient

Stress Distribution in Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method. - Pressure Blubs

UNIT – IV

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control - Field compaction and its control, Relative compaction

Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) -

Over consolidated and normally consolidated clays - Preconsolidation pressure and its determination

UNIT – V

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – total and effective shear strength parameters – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions – stress paths

TEXTBOOKS:

1. 'Soil Mechanics and Foundation Engineering' by Dr. K.R. Arora, Standard Publishers and Distributors, New Delhi.
2. Basic and Applied Soil Mechanics' by Gopal Ranjan and A.S.R.Rao, New Age International Publishers.
3. 'Soil Mechanics and Foundation Engineering' by V.N.S.Murthy, CBS publishers.
4. 'Geotechnical Engineering' by C. Venkataramaiah, New Age International Publishers.

REFERENCES:

1. 'Fundamentals of Soil Mechanics' by D.W.Taylor., Wiley.
2. 'An introduction to Geotechnical Engineering' by Holtz and Kovacs; Prentice Hall.
3. 'Principles of Geotechnical Engineering', Braja M. Das, Cengage Learing.
4. 'Soil Mechanics and Foundations' by Muni Budhu, John Wiley & Sons, Inc.
5. 'Advanced Soil Mechanics' by Braja M. Das, CRC Press.

VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
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DEPARTMENT OF CIVIL ENGINEERING

Subject	ADVANCED STRUCTURAL ANALYSIS				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

By the end of the course, students will be able to:

1. Understand the behavior and analysis of arches, cable structures, and suspension bridges.
2. Apply approximate and classical methods for analyzing indeterminate structures.
3. Analyze multi-story and portal frames using displacement-based methods (Moment Distribution, Kani's).
4. Evaluate the response of structural systems under various loading conditions, including temperature and support settlements.
5. Develop and implement matrix methods for the analysis of beams, trusses, and frames.

Course Outcomes:

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

1. Determine internal forces in three-hinged and two-hinged arches considering thermal and geometric effects.
2. Perform approximate analysis of building frames using portal, cantilever, and substitute frame methods.
3. Analyze cable structures and suspension bridges under various loading and support conditions.
4. Use Moment distribution method, Kani's method to analyze frames and continuous beams, including sway and support movements.
5. Apply matrix stiffness methods to analyze statically indeterminate beams, trusses, and frames, and interpret the results structurally.

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

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS:

UNIT – I

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

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, Tied arches – Fixed arches – (No analytical question)

UNIT – II

Approximate Methods of Analyses: Application to building frames. (i) Portal Method (ii) Cantilever Method (iii) Substitute frame method for approximate analysis of multi-storey frames subjected to gravity loads and lateral loads. Shear force and bending moment diagrams - Elastic curve.

UNIT – III

Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

UNIT – IV

Moment Distribution Method: Analysis of Portal frames – including Sway- Substitute frame analysis by two cycle.

Kani's Method: Analysis of continuous beams–including settlement of supports and single bay portal frames with and without side sway. Shear force and bending moment diagrams - Elastic curve.

UNIT – V

Introduction to matrix methods:

Flexibility methods: Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

Stiffness method: Introduction, application to continuous beams (maximum of two unknowns) including support settlements

TEXT BOOKS:

1. Structural Analysis by R.C. Hibbeler, Pearson, New Delhi.
2. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi.

REFERENCES:

1. Mechanics of Structures Vol – II by H. J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt. Ltd.
2. Structural Analysis by Devdas Menon, Narosa Publishing Housing Pvt. Ltd.
3. Structural Analysis: A Matrix Approach, G. S. Pandit and S. P.Gupta, Mc Graw Hill Pvt. Ltd.

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

Subject	ARCHITECTURE, HERITAGE AND TOWN PLANNING				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning 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, and Indian Vedic, Indus valley civilization, Buddhist, Hindu and Indo-Sarsanic Architecture are introduced.
3. Architectural design concepts, principles of planning and composition are imparted.
4. Enabling the student to understand town planning from ancient times to modern times.
5. To impart the concepts of town planning standards, landscaping and expansion of towns.

Course Outcomes:

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

1. Identify and compare the salient features of Western and Indian architectural styles.
2. Apply the principles of architectural designing and planning of residential spaces.
3. Understand the historical evolution of town planning.
4. Analyze the components of modern town planning and explain national and regional planning standards.
5. Discuss the concepts of landscaping and evaluate the models for horizontal and vertical expansion of towns.

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, Bhubaneshwar, 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.

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, Mohenjo- Daro, 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- Neighborhood 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-skyscrapers-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'byPercy 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 Hand book' by John Patten Guthrie–McGraw Hill International Publications.
3. 'Modern 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 Federik Glbbard, Architectural press, London.

VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
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DEPARTMENT OF CIVIL ENGINEERING

Subject	CONSTRUCTION TECHNOLOGY &MANAGEMENT				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student, the concept of project management including network drawing and monitoring.
2. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery.
3. To introduce the importance of safety in construction projects.

Course Outcomes:

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

1. Appreciate the importance of construction planning and scheduling.
2. Apply project management techniques like PERT, CPM, crashing, and software tools.
3. Understand the functioning of various earth moving equipment.
4. Know the methods of production of aggregate products and concreting.
5. Recognize modern construction methods, safety practices, BIM, and Lean Construction.

SYLLABUS:

UNIT - I

Construction project management and its relevance – qualities of a project manager – project planning – coordination – scheduling – monitoring – bar charts – milestone charts -critical path method (CPM) – types of construction projects and stakeholder roles

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

DEPARTMENT OF CIVIL ENGINEERING

UNIT – II

Project Evaluation and Review Technique (PERT) – cost analysis – updating – crashing for optimum cost and resources – allocation of resources – introduction to construction management software – project management using PRIMAVERA (or equivalent)

UNIT – III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers

Hoisting and earth work equipment–hoists–cranes–tractors-bulldozers–graders–scrapers–draglines-clam shell buckets - basic considerations of equipment ownership vs rental

UNIT – IV

Concreting equipment – concrete mixers – batching plants – mobile batching plants (e.g., Ajax) – mixing and placing of concrete – consolidating and finishing - brief overview of slip form systems and 3D printing in concrete

UNIT – V

Construction methods – earthwork – piling – placing of concrete – formwork – quality control and safety engineering – Building Information Modelling (BIM) for Civil Engineers – introduction to Lean Construction

TEXT BOOKS:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata McGraw hill.
2. 'Construction Project Management Theory and Practice' by Kumar NeerajJha(2011), Pearson.
3. 'Construction Technology' by Subir K.Sarkar and Subhajit Sarasvati, Oxford University press

REFERENCES:

1. 'Construction Project Management-An Integrated Approach' by Peter Fewings, Taylor and Francis

2. ‘Construction Management Emerging Trends and Technologies’ by Trefor Williams , Cengage learning

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

Subject	GREEN BUILDINGS				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The Objective of this course is:

1. Understand the fundamental concepts of green buildings and the importance of sustainable construction practices.
2. Identify the role of organizations like the Indian Green Building Council and Understand the rating systems and benefits of green building adoption.
3. Analyze green building design principles for energy reduction, onsite renewable integration and system efficiency enhancement.
4. Examine the role of HVAC systems, lighting and air conditioning in green buildings through real-time case studies.
5. Evaluate sustainable materials and indoor environmental quality parameters to ensure eco-friendly and occupant-safe construction practices.

Course Outcomes:

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

1. Understand the concept, significance, and development requisites of green buildings.
2. Assess the green building movement in India and evaluate the impact of rating systems like LEED and IGBC on sustainable practices.
3. Apply strategies for energy demand reduction and integration of renewable energy in green building design.
4. Analyze energy-efficient HVAC and lighting system designs based on green building principles.
5. Evaluate material conservation techniques and indoor air quality parameters, and propose solutions for a healthy indoor environment.

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

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS:

UNIT – I

Introduction

What is Green Building, Why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building

UNIT – II

Green Building Concepts And Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency

UNIT – III

Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Eco friendly captive power generation for factory, Building requirement

UNIT – IV

Air Conditioning Introduction, CII Godrej Green business centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handing units, Precooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement

UNIT – V

Material Conservation Handling of non process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh

air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels

TEXTBOOKS:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Hand Book by Tom woolley and Samkimings, 2009. Recommended.
3. Complete Guide to Green Buildings by Trish riley.
4. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009.

REFERENCES:

1. ‘Green Building: Principles and Practices in Residential Construction” by Abe Kruger and Carl Seville.
2. ‘Sustainable Construction: Green Building Design and Delivery” by Charles J. Kibert.

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

Subject	CONSTRUCTION TECHNOLOGY &MANAGEMENT				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student, the concept of project management including network drawing and monitoring.
2. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery.
3. To introduce the importance of safety in construction projects.

Course Outcomes:

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

1. Appreciate the importance of construction planning and scheduling.
2. Apply project management techniques like PERT, CPM, crashing, and software tools.
3. Understand the functioning of various earth moving equipment.
4. Know the methods of production of aggregate products and concreting.
5. Recognize modern construction methods, safety practices, BIM, and Lean Construction.

SYLLABUS

UNIT - I

Construction project management and its relevance – qualities of a project manager – project planning – coordination – scheduling – monitoring – bar charts – milestone charts -critical path method (CPM) – types of construction projects and stakeholder roles

UNIT – II

Project Evaluation and Review Technique (PERT) – cost analysis – updating – crashing for optimum cost and resources – allocation of resources – introduction to construction management software – project management using PRIMAVERA (or equivalent)

UNIT – III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers

Hoisting and earth work equipment–hoists–cranes–tractors-bulldozers–graders–scrapers–draglines-clam shell buckets - basic considerations of equipment ownership vs rental

UNIT – IV

Concreting equipment – concrete mixers – batching plants – mobile batching plants (e.g., Ajax) – mixing and placing of concrete – consolidating and finishing - brief overview of slip form systems and 3D printing in concrete

UNIT – V

Construction methods – earthwork – piling – placing of concrete – formwork – quality control and safety engineering – Building Information Modelling (BIM) for Civil Engineers – introduction to Lean Construction

TEXT BOOKS:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata McGraw hill.
2. 'Construction Project Management Theory and Practice' by Kumar NeerajJha(2011), Pearson.
3. 'Construction Technology' by Subir K.Sarkar and Subhajit Sarasvati, Oxford University press

REFERENCES:

1. 'Construction Project Management-An Integrated Approach'by Peter Fewings,Taylor and Francis
2. 'Construction Management Emerging Trends and Technologies' by TreforWilliams , Cengage learning

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DEPARTMENT OF CIVIL ENGINEERING

Subject	CLIMATE CHANGE IMPACT ON ECO-SYSTEM				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. Understand the components of the climate system and the thermal processes governing Earth's atmosphere and surface.
2. Learn the dynamics of the hydrologic cycle and its interaction with climate systems.
3. Recognize the impact of climate variables on precipitation, evaporation, runoff, and streamflow.
4. Understand the nature and implications of climate variability, including floods, droughts, and heatwaves.
5. Gain insight into climate change models, their scenarios, and the global response to climate change.

Course Outcomes:

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

1. Explain the vertical and temporal variations in air and soil temperature, and their relevance in climate studies.
2. Describe the global water cycle and analyze its role in climate regulation.
3. Examine the influence of atmospheric conditions on precipitation and interpret climate variables affecting hydrologic processes.
4. Identify and evaluate extreme weather events like floods, droughts, and heatwaves associated with climate variability.
5. Analyze the causes and modeling approaches of climate change using IPCC scenarios and global circulation models.

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS

UNIT – I

Climate System; Climate, weather and Climate Change; Overview of Earth's Atmosphere; Vertical Structure of Atmosphere; Radiation and Temperature; Laws of Radiation; Heat-Balance of Earth Atmosphere System; Random Temperature Variation; Modelling Vertical Variation in Air Temperature; Temporal Variation of Air temperature; Temperature Change in Soil; Thermal Time and Temperature Extremes.

UNIT - II

Hydrologic Cycle: Introduction; Global water balance; Cycling of water on land, a simple water balance model

UNIT - III

Climate Variables affecting Precipitation: Precipitation and Weather, Humidity, Vapor Pressure, Forms of Precipitation, Types of Precipitation; Cloud; Atmospheric Stability; Monsoon; Wind Pattern in India; Global Wind Circulation; Evaporation and Transpiration, Processes of Vadose Zone, Surface Runoff, Stream flow

UNIT – IV

Climate Variability: Floods, Droughts, Drought Indicators, Heat waves, Climate Extremes.

UNIT – V

Climate Change: Introduction; Causes of Climate Change; Modeling of Climate Change, Global Climate Models, General Circulation Models, Downscaling; IPCC Scenarios

TEXT BOOKS:

1. Climate Change and Its Impact on Ecosystem Services and Biodiversity in Arid and Semi-Arid Zones by Ahmed Karmaoui, IGI Global. ISBN: 1522573879
2. Climate Change and Managed Ecosystems by Jagtar Bhatti, Rattan Lal, Michael J. Apps, Mick A. Price, CRC Press. ISBN: 9780849330971
3. Climate change: an integrated perspective by Jan Rotmans, Pim Martens, J. Rotmans, Springer. ISBN: 9780792359968

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DEPARTMENT OF CIVIL ENGINEERING

Subject	GEOTECHNICAL ENGINEERING LAB				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Learning 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 find the degree of swelling by DFS test.
4. To impart knowledge of determination of index properties required for classification of soils.
5. To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
6. To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes:

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

1. Analyze the index properties of soils and classify them using IS classification system.
2. Conduct and interpret permeability tests to evaluate the rate of seepage and drainage characteristics of different soil types.
3. Perform compaction and consolidation tests to assess the compressibility and load-settlement behavior of soils.
4. Determine and compare the shear strength parameters of soils under different drainage and loading conditions using shear box, triaxial, vane shear, and unconfined compression tests.

SYLLABUS:

LIST OF EXPERIMENTS:

1. Specific gravity, G

2. Atterberg's Limits.
3. Field density - Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Permeability of soil-Constant and Variable head tests
6. Compaction test
7. Consolidation test (to be demonstrated)
8. Direct Shear test
9. Triaxial Compression test
10. Unconfined Compression test
11. Vane Shear test
12. Differential free swell (DFS)
13. Field Plate Load Test demo
14. Field CBR demo
15. Determination of water content of soil
16. Grain size analysis using Hydrometer test
17. Swell pressure test

Atleast Eight experiments shall be conducted.

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrink age 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. Hydrometer
6. Permeability apparatus for
    a) Constant head test
    b) Variable head test

7. Universal auto compactor for I. Slight and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories
12. Triaxial cell with provision for accommodating 38mm dia specimens
13. Box shear test apparatus
14. Laboratory vane shear apparatus
15. Hot air ovens (range of temperature 50^0 - 150^0 C)
16. Field plate load Test equipment
17. Field CBR test equipment

REFERENCES:

1. 'Determination of Soil Properties'by J.E.Bowles.
2. IS Code2720 – relevant parts.
3. William A. Kitch, Geotechnical Engineering Lab Manual, 2011.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	FLUID MECHANICS AND HYDRAULIC MACHINES LAB				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Learning 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 and apply Bernoulli's theorem and principles of fluid flow through various devices such as Venturimeter, Orificemeter, notches, and orifices.
2. Calibrate and analyze the performance of flow measuring devices (Venturimeter, Orificemeter, notches) and determine discharge coefficients.
3. Determine energy losses in pipelines due to friction, sudden expansion/contraction, and bends, and calculate corresponding loss coefficients.
4. Evaluate the impact force of jet on different vane surfaces and interpret momentum transfer in hydraulic systems.
5. Conduct performance and efficiency tests on hydraulic machines like centrifugal and reciprocating pumps under varying operating conditions.

LIST OF EXPERIMENTS:

1. Verification of Bernoullis' equation.
2. Calibration of Venturimeter.
3. Calibration of orificemeter.
4. Determination of coefficient of discharge of a small orifice by constant head method

5. Determination of coefficient of discharge of an external cylindrical mouth piece by variable head method.
6. Calibration of a contracted rectangular notch.
7. Calibration of a triangular notch.
8. Determination of friction factor of the pipe material.
9. Determination of coefficient of head loss due to a sudden expansion/ contraction in a pipeline.
10. Determination of head loss coefficient due to a bend in pipe line.

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. Centrifugal and Reciprocating pumps.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ESTIMATION, SPECIFICATION AND CONTRACTS				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	1	2	2

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Apply standard methods to calculate quantities of various components in a building structure.
2. Analyze material, labor, and overhead costs to prepare rate analysis for different items of construction work.
3. Interpret specifications for common building components and explain their relevance in estimation and contract documentation.
4. Demonstrate the use of estimation methods and software tools to generate detailed and abstract estimates for building projects.

Course Outcomes:

Upon the successful completion of this course:

1. Interpret specifications and contract conditions from standard documents and evaluate different types of contracts and procurement systems including e-procurement and reverse auctions.
2. Assess the valuation of structures based on market data, standard methods, and applicable codes and regulations.
3. Analyze cost components and prepare detailed rate analysis for various building items.
4. Apply standard measurement techniques to calculate quantities for different components of a building using individual wall, centerline methods and software tools.

SYLLABUS

UNIT – I

Contracts – Types of contracts – Contract Documents – Conditions of contract – Tendering process – Valuation of buildings - concepts of e-procurement and reverse auctions – Standard specifications for different items of building construction – Environment Social Governance

UNIT – II

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

UNIT – III

Rate Analysis – Working out data for various items of work over head and contingent charges – Use of Schedule of Rates – Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules

UNIT – IV

Detailed Estimation of Buildings using individual wall method for single, double and four roomed buildings – Common errors and best practices.

UNIT – V

Detailed Estimation of Buildings using centre line method for single, double and four roomed buildings. Standard software's like building estimator etc.

TEXT BOOKS:

1. 'Estimating and Costing' by B.N.Dutta, UBS publishers, 2000.
2. 'Civil Engineering Contracts and Estimates' by B.S.Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. 'Construction Planning and Technology' by Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. 'Estimating and Costing'by G.S. Birdie.

REFERENCES:

1. 'Standard Schedule of rates and standard data book' by public works department.
2. IS1200 (PartsItoXXV-1974/ Method of Measurement of Building & Civil Engg Works–B.I.S.)
3. 'Estimation, Costing and Specifications' by M.Chakraborthi; Laxmi publications.
4. National Building Code

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DEPARTMENT OF CIVIL ENGINEERING

Subject	TINKERING LAB				
Year / Semester	III B. Tech. / I Sem.	L	T	P	C
Regulation Year	R - 23	0	0	2	1

The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course Objectives: To

1. Encourage Innovation and Creativity
2. Provide Hands-on Learning
3. Impart Skill Development
4. Foster Collaboration and Teamwork
5. Enable Interdisciplinary Learning
6. Impart Problem-Solving mind-set
7. Prepare for Industry and Entrepreneurship

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

List of experiments:

1. Make your own parallel and series circuits using breadboard for any application of your choice.
2. Demonstrate a traffic light circuit using breadboard.
3. Build and demonstrate automatic Street Light using LDR.
4. Simulate the Arduino LED blinking activity in Tinkercad.
5. Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
6. Interfacing IR Sensor and Servo Motor with Arduino.

7. Blink LED using ESP32.
8. LDR Interfacing with ESP32.
9. Control an LED using Mobile App.
10. Design and 3D print a Walking Robot
11. Design and 3D Print a Rocket.
12. Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard.
13. Demonstrate all the steps in design thinking to redesign a motor bike.

Students need to refer to the following links:

1. https://aim.gov.in/pdf/equipment-manual-pdf.pdf
2. https://atl.aim.gov.in/ATL-Equipment-Manual/
3. https://aim.gov.in/pdf/Level-1.pdf
4. https://aim.gov.in/pdf/Level-2.pdf
5. https://aim.gov.in/pdf/Level-3.pdf

Course Outcomes: The students will be able to experiment, innovate, and solve real-world challenges.

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DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

III B.Tech. - II Semester

(R23)

VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
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DEPARTMENT OF CIVIL ENGINEERING

Subject	DESIGN AND DRAWING OF STEEL STRUCTURES				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	2	0	2	3

Course Learning Objectives:

The objective of this course is to:

1. Familiarize students with different types of connections and relevant IS codes
2. Equip student with the concepts of designing flexural members
3. Understand design concepts of tension and compression members in trusses
4. Familiarize students with different types of columns and column bases and their design
5. Familiarize students with Plate girder and Gantry Girder and their design

Course Outcomes:

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

1. Explain the principles and design procedures for riveted and welded steel connections, including fillet welds under moment, as per IS code requirements
2. Apply IS code provisions to design simple and compound steel beams, including connections and checks for deflection, shear, buckling, and lateral stability
3. Analyze and design steel tension and compression members, including roof truss components and joints, considering effective length, slenderness, and IS code load combinations
4. Evaluate and design built-up steel columns with lacings, battens, splices, and column foundations, including slab and gusseted bases under axial load and moment
5. Develop complete designs for welded plate girders and gantry girders, including flange curtailment, stiffeners, splicing, and connections, as per IS code recommendations

SYLLABUS

UNIT – I

Connections: Riveted connections – definition, rivet strength and capacity, Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds:

Permissible stresses – IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT – II

Beams: Allowable stresses, design requirements as per IS Code-Design of simple beams and introduction to compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT – III

Tension Members and compression members: Effective length of members, slenderness ratio-permissible stresses. Design compression members subjected to axial and eccentric loading. Design of members subjected to direct tension and bending. Roof Trusses: Different types of roof trusses – Design loads – Load combinations as per IS Code recommendations, structural details – Design of purlins, members and joints.

UNIT – IV

Design of Columns: Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected to 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 – V. Drawing classes must be conducted every week and 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.

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

Plate 7 Detailing of gantry girder.

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' by N.Subramanian, Oxford University Press.
2. 'Design of Steel Structures' by Ramachandra, Vol – 1, Universities Press.
3. 'Design of steel structures' by S.K. Duggal, Tata Mcgraw Hill, and New Delhi.

REFERENCES

1. 'Structural Design in Steel' by SarwarAlamRaz, New Age International Publishers, New Delhi
2. 'Design of Steel Structures' by P. Dayaratnam; S. Chand Publishers
3. 'Design of Steel Structures' by M. Raghupathi, Tata Mc. Graw-Hill
4. 'Structural Design and Drawing' by N. Krishna Raju; University Press

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DEPARTMENT OF CIVIL ENGINEERING

Subject	HIGHWAY ENGINEERING				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning 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. Analyze highway planning strategies, including road network classification and alignment design, under various development plans, considering environmental and budget constraints.
2. Apply geometric design principles to develop safe and efficient highway alignments, considering design controls, sight distances, and terrain variations.
3. Evaluate traffic flow data to design effective intersections and traffic signals, ensuring compliance with capacity standards and road safety regulations.
4. Assess highway materials, including subgrade soil and bituminous materials, and apply appropriate tests for material selection based on road type and traffic loading conditions.
5. Design flexible and rigid pavements using established methods (CBR, IRC, Burmister) under varying traffic loads and environmental factors, ensuring structural integrity and durability.

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.

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.

Introduction to Traffic Simulation tools: Need and Importance of Traffic Simulation in Transportation Engineering. Types of Traffic Simulation Models: Microscopic, Mesoscopic, and Macroscopic

UNIT – IV

Highway Materials: Sub grade 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 — Testson 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.

TEXTBOOKS:

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

REFERENCES:

1. Principles of Highway Engineering, KadiyaliL, R,Khanna Publishers, NewDelhi
2. Principles of Transportation Engineering, Partha Chakraborty and Animesh Das,PHI Learning Private Limited, Delhi

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENVIRONMENTAL ENGINEERING				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The course will address the following:

1. Outline planning and the design of water supply systems for a community/town/city
2. Provide knowledge of water quality requirement for domestic usage and knowledge on design of water distribution network
3. Selection of valves and fixture in water distribution systems
4. Outline the planning and design of Sewerage System for a community/town/city
5. To impart knowledge on waste water treatment and disposal

Course Outcomes:

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

1. Develop plans and designs for water distribution networks and sewerage systems tailored to community needs.
2. Evaluate potential water sources by assessing both quality and quantity requirements for intended uses.
3. Recommend appropriate treatment processes for raw water and sewage, considering technical, environmental, and regulatory criteria.
4. Assess options for the disposal of wastewater, ensuring compliance with environmental and regulatory standards.

SYLLABUS:

UNIT – I

Introduction: Importance and Necessity of Protected Water Supply systems. Water borne diseases. Planning of public water supply systems. Per capita demand and factors influencing it, types of

water demands and its variations, factors affecting water demand, Design Period, Factors affecting the Design period, estimation of water demand for a town or city, Population Forecasting.

Sources of Water: Various surface and subsurface sources considered for water supply and their comparison- Capacity of storage reservoirs, Conveyance of Water from the source to the point of interest: Gravity and Pressure conduits, Types of Pipes and Pipe joints.

UNIT – II

Quality and Analysis of Water: Physical, Chemical and Biological characteristics of water. Water quality criteria for different uses- Rural, Municipal, Industrial and Agricultural uses. Drinking water quality standards: IS and WHO guidelines.

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods – Appurtenances of water distribution system–Laying and testing of pipe lines.

UNIT – III

Treatment of Water: Typical treatment flow of a municipal water treatment plant, Unit operations of water treatment: Theory and Design of Sedimentation, Coagulation, flocculation, Filtration, Water conditioning and softening, Disinfection, Removal of color and odors – Removal of Iron and manganese – Fluoridation and De-fluoridation –Ion Exchange - Ultra filtration- Reverse Osmosis.

UNIT – IV

Planning and Design of Sewerage System

Characteristics and composition of sewage — population equivalent -Sanitary sewage flow estimation — Sewer materials — Hydraulics of flow in sanitary sewers — Sewer design — Storm drainage-Storm runoff estimation — sewer appurtenances — corrosion in sewers — prevention and control — sewage pumping-drainage in buildings-plumbing systems for drainage Primary Treatment of Sewage

Objectives — Unit Operations and Processes — Selection of treatment processes — Onsite sanitation — Septic tank- Grey water harvesting — Primary treatment — Principles, functions and

design of sewage treatment units — screens — grit chamber-primary sedimentation tanks — Construction, Operation and Maintenance aspects.

UNIT – V

Secondary Treatment of Sewage

Objectives — Selection of Treatment Methods — Principles, Functions, — Activated Sludge Process and Extended aeration systems -Trickling filters– Sequencing Batch Reactor (SBR) — Membrane Bioreactor — UASB — Waste Stabilization Ponds — Other treatment methods - Reclamation and Reuse of sewage — Recent Advances in Sewage Treatment — Construction, Operation and Maintenance aspects.

Disposal of Sewage

Standards for– Disposal — Methods — dilution — Mass balance principle — Self purification of river - Oxygen sag curve — de-oxygenation and re-aeration — Streeter–Phelps model — Land disposal — Sewage farming — sodium hazards — Soil dispersion system.

TEXTBOOKS:

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – McGraw-Hill Book Company, New Delhi, 1985.
2. Water Supply Engineering. Dr. P.N. Modi, Standard Book House, Delhi.

REFERENCES:

1. Elements of Environmental Engineering – K.N. Duggal, S. Chand & Company Ltd., New Delhi.
2. Water Supply Engineering – Dr. B.C. Punmia, A.K. Jain and A.K. Jain. Laxmi Publications (P) Ltd., New Delhi.
3. Water Supply and Sanitary Engineering – G.S. Birdie and J.S. Birdie.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	GROUND IMPROVEMENT TECHNIQUES				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

1. Explain the need for ground improvement and identify appropriate in-situ densification and dewatering techniques for different soil conditions.
2. Describe the principles of reinforced earth and soil nailing systems and recognize their applications in soil retention problems.
3. Summarize the objectives and procedures of grouting and analyze its effects on soil and rock improvement.
4. Classify different types of geotextiles and geosynthetics and demonstrate how they enhance the engineering behavior of soils.

Course Outcomes:

1. Classify various in-situ densification techniques for granular and cohesive soils and select suitable methods for given site conditions.
2. Understand different dewatering methods and evaluate their effectiveness based on soil and site constraints.
3. Analyze mechanical and chemical soil stabilization methods and recommend appropriate grouting techniques for soil and rock improvement.
4. Understand the principles and components of reinforced earth systems and describe the concept and applications of soil nailing.
5. Identify different types of geosynthetics and explain their functions and applications in ground improvement works.

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

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS:

UNIT – I

Introduction to ground modification – need and objectives of ground improvement – Classification of ground improvement techniques – Suitability and feasibility criteria. In situ densification methods – in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – insitu densification of cohesive soils – pre loading – vertical drains, sand drains and geo drains – stone columns.

UNIT – II

Dewatering – sumps and interceptor ditches – single and multi-stage well points – vacuum well points, horizontal wells – criteria for choice of filler material around drains – electro osmosis – quality control & monitoring parameters for hydraulic methods.

UNIT – III

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag – emerging trends: MICP/Bio-cementation, deep soil mixing.

Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests. Introduction to liquefaction, its effects & applications.

UNIT – IV

Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing – ground anchors: types of ground anchors and their suitability – case studies and field applications

UNIT – V

Geosynthetics – geotextiles – types – functions, properties and applications – geogrids, geomembranes – properties and applications – confinement systems: gabion walls, crib walls, geo-bags, fabric formwork.

TEXTBOOKS:

1. ‘Ground Improvement Techniques’ by Purushotham Raj, Laxmi Publications, New Delhi.

2. 'Ground Improvement Techniques' by Nihar Ranjan Patro, Vikas Publishing House(p) limited, New Delhi.
3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, Universities Press.

REFERENC EBOOKS:

1. 'Ground Improvement 'by MP Moseley, Blackie Academic and Professional, USA.
2. 'Designing with Geosynethetics 'by RM Koerner, Prentice Hall
3. 'Engineering Principles of Ground Modification', by Manfred R. Hausmann, McGraw- Hill College, 2013, First Edition
4. 'Ground Improvement Techniques', by Bujang B.K. Huat, Arun Prasad, Sina Kazemian, Vivi Anggraini, CRC Press2021, First Edition

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

DEPARTMENT OF CIVIL ENGINEERING

Subject	REPAIR AND REHABILITATION OF STRUCTURES				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Identify the causes and mechanisms of deterioration in concrete structures and the materials used for effective repair and rehabilitation.
2. Interpret and apply non–destructive evaluation (NDE) techniques for assessing structural health and performance.
3. Explain and compare different strengthening and stabilization methods for structural elements.
4. Evaluate the properties, applications, and performance of special concretes used in repair, such as fiber–reinforced, lightweight, and high–performance concretes.
5. Assess the appropriate repair, retrofitting, or strengthening strategy for degraded structures based on service life predictions and material performance.

Course Outcomes:

At the end 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. Analyze various structural strengthening and stabilization techniques and justify their application for beams, columns, connections, and cracks.
3. Illustrate bonded installation methods using FRP systems and interpret debonding mechanisms for structural retrofitting.
4. Describe the properties, mix design, and applications of fiber–reinforced, lightweight, and fly ash concretes in repair and rehabilitation projects.
5. Evaluate the performance characteristics of high–performance and self–compacting concretes and assess their suitability for long–term durability.

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

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS

UNIT – I

Materials for repair and rehabilitation – Admixtures – types of admixtures – purposes of using admixtures – chemical composition – Natural admixtures – Fibers – wraps – Glass and Carbon fiber 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 – Ultra sound pulse velocity methods – pull out tests.

UNIT – II

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 lay upsheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms – intermediate crack debonding – CDC debonding – plate end de bonding – strengthening of floor of structures

UNIT – IV

Fiber reinforced concrete – Properties of constituent materials – Mix proportions, mixing and casting methods – Mechanical properties of fiber reinforced concrete – applications of fiber reinforced concretes – Lightweight concrete – properties of light weight concrete – No fines concrete – design of light weight concrete – Fly ash concrete – Introduction – classification of fly ash – properties and reaction mechanism of fly ash – Properties of fly ash concrete in fresh state and hardened state – Durability of fly ash concretes

UNIT – V

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

TEXTBOOKS:

1. Maintenance Repair Rehabilitation & Minor works of Buildings – P.C.Varghese, PHI Publications
2. Repair and Rehabilitation of Concrete Structures–P.I.Modi, C.N.Patel, PHI Publications
3. Rehabilitation of Concrete Structures – B.Vidivelli, Standard Publishers Distributors
4. Concrete Bridge Practice Construction Maintenance & Rehabilitation – V.K.Raina, Shroff Publishers and Distributors.

REFERENCE:

1. Concrete Technology Theory and Practice – M.S.Shetty, S Chand Publishing.
2. Concrete Repair and Maintenance illustrated-Peter H Emmons, Galgotia Publications Pvt Ltd
3. Concrete Chemical Theory and Applications – Santa Kumar A.R, Indian Society for Construction Engineering and Technology, Madras
4. Hand book on Repair and Rehabilitation of RC Buildings published by CPWD, Delhi.

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

Subject	VALUATION AND QUANTITY SURVEY				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Explain the fundamental concepts and terminology related to quantity surveying, estimation, and contract documentation.
2. Perform rate analysis using CPWD Data Analysis Rates (DAR) and Schedule of Rates (DSR).
3. Prepare detailed estimates for various civil engineering works using established methods.
4. Develop bar bending schedules and estimate quantities for earthwork, roads, sanitary and water supply systems.
5. Understand valuation principles and calculate depreciation and value of land and buildings using various standard methods.

Course Outcomes:

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

1. Explain the basic principles of quantity surveying, estimation types, contract documents, item identification, and measurement rules as per IS:1200.
2. Apply CPWD DSR and DAR to analyze the rate of major construction items and interpret general and detailed specifications.
3. Prepare detailed measurements and compute quantities using Centre Line and Long/Short Wall methods and generate a BOQ.
4. Develop bar bending schedules and estimate quantities for roadwork, sanitary systems, and water supply works, and explain basic valuation terminology.
5. Calculate depreciation and evaluate property value using standard methods.

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

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS:

UNIT – I

Introduction – Quantity Surveying – Basic principles, Role/responsibility of Quantity Surveyor at various stages of construction. Estimate – Details required, Type of estimate, purposes. Contingencies, Work – charge establishment, Tools and Plant, centage charge, Day work, Prime cost, Provisional sum & provisional Quantity, Overhead charges, Cost index, Contract documents (Brief description only)Bill of Quantity – Typical format – use Item of works – Identify various item of work from the drawings – units of measurement of various materials and works (focus may give to RCC residential building) General rule & method of measurement with reference to Indian Standard Specifications – IS1200.

UNIT – II

Introduction to the use of CPWD schedule of rates as per latest DSR and Analysis of rate as per latest DAR. Specifications – General specification of all items of a residential building. Detailed specification (CPWD specifications) of major item of work like Earth work excavation in foundation, masonry, Reinforced cement concrete, finishing of building work Analysis of rates for Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing work, masonry work, stone works, flooring with reference to latest DSR and latest DAR (Data should be given).

UNIT – III

Detailed Estimate – Preparation of detailed measurement using Centre line method & Short wall long wall (separate wall) method for RCC single storied building (Flat roof) including stair cabin – Residential/office/school building. BOQ preparation of a single storied RCC building work. Material quantity calculation of the items of work (Rubble, Brick work, Concrete work, Plastering) in detailed estimate prepared for building work. (Data for unit quantity should be provided from DAR)

UNIT – IV

Bar Bending Schedule – Preparation of BBS of RCC beams, slabs, Column footings, Retaining wall. Road estimation – Estimation of earth work from longitudinal section – metaled road. Estimation of sanitary and water supply work – Water tank, Septic tank, Manhole (No Detailed

estimate needed – concept of item of work, its general specification and unit of measurement). Valuation – purpose, factor affecting, introduction to terms – Value, Cost, Price, kinds of values Income – Gross income, net income, outgoings, annuity, sinking fund, Year's purchase, Depreciation, obsolescence – Free hold and leasehold properties.

UNIT – V

Methods of calculating depreciation – straight line method – constant percentage method, sinking fund method and quantity survey method.

Methods of valuation–rental method, direct comparison of capital cost, valuation based on profit, depreciation method. Various methods of valuation of land (Brief description only)

TEXTBOOKS:

1. B.N. Dutta, Estimation and costing in civil engineering, UBS publishers
2. Rangwala, Estimation Costing and Valuation, Charotar publishing house Pvt. Ltd
3. Dr. S. Seetha Raman, M. Chinna swami, Estimation and quantity surveying, Anuradha publications Chennai.
4. M Chakraborthy, Estimating, Costing, Specification and valuation, published by the author, 21 B, Babanda Road, Calcutta 26

REFERENCES:

1. B S Patil, Civil Engineering contracts and estimates, university press
2. V N Vazirani & S P Chandola, Civil Engineering Estimation and Costing, Khanna Publishers
3. IS1200 – 1968; Methods of measurement of building & civil engineering works
4. CPWDDAR 2018 and DSR 2018 or latest
5. CPWD Specifications Vol1 & 2 (2019 or latest edition)

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

Subject	FINITE ELEMENT METHOD				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is to:

1. Understand the fundamentals of stiffness method, and variational principles in finite element analysis.
2. Formulate and analyze structural elements using finite element procedures.
3. Develop and assemble the stiffness matrices for various elements.
4. Interpret FEM results such as displacements, strains, and stresses in plane stress, plane strain, and axisymmetric problems.
5. Apply FEM techniques and numerical integration methods to model, solve, and evaluate structural systems.

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

1. Develop finite element formulations of 1degree of freedom problems and solve Them
2. Understand any Finite Elements of ware to perform stress, thermal and modal Analysis
3. Compute the stiffness matrices of different elements and system
4. Interpret displacements, strains and stress resultants
5. Analyze planar structural systems using finite element modeling

SYLLABUS:

UNIT – I

Introduction: Review of stiffness method-Principle of Stationary potential energy Potential energy of anelastic body-Rayleigh-Ritz method of functional approximation-variational approaches-weighted residual methods

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

DEPARTMENT OF CIVIL ENGINEERING

UNIT – II

Finite Element formulation of truss element: Stiffness matrix-properties of stiffness matrix - Selection of approximate displacement functions-solution of a plane truss - transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports - Galerkin's method for1-D truss – Computation of stress in a truss element.

UNIT – III

Finite element formulation of Beam elements: Beam stiffness-assemble age of beam stiffen matrix-Examples of beam analysis for concentrated and distributed loading - Galerkin's method – 2 Darbitrarily oriented beam element–inclined and skewed supports–rigid plane frame examples

UNIT – IV

Finite element formulation for plane stress, plane strain and axi symmetric problems-Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress and axi-symmetric problems-comparison of CST and LST elements– convergence of solution-interpretation of stresses

UNIT – V

Iso-parametric Formulation: Iso-parametric bar element- plane bilinear Iso-parametric element – quadratic plane element-shape functions, evaluation of stiffness matrix, consistent modal load vector- Gauss quadrature-appropriate order of quadrature–element and mesh instabilities–spurious zero energy modes, stress computation-patch test.

TEXTBOOKS:

1. A first course in the Finite Element Method–Daryl L.Logan, Thomson Publications.
2. Concepts and applications of Finite Element Analysis–Robert D.Cook, Michael EPlesha, JohnWiley & Sons Publications

REFERENCES:

1. Introduction to Finite Elements in Engineering-Tirupati R.Chandrupatla, Ashok D. Belgunda, PHI publications.
2. Finite Element Methods (For Structural Engineers) Wail N Rifaie, Ashok K Govil, New Age International(P)Limited.

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

Subject	BRIDGE ENGINEERING				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is to:

1. Familiarize students with different types of Bridges and IRC standard
2. Equip student with the concepts and design of Slab Bridges, T Beam Bridges, Box Culverts
3. Understand concepts of design of Plate Girder Bridges
4. Familiarize with different methods of inspection of bridges and their maintenance

Course Outcomes:

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

1. Understand the types, components, and selection criteria for bridges, along with the standards for railway and IRC loading.
2. Analyze and design slab bridges using effective width methods and advanced techniques like Guyon's and Massonet's methods.
3. Design and detail T-beam bridge elements, including deck slabs, longitudinal girders, and secondary beams.
4. Design plate girder bridges, including key elements like webs, flanges, stiffeners, and splices, with appropriate reinforcement detailing.
5. Analyze, design, and detail box culverts, and apply inspection and maintenance strategies for bridges, including substructures, superstructures, and bearings.

SYLLABUS:

UNIT – I

General Introduction to types of Bridges- (Slab bridges, TBeam, Arch bridges, Cable Stayed bridges, pre stressed 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-Jaegar Methods- Courbon's theory- Pigeaud's method

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.

Inspection and Maintenance of Bridges: Procedures and methods for inspection–Testing of bridges- Maintenance of Sub Structures and Super structures-Maintenance of bearings-Maintenance Schedules.

TEXTBOOK:

1. 'Essentials of Bridge Engineering 'by Johnson Victor D
2. 'Design of Bridge Structures' by T.R. Jagadeesh, M.A. Jayaram, PHI
3. 'Design of RC Structures' by B. C.Punmai, Jain & Jain, Lakshmi Publications

REFERENCES:

1. 'Design of Concrete Bridges' by Aswini, Vazirani,Ratwani
2. 'Design of Steel Structures' by B.C.Punmai, Jain & Jain, Lakshmi Publications
3. 'Design of Bridges' by Krishna Raju

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

Subject	WATER RESOURCES ENGINEERING				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The course is designed to make the students,

1. Learn the types of irrigation systems.
2. Understand the concepts of planning and design of irrigation systems.
3. Study the relationships among soil, water and plant and their significance in planning an irrigation system.
4. Understand design principles of erodible and non-erodible canals.
5. Know the principles of design of weirs on permeable foundations.
6. Know the concepts for analysis and design of storage head works.
7. Learn design principles of canal structures.

Course Outcomes:

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

1. Estimate the irrigation water requirements for different crops and regions based on climate, soil, and crop characteristics.
2. Design irrigation canals to efficiently convey water from the source to the fields, considering hydraulic and topographic conditions.
3. Design irrigation canal structures such as regulators, drops, and escapes to control and manage water flow within the canal system.
4. Plan and design diversion headworks to ensure effective water intake from rivers or reservoirs for irrigation purposes.
5. Analyze the stability of gravity and earth dams under various loading conditions to ensure their safety and functionality.

6. Design hydraulic ogee spillways to safely discharge excess water from reservoirs during flood events.

SYLLABUS:

UNIT – I

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT – II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals -Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

UNIT – III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight glacis fall. (Description only)

Regulators: Head and cross regulators, design principles (Description only)

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage. (Description only)

Outlets: Types, proportionality, sensitivity and flexibility

River Training: Objectives and approaches

UNIT – IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

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

DEPARTMENT OF CIVIL ENGINEERING

UNIT – V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis.

Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters.

Spillways: Types, design principles of Ogee spillways, types of spillways crest gates.

TEXTBOOKS:

1. 'Irrigation and Waterpower Engineering' by Punmia B C, P.B.B Lal, A.K. Jain and A.K. Jain (2009), Laxmi Publications Pvt. Ltd., New Delhi
2. 'Irrigation and Water Resources Engineering' by Asawa G L (2013), New Age International Publishers
3. 'Irrigation Engineering' by Raghunath H.M (2012), Wiley India.
4. 'Irrigation Water Resources and Waterpower Engineering' by Modi P N (2011), Standard Book House, New Delhi

REFERENCES:

1. 'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T. K (2012), S. Chand & Co Publishers.
3. 'Water Resources Engineering' by Satyanarayana Murthy Challa (2008), New Age International Publishers.

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

DEPARTMENT OF CIVIL ENGINEERING

Subject	INTERIOR DESIGN & SPACE PLANNING				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:
The objective of this course is:

To provide foundational knowledge of interior design principles and practical skills in space utilization, material selection, and integration of interior elements in building design.

Course Outcomes

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

1. Demonstrate an understanding of foundational interior design principles and apply them to conceptualize basic spatial layouts.
2. Recognize the significance of cultural and vernacular influences in interior environments and integrate them into design themes.
3. Identify key interior elements and select appropriate materials and finishes for visual and functional effectiveness.
4. Analyze and apply lighting strategies and decorative components to enhance interior ambiance and user experience.
5. Design ergonomically responsive furniture layouts addressing the functional needs of various interior typologies.

SYLLABUS:

UNIT – I

Introduction to Interior Design and Space Planning: Definition and scope of interior design from a civil engineering perspective. Design process in interior works. Role of civil engineers in interior fit-outs. Terminology related to design principles (scale, proportion, harmony) and elements (space, form, color, texture). Basics of space management based on function, circulation, and user requirements.

UNIT – II

Traditional and Vernacular Interiors: Overview of interior design evolution with reference to Indian vernacular architecture, indigenous materials, and regional construction practices. Role of folk art, crafts, and local design traditions in interiors. Application of traditional concepts in contemporary civil interior projects.

UNIT – III

Interior Components and Finishes: Study of interior elements: walls, floors, ceilings, staircases, partitions, doors/windows. Emphasis on materials (wood, glass, gypsum, tiles, composites), their properties, specifications, and methods of installation and surface finishing. Technical detailing of false ceilings, wall panelling, flooring systems, and joinery relevant to interior works. Site management in interior works

UNIT – IV

Lighting and Interior Services: Overview of natural and artificial lighting systems in interiors. Types of lighting fixtures and their placement for task, ambient, and accent lighting. Introduction to HVAC, plumbing, fire safety systems, and electrical layouts as integrated services in interior design. Role of engineers in coordination and execution.

UNIT – V

Furniture Layout and Functional Zoning: Design and planning of furniture layouts considering human ergonomics and space utilization. Types of furniture for residential, commercial, and institutional interiors. Introduction to modular furniture and prefabricated systems. Case studies of interior planning in civil buildings.

TEXTBOOKS:

1. Ching, F. D. K. Interior Design Illustrated. V.N.R. Publications.
2. Doshi, S. (Ed.) (1982). The Impulse to adorn - Studies in traditional Indian Architecture. Marg Publications.
3. Kathryn, B. H. and Marcus, G. H. (1993). Landmarks of twentieth Century Design. Abbey Ville Press.

4. Penero, J. and Zelnik, M. (1979). Human Dimension and Interior space: A Source Book of Design Reference Standards. New York : Whitney Library of Design.
5. Arora, S. P. & Bindra, S. P. Building Construction. Dhanpat Rai Publications.
6. Slesin, S. and Ceiff, S. (1990). Indian Style. New York : Clarkson N. Potter.
7. Dorothy, S-D., Kness, D. M., Logan, K. C. and Laura, S. (1983). Introduction to Interior Design. Michigan : Macmillan Publishing.

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

DEPARTMENT OF CIVIL ENGINEERING

Subject	DISASTER MANAGEMENT				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
3. Understand the 'relief system' and the 'disaster victim.'
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.
6. Describe public awareness and economic incentive possibilities.
7. Understand the tools of post-disaster management.

Course Outcomes:

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

1. Explain the interdisciplinary nature of disaster management and describe various natural disasters using case studies.
2. Identify the causes and consequences of man-made disasters and evaluate appropriate management strategies using real-world examples.
3. Analyze risk and vulnerability factors associated with disasters, including socio-economic and environmental aspects, and apply land-use and financial planning for risk reduction.
4. Assess the role of technology, remote sensing, GIS, and indigenous knowledge in disaster mitigation, preparedness, and infrastructure resilience.
5. Evaluate the role of education, community participation, and cross-sectoral approaches in building disaster-resilient communities.

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

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS:

UNIT – I

Natural Hazards and Disaster Management: Introduction of DM – Inter disciplinary nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: Vegetal Cover floods, droughts – Earthquakes – landslides – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

UNIT – II

Man Made Disaster and Their Management Along with Case Study Methods of the following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism - threat in mega cities, rail and aircraft accidents, ground water, industries - Emerging infectious diseases and Aids and their management.

UNIT – III

Risk and Vulnerability: Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable development, Climate change risk rendition – Financial management of disaster – related losses.

UNIT – IV

Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes – flowchart, geospatial information in agriculture drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS.

UNIT – V

Multi-sectional Issues, Education and Community Preparedness: Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards and environmental risk-Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector and disaster risk reduction- Education in disaster risk reduction- Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

TEXTBOOKS:

1. An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Publishers & Distributors Pvt.Ltd.
2. Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh- Rawat Publications
3. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., NewDelhi.
4. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt.Ltd.

REFERENCE BOOKS:

1. 'Disaster Management' edited by H K Gupta (2003), Universitiespress.
2. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universitiespress.R. Nishith, Singh AK,
3. "Disaster Management in India: Perspectives, Issues and strategies" New Royal BookCompany."

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

DEPARTMENT OF CIVIL ENGINEERING

Subject	SUSTAINABILITY IN ENGINEERING PRACTICES				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is:

1. Understand the principles of sustainable development and environmental legislation relevant to engineering.
2. Recognize and evaluate local and global environmental challenges and renewable energy solutions.
3. Learn the tools and techniques for environmental assessment, life cycle analysis, and sustainability metrics.
4. Explore sustainable solutions in habitat design, urban development, and industrial practices.
5. Understand and apply green technologies and renewable energy sources in engineering contexts.

Course Outcomes:

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

1. Explain the concept of sustainable development, models of sustainability, and key environmental laws and agreements.
2. Discuss local and global environmental issues and analyze methods for managing waste and reducing resource degradation.
3. Apply sustainability tools such as EMS, LCA, and EIA to assess environmental impacts and propose improvements.
4. Differentiate between conventional and sustainable urban/industrial practices and evaluate solutions for green buildings, transport, and cities.
5. Describe various renewable energy technologies and recommend green technologies for sustainable business and engineering practices.

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS:

UNIT – I

Introduction to Sustainable Engineering- Sustainable development, concepts of sustainable development: three pillar model, egg of sustainability model, Atkisson's pyramid model, prism model, principles of sustainable development, sustainable engineering, threats for sustainability. Environmental Ethics and Legislations – Environmental ethics and education, multilateral environmental agreements and protocols, enforcement of environmental laws in India – The Water Act, The Air Act, The Environment Act.

UNIT – II

Local Environmental Issues- Solid waste, impact of solid waste on natural resources, zero waste concept and three R concept, waste to energy technology: thermo-chemical conversion, biochemical conversion. Global Environmental Issues- Resource degradation: deterioration of water resources, land degradation, air pollution, climate change and global warming, ozone layer depletion, carbon footprint, carbon trading.

UNIT – III

Tools for Sustainability - Environmental management System (EMS), concept of ISO 14000, life cycle assessment (LCA): basic components, advantages, disadvantages, case study. Environmental impact assessment (EIA), environmental auditing, bio mimicking, case studies.

UNIT – IV

Sustainable Habitat - Concept of green building, green building materials, green building certification and rating: green rating for integrated habitat assessment (GRIHA), leadership in energy and environmental design (LEED) rating, energy efficient buildings, sustainable cities, sustainable transport, sustainable pavements, case studies in sustainability engineering: Green building, sustainable city, sustainable transport system.

Sustainable Industrialization and Urbanization – Sustainable urbanization, industrialization, material selection, pollution prevention, industrial ecology, industrial symbiosis, poverty reduction.

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Vishnupur, Bhimavaram, West Godavari Dt., AP, India

DEPARTMENT OF CIVIL ENGINEERING

UNIT – V

Renewable energy resources- Conventional and non- conventional forms of energy, solar energy, fuel cells, wind energy, small hydroplants, biogas systems, biofuels, energy from ocean, geothermal energy, conservation of energy.

Green technology and Green Business: Sustainable business, green technology, green energy, green construction, green transportation, green chemistry, green computing

TEXTBOOK:

1. R.L. Rag and Lekshmi Dinachandran Remesh. Introduction to Sustainable Engineering. 2nd Edition, PHI Learning Pvt. Ltd., 2016.

REFERENCES:

1. D. T. Allen and D. R. Shonnard. Sustainability Engineering: Concepts, Design and Case Studies, 1st Edition, Prentice Hall, 2011.
2. A. S. Bradley, A.O. Adebayo, P. Maria. Engineering applications in sustainable design and development, 1st Edition, Cengage learning, 2016.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	WATER SUPPLY SYSTEMS				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Identify and classify different sources of water and distinguish between potable and non-potable water systems and understand water quality considerations in public health.
2. Describe the methods of water distribution and components of municipal supply networks, including emergency provisions.
3. Evaluate water requirements and wastewater characteristics in industrial operations, along with environmental discharge standards.

Course Outcomes:

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

1. Outline of the various facets of water usage in daily life
2. Explain the origin of Natural waters and also to synthesize it for regular use
3. Discuss the utilization of non-potable water
4. Describe water supply system from a reservoir
5. Explain the characteristics of wastewater

SYLLABUS:

UNIT – I

WATER AND LIFE: Necessity of water – Domestic demand – Public demand – Irrigation – Transportation – Sanitation – Dilution of waste waters – Dust palliative – Recreation – Fire protection.

UNIT – II

SOURCES OF WATER: Surface sources – Ground sources – Water from atmosphere – Desalination – Recycling of waste water – Recharging of aquifers.

UNIT – III

DUAL SUPPLY OF WATER: Potable and non-potable water – Protected water – Grey water – Black water – Water bornediseases – water related diseases – Sewage Irrigation.

UNIT – IV

DISTRIBUTION OF WATER: Based on topography – Gravity distribution – Direct pumping – Combined pumping and gravity flow. Service Reservoirs – Continuous supply – Intermittent supply – Networks of distribution– Emergency water supply as in case of fire accidents – Valves, hydrants and meters.

UNIT – V

INDUSTRIAL WATER: Location of Industry with reference to surface sources of water – Quality of water required for industrial operations – characteristics of waste water produced – Standards for letting industrial effluents into sources of water.

TEXTBOOKS:

1. K.N. Duggal, "Elements of Environmental Engineering", 7thEdition, S. Chand Publishers, 2010.
2. Hammer and Hammer "Water and wastewater Technology", 4th Edition, Prentice hall of India, 2003.
3. Howard S. Peavy, Donand P. Rowe, George Technobanoglous, "Environmental Engineering", 1stEdition Mc Graw –Hill Publications, Civil Engineering Series, 1985.

REFERENCES:

1. B.C.Punmia, "Water Supply Engineering", Vol. 1, "Waste water Engineering Vol. II", 2nd Edition, Ashok Jain &Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi, 2008.
2. Fair, Geyer and Okun, "Water and Waste Water Engineering", 3rdEdition, Wiley, 2010.
3. Metcalf and Eddy, "Waste Water Engineering", 3rd Edition, Tata Mc Graw Hill, 2008.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ENVIRONMENTAL ENGINEERING LAB				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Learning Objectives:

The course will address the following:

1. Estimation of some important characteristics of water and wastewater in the laboratory.
2. It also gives 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 and wastewater in the laboratory.
2. Draw some conclusion and decide whether the water is suitable for construction or not, drinking or not; ultimate disposal as per effluent standards or not.
3. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments.
4. Estimate and study the strength of the raw and treated effluents in terms of BOD, COD, pH, TDS and chloride of the neutralization tank treating effluents from Chemistry lab or Environmental Engineering Laboratory

SYLLABUS:

List of Experiments:

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides 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 Iron.

7. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method and B.O.D.
8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.
14. Visit a Water Treatment Plant and give a technical report.

NOTE: At least 10 of the above experiments are to be conducted.

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

TEXTBOOKS:

1. Standard Methods for Analysis of Water and Waste Water – APHA
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi

REFERENCE:

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

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DEPARTMENT OF CIVIL ENGINEERING

Subject	HIGHWAY ENGINEERING LAB				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

Course Learning 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.
4. Determine the traffic volume, speed and parking characteristics.
5. Draw highway cross sections and intersections.

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.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING

1. Earthwork calculations for road works
2. Drawing of road cross sections
3. Rotary intersection design

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.
12. Enoscope for spot speed measurement.
13. Stop Watches

TEXTBOOKS:

1. 'Highway Material Testing Manual' by S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.

REFERENCE BOOKS:

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

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DEPARTMENT OF CIVIL ENGINEERING

Subject	CAD LAB				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	0	1	2	2

Course Learning Objectives:

The objectives of the course are to

1. Learn the usage of any fundamental software for design
2. Create geometries using pre-processor
3. Analyze and Interpret the results using post processor
4. Design the structural elements

Course Outcomes:

After the completion of the course student should be able to

1. Develop accurate geometric models of real-world structures and structural elements using appropriate modeling techniques.
2. Conduct structural analysis to determine the behavior of structures under various loading conditions.
3. Interpret and evaluate post-processing results to assess the structural performance and identify critical areas.
4. Design structural elements and complete structural systems in compliance with relevant Indian Standard (IS) Codes.

LIST OF EXPERIMENTS:

1. Analysis & Design determinate structures using a software
2. Analysis &Design of fixed &continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads (DL, LL, WL, EQL)

6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design program for foundation using EXCEL Spread Sheet
9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

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

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DEPARTMENT OF CIVIL ENGINEERING

Subject	TECHNICAL PAPER WRITING & IPR				
Year / Semester	III B. Tech. / II Sem.	L	T	P	C
Regulation Year	R - 23	2	0	0	-

Course Learning Objective:

1. To explain the basics of writing technical reports and understanding formatting and structure.
2. To help students develop skills in proofreading, report drafting, and proposal writing.
3. To provide awareness on intellectual property rights relevant to academic and technical domains.

Course Outcomes

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

1. Understand the basics of technical report writing, sentence formation, and report structure.
2. Apply drafting and editing techniques to improve technical writing clarity.
3. Demonstrate skills in proofreading, summarizing, and presenting technical reports.
4. Use word processing tools effectively for document preparation and formatting.
5. Explain the fundamentals of intellectual property rights and their relevance in academic work.

SYLLABUS:

UNIT – I

Introduction: An introduction to writing technical reports, technical sentences formation, using transitions to join sentences, Using tenses for technical writing.

Planning and Structuring: Planning the report, identifying reader(s), Voice, Formatting and structuring the report, Sections of a technical report, basics of clarity and conciseness, Minutes of meeting writing.

UNIT – II

Drafting report and design issues: The use of drafts, Illustrations and graphics.

Final edits: Grammar, spelling, readability and writing in plain English: Writing in plain English, Jargon and final layout issues, Spelling, punctuation and Grammar, Padding, Paragraphs, Ambiguity.

UNIT – III

Proofreading and summaries: Proofreading, summaries, Activities on summaries. Presenting final reports: Printed presentation, Verbal presentation skills, Introduction to proposals and practice.

UNIT – IV

Using word processor: Adding a Table of Contents, Updating the Table of Contents, Deleting the Table of Contents, Adding an Index, Creating an Outline, Adding Comments, Tracking Changes, Viewing Changes, Additions, and Comments, Accepting and Rejecting Changes, Working with Footnotes and Endnotes, Inserting citations and Bibliography, Comparing Documents, Combining Documents, Mark documents final and make them read only., Password protect Microsoft Word documents., Using Macros

UNIT – V

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property- relevance of IPR in academic writing.

TEXTBOOKS:

1. Kompal Bansal & Parshit Bansal, “Fundamentals of IPR for Beginner’s”, 1st Ed., BS Publications, 2016.
2. William S. Pfeiffer and Kaye A. Adkins, “Technical Communication: A Practical Approach”, Pearson.
3. Ramappa,T., “Intellectual Property Rights Under WTO”, 2nd Ed., S Chand, 2015.

REFERENCE BOOKS:

1. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.
2. Day R, how to Write and Publish a Scientific Paper, Cambridge University Press (2006)

E-resources:

1. https://www.udemy.com/course/reportwriting/
2. https://www.udemy.com/course/professional-business-english-and-technical-report-writing/
3. https://www.udemy.com/course/betterbusinesswriting/

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DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

MINORS

(R23)

VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
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DEPARTMENT OF CIVIL ENGINEERING

Subject	CONSTRUCTION PLANNING AND MANAGEMENT				
MINOR		L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

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

1. To introduce the fundamentals of construction project management, including planning, scheduling, and monitoring techniques.
2. To familiarize students with project evaluation methods, cost/resource optimization, and construction management software tools.
3. To impart knowledge about construction equipment used for earthwork, hauling, hoisting, and material handling.
4. To educate students on the methods and machinery involved in concrete production, placement, and finishing.
5. To develop an understanding of construction methods, safety practices, and the application of BIM in modern construction projects.

Course Outcomes:

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

1. Understand the significance of construction planning, coordination, and scheduling techniques.
2. Apply PERT, CPM, and resource optimization techniques using construction management software.
3. Understand the operation and economic considerations of earthmoving and material handling equipment.
4. Describe the working principles of concrete equipment and processes involved in concrete works.

SYLLABUS

UNIT – I

Construction Project Management: Construction project management and its importance – Qualities of a good project manager – Project planning, coordination, scheduling, and monitoring – Bar charts – Milestone charts – Critical Path Method (CPM).

UNIT – II

Project Evaluation and Resource Management: Project Evaluation and Review Technique (PERT) – Cost analysis – Project crashing for optimum cost and resources – Resource allocation – Introduction to project management software – Application of PRIMAVERA or equivalent tools.

UNIT – III

Earthmoving and Material Handling Equipment: Construction equipment and economic considerations – Earthwork equipment – Trucks and handling equipment – Rear dump trucks – Capacity and productivity calculations – Compaction equipment – Rollers and types – Hoisting and earthwork equipment: hoists, cranes, tractors, bulldozers, graders, scrapers, draglines, clam shell buckets.

UNIT – IV

Concreting Equipment and Techniques: Concrete production: Batching plants, mobile units (e.g., AJAX), mixers – Mixing, placing, consolidating, and finishing of concrete – Equipment used in concreting operations.

UNIT – V

Construction Methods and Safety: Construction methods: Earthwork, piling, concrete placement, formwork, fabrication and erection – Quality control – Safety engineering – Introduction to BIM (Building Information Modelling) for civil engineering applications

Text Books:

1. Peurifoy, Schexnayder, Shapira, Construction Planning, Equipment and Methods, Tata McGraw Hill.
2. Kumar NeerajJha, Construction Project Management: Theory and Practice, Pearson, 2011.
3. Subir K. Sarkar and SubhajitSarasvati, Construction Technology, Oxford University Press.

Reference Books:

1. Peter Fewings, Construction Project Management – An Integrated Approach, Taylor and Francis.
2. Trefor Williams, Construction Management: Emerging Trends and Technologies, Cengage Learning.

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DEPARTMENT OF CIVIL ENGINEERING

SUBJECT	BUILDING PLANNING AND DRAWING				
MINOR		L	T	P	C
Regulation Year	R - 23	0	0	3	1.5

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.
4. Giving training exercises on different building units.
5. Imparting the skills and methods of planning of various buildings.

Course Outcomes:

1. To plan various buildings as per the building by-laws.
2. To distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
3. To draw signs and bonds
4. To draw different building units
5. To learn the skills of drawing building elements and plan the buildings as per requirements.

List of Drawings:

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors & Windows.
5. Detailing & Drawing of Staircase.
6. Detailing & Drawing of Ventilators & Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

Text Books:

1. "Planning, designing and Scheduling", Gurcharan Singh and Jagdish Singh
2. "Building planning and drawing" by M. Chakraborti.
3. "Building drawing", M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

Reference Books:

1. "National Building" Code 2016 (Volume- I & II).
2. "Principles of Building Drawing", M G Shah and C M Kale, Trinity Publications, New Delhi.
3. "Civil Engineering drawing and House planning", B. P. Verma, Khanna publishers, New Delhi.
4. "Civil Engineering Building practice", Suraj Singh: CBS Publications, New Delhi, and Chennai
5. "Building Materials and Construction", G. C Saha and Joy Gopal Jana, McGrawHill Education (P) India Ltd. New Delhi.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	CIVIL ENGINEERING- BUILDING MATERIALS AND CONSTRUCTION				
MINOR		L	T	P	C
Regulation Year	R - 23	3	0	0	3

Course Learning Objectives:

1. To introduce various building construction materials
2. To describe various properties of masonry, types.
3. To explain various types of cements and their importance and properties.
4. To explain various building components
5. To describe the various types of finishing's

Course Outcomes:

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

1. Know various engineering properties of building construction materials and suggest their suitability.
2. Identify the functional role of masonry and its importance
3. Acquire and apply fundamental knowledge about cement and lime.
4. Know about components of buildings
5. Identify different types of finishing paint.

SYLLABUS

UNIT – I

STONES, BRICKS, TILES, WOOD AND PAINTS

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

MASONRY: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls.

WOOD: Structure – Properties- Seasoning of timber-Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiver – Reinforced Plastics, Steel, aluminum.

UNIT – III

LIME AND CEMENT SUPPLEMENTATIONARY MATERIALS

Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Cement Supplementary materials like Silica fume, Fly ash, GGBS, Rice husk ash used and properties.

UNIT – IV

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

UNIT - V

FINISHINGS

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

TEXTBOOKS:

1. Building Materials by S.S.Bhavikatti, Vicespublications House private ltd.
2. Building Materials by B.C.Punmia, Laxmi Publications private ltd

REFERENCES:

1. Building Materials by S.K.Duggal, New Age International Publications.
2. Building Materials by P.C. Verghese,P HI learning (P)ltd.
3. Building Materials by M.L.Gambhir, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	SAFETY IN CONSTRUCTION				
MINOR		L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Learning Objectives:

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

1. To introduce students to the fundamentals of safety in the construction industry.
2. To impart knowledge about safety practices in various construction operations.
3. To familiarize students with safety standards in material handling and equipment usage.
4. To educate students about relevant safety laws and codes applicable to construction.
5. To develop awareness of workers' welfare and legal safety provisions in construction projects.

Course Outcomes:

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

1. Understand safety concerns and human factors influencing construction site operations.
2. Apply safety measures for excavation, demolition, tunneling, and confined spaces.
3. Explain safety standards in material handling and storage procedures.
4. Apply safety practices while using construction equipment and temporary power systems.
5. Describe relevant safety laws, obstruction acts, and legal codes related to construction safety.

SYLLABUS

UNIT – I

Introduction to the Construction Industry and Safety Management: Introduction to the construction industry – Safety issues in construction – Human factors in construction safety – Roles of various groups in ensuring safety – Framing contract conditions related to safety – Relevance of ergonomics in construction safety.

UNIT – II

Safety in Construction Operations and Standards: Safety in excavation, underwater works, underpinning, and shoring – Ladders and scaffolds – Tunneling – Blasting – Demolition –

Pneumatic caissons – Confined spaces – Temporary structures – Indian Standards and National Building Code provisions on construction safety.

UNIT – III

Safety in Material Handling and Storage: Safety practices in handling construction materials – Safety in storage and stacking of materials at construction sites.

UNIT – IV

Safety in Construction Equipment Usage: Safe use of vehicles, cranes, tower cranes, lifting gears, hoists, lifts, wire ropes, pulley blocks, mixers, conveyors – Pneumatic and hydraulic tools – Safety in temporary power supply.

UNIT – V

Construction Labor Laws and Welfare Regulations: Contract Labor (Regulation & Abolition) Act and Central Rules – Definitions – Registration of establishments – Licensing of contractors – Health and welfare provisions – Penalties and wage rules. Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Central Rules, 1998 – Applicability – Administration – Welfare Board and Fund – Worker training – General safety, health, and welfare provisions – Penalties.

Text Books:

1. R.K. Jain and Sunil S. Rao, Safety, Health and Environment Management Systems, Khanna Publishers.
2. V. J. Davies and K. Tomasin, Construction Safety Handbook, Thomas Telford Ltd., 1996.
3. Dr. R. Chudley, Construction Technology, Volumes 1–4, Pearson Education.

Reference Books:

1. National Building Code of India 2016, Bureau of Indian Standards.
2. IS Codes related to Construction Safety, Bureau of Indian Standards.
3. Contract Labor (R&A) Act, 1970 with Central Rules, 1971
4. Building and Other Construction Workers (RE&CS) Act, 1996 and Rules, 1998

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DEPARTMENT OF CIVIL ENGINEERING

Subject	SUSTAINABLE MATERIALS AND GREEN BUILDING				
MINOR		L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Learning Objectives:

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

1. To understand the concept of sustainability in the context of construction materials and ecological systems.
2. To familiarize students with environmentally friendly alternatives to conventional construction materials.
3. To introduce the processing and classification of recycled aggregates and sustainable brick-making techniques.
4. To explore the health, environmental, and radiation impacts of conventional building materials.
5. To provide knowledge on energy-efficient building codes, green building rating systems, and sustainable construction techniques.

Course Outcomes:

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

1. Explain the ecological footprint, bio-capacity, global hectare, planet equivalent, and Earth's natural systems.
2. Discuss conventional engineered building materials such as concrete and bricks, and describe the use of low-carbon cements.
3. Illustrate the properties, processing, and classification of recycled aggregates.
4. Identify the ill effects of building materials due to radiation.
5. Appraise the Energy Conservation Building Code (ECBC 2007) and ECBC compliant methodology.

SYLLABUS

UNIT – I

Basics of Material Sustainability: Ecological footprint, bio-capacity, global hectare, planet equivalent, earth natural system, CO_2 emissions, basics of the carbon cycle, factors affecting the carbon cycle, urban environment, fundamentals of sustainability, life cycle assessment, role of materials and primary energy, secondary energy, embodied energy, energy analysis, factors affecting material sustainability, ecological footprint and bio-capacity calculation, equivalent factor, yield factor, role of cement in sustainability, and chemical exergy calculation.

UNIT – II

Sustainability in Cement Usage: Fuel required for cement production, cementitious/supplementary cementitious materials and their characterization, strength of concrete, types of composite cements, alternative fuel for cement, life cycle embodied energy and concrete sustainability, use of admixtures, curing methods, and use of wastewater for mixing and curing.

UNIT – III

Recycled Aggregates and Clay Bricks: Processing and classification of recycled aggregates, crushing and grinding of aggregates, Bond's law, operational energy, thermal conductivity models, thermal diffusivity, types of clay bricks, and comparison of various types of brick kilns.

UNIT – IV

Ill-effects of Building Materials and Radiation: Carbon balance, paints, adhesives, sealants, health hazards of building materials, emission models and testing, energy-efficient design of buildings, design optimization, urban heat island effect, radiation concepts, and evapotranspiration theory and models.

UNIT – V

Energy Conservation and Formwork Basics: Energy Conservation Building Code (ECBC 2007), ECBC-compliant methodology, OTTV methodology, solar energy and solar PV cells, solar water heating, green design strategies, green building rating systems, Autoclaved Aerated Concrete (AAC), insulated precast systems and forms, insulated concrete form, tunnel form, and modular construction.

TEXTBOOKS:

1. Newman, J. and Choo, Ban Sang, Advanced Concrete Technology – Processes, 1st Edition, Elsevier, 2003.
2. Kubba, S., LEED Practices, Certification, and Accreditation Handbook, 1st Edition, Elsevier, 2010.
3. Indian Building Congress, Practical Handbook on Energy Conservation in Buildings, 1st Edition, Nabhi Publication, 2008.
4. Andrew H. Buchanan and Brian G., Energy and Carbon Dioxide Implications of Building Construction, Energy and Buildings, 20, 205–217, 1994.

REFERENCES:

1. Green Building Basics, California Integrated Waste Management Board
   https://www.ciwmb.ca.gov/GREENBUILDING/Basics.htm#What
2. Venkatarama Reddy, B.V. and Jagadish, K.S., Embodied Energy of Common and Alternative Building Materials and Technologies, Energy and Buildings, 35, 129–137, 2003.
3. Ministry of Power, Energy Conservation Building Code 2018, Revised Version, Bureau of Energy Efficiency, 2018.

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DEPARTMENT OF CIVIL ENGINEERING

Subject	ESTIMATION AND COSTING				
MINOR		L	T	P	C
Regulation year	R - 23	0	0	3	1.5

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Apply standard methods to calculate quantities of various components in a building structure.
2. Analyze material, labor, and overhead costs to prepare rate analysis for different items of construction work.
3. Interpret specifications for common building components and explain their relevance in estimation and contract documentation.
4. Demonstrate the use of estimation methods and software tools to generate detailed and abstract estimates for building projects.

Course Outcomes:

Upon the successful completion of this course:

1. Interpret specifications and contract conditions from standard documents and evaluate different types of contracts and procurement systems including e-procurement and reverse auctions.
2. Assess the valuation of structures based on market data, standard methods, and applicable codes and regulations.
3. Analyze cost components and prepare detailed rate analysis for various building items.
4. Apply standard measurement techniques to calculate quantities for different components of a building using individual wall, centerline methods and software tools.

SYLLABUS

UNIT – I

Contracts – Types of contracts – Contract Documents – Conditions of contract – Tendering process – Valuation of buildings - concepts of e-procurement and reverse auctions – Standard specifications for different items of building construction – Environment Social Governance

UNIT – II

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

UNIT – III

Rate Analysis – Working out data for various items of work over head and contingent charges –Use of Schedule of Rates – Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules

UNIT – IV

Detailed Estimation of Buildings using individual wall method for single, double and four roomed buildings – Common errors and best practices.

UNIT – V

Detailed Estimation of Buildings using centre line method for single, double and four roomed buildings. Standard software's like building estimator etc.

TEXT BOOKS:

1. 'Estimating and Costing' by B.N.Dutta, UBS publishers, 2000.
2. 'Civil Engineering Contracts and Estimates' by B.S.Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. 'Construction Planning and Technology' by Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. 'Estimating and Costing'by G.S. Birdie.

REFERENCES:

1. 'Standard Schedule of rates and standard data book' by public works department.
2. IS1200 (PartsItoXXV-1974/ Method of Measurement of Building & Civil Engg Works–B.I.S.)
3. 'Estimation, Costing and Specifications' by M.Chakraborthi; Laxmi publications.
4. National Building Code

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DEPARTMENT OF CIVIL ENGINEERING

Syllabus for

HONORS

(R23)

VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS)
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DEPARTMENT OF CIVIL ENGINEERING

Subject	MATLAB APPLICATIONS FOR CIVIL ENGINEERS				
HONOR		L	T	P	C
Regulation year	R - 23	0	0	3	1.5

Course Learning Outcomes:

1. Understand and utilize the MATLAB environment to perform basic computations, handle matrices and vectors, and solve linear systems relevant to civil engineering problems.
2. Develop structured MATLAB programs using scripts, functions, control structures, and file handling techniques to implement logic-based solutions.
3. Apply MATLAB tools for data visualization and solve domain-specific problems in civil engineering such as beam analysis, soil classification, concrete mix design, and project scheduling.

Course Outcomes:

1. Demonstrate proficiency in using MATLAB for basic operations, matrix manipulation, solving linear systems, and developing user-defined functions to automate civil engineering calculations.
2. Apply programming logic, control structures, and file handling techniques to model, analyze, and solve civil engineering problems using structured MATLAB code.
3. Interpret and visualize engineering data through graphical functions and apply MATLAB to domain-specific applications such as beam analysis, soil classification, mix design, and project scheduling.

List of Experiments:

1. Introduction to MATLAB Environment and Basic Operations
2. Using Built-in Mathematical Functions and Writing Engineering Formulas (Area, Volume, Discharge, etc.)
3. Vectors and Matrices – Creation and Operations
4. Solving Linear Equations Using Matrix Methods
5. MATLAB Scripts and User-defined Functions
6. Control Structures – if-else and Loops

7. File Handling – Reading and Writing Data
8. Basic 2D Plotting and Graphical Functions
9. Bending Moment and Shear Force for Simply Supported Beam
10. Soil Classification Using Flowchart Logic
11. Concrete Mix Proportion Calculator
12. Project Scheduling using Simple Bar Chart

Textbooks:

1. Matlab For Beginners, A Gentle Approach by Peter I.Kattan, Petra Books, 2008.
2. MATLAB: A Practical Introduction to Programming and Problem Solving by Stormy Attaway, Butterworth-Heinemann Inc; 6th edition, 2022
3. Matlab for Civil Engineers: From Basics to Advanced Applications by Dimitrios Sargiotis, Springer Nature, 2025.

Reference Books:

1. MATLAB Handbook with Applications to Mathematics, Science, Engineering, and Finance by Jose Miguel David Baez-Lopez, David Alfredo Baez Villegas, CRC Press, 2019.
2. Numerical Methods Using Matlab, by Mathews J H and Fink K D., Prentice Hall of India, 2005.
3. Essential MATLAB for Engineers and Scientists, by Brian D. Hahn and Daniel T. Valentine, Academic Press I

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DEPARTMENT OF CIVIL ENGINEERING

Subject	INTRODUCTION TO EARTHQUAKE ENGINEERING				
HONOR		L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Learning Objectives:

1. To impart the knowledge of behavior of civil engineering structures during earthquakes.
2. To explain seismic analysis of framed and masonry structures.
3. To introduce the concepts of ductile detailing.
4. Developing the ability to analyze structures for seismic loads using various methods, including dynamic analysis techniques.
5. Seismic Design Principles: Learning the methodologies and philosophies behind designing earthquake-resistant structures. This includes understanding the role of building codes and standards like ASCE 7, ACI 318, and ANSI/AISC 341.

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

1. Acquire basic knowledge of engineering seismology.
2. Develop response spectra for a given earthquake time history and its implementation to estimate Response of a given structure.
3. Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios
4. Analyze multi-storied structures modeled as shear frames and determine lateral force distribution due to earthquake input motion using IS-1893 procedures.
5. Comprehend planning and design requirement of earthquake resistant features of RCC and Masonry Structures through exposure to different IS Code Practices.

SYLLABUS

UNIT - I

Introduction to seismology: Engineering seismology– rebound theory – plate tectonics – seismic waves- earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT – II

Seismic design concepts: EQ load on simple building –load path–floor and roof diaphragms –seismicresistantbuildingarchitecture–planconfiguration–verticalconfiguration– pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames (MRF) – ductility of MRF – Infill wall – Non- structural elements.

UNIT - III

Calculation of loads: EQ load – 3D modeling of building systems and analysis (theory only) Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing of shear walls.

UNIT-IV

Earthquake loads: Cyclic loading behavior of RC, steel and pre- stressed concrete elements - modern concepts-Base isolation – Adaptive systems – case studies.

UNIT-V

Concept of damages: Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects of earthquakes – factors related to building damages due to earthquake- methods of seismic retrofitting- restoration of buildings

TEXTBOOKS:

1. Agrawal, P. and Shrikhande, M. (2006), "Earthquake resistant design of structures", Prentice Hall of India, Inc.
2. Chopra, A.K. (2007), "Dynamics of structures: Theory and application to earthquake engineering", 2nd edition, Prentice Hall of India.
3. Pankaj Agarwal and Manish Shri Khande, Earthquake Resistant Design of Structures, Prentice – Hall of India, 2007, New Delhi.
4. Bullet K.E., Introduction to the Theory of Seismology, Great Britain at the University Printing houses, Cambridge University Press 1996.

REFERENCES:

1. Chowdhary, I. and Dasgupta, S.P. (2009). "Dynamics of structure and foundation – A unified approach : 2 Applications", CRC Press, Balkema.
2. Clough, R. W. and Penzien, J. (1993). "Dynamics of structures", McGraw Hill, Inc.,

New York.

3. Datta, T. K. (2010). “Seismic analysis of structures”, John Wiley & Sons (Asia) Pte Ltd. Singapore.
4. Hart, G. C. and Wong, K. (2000). “Structural dynamics for structural engineers”, John Wiley & Sons, Inc.,

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DEPARTMENT OF CIVIL ENGINEERING

Subject	SOIL DYNAMICS				
HONOR		L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Learning Objectives:

1. To explain the significance of dynamic load in machine foundation analysis
2. To explain theory of vibration for different field conditions
3. To explain the principles of machine foundation design for reciprocating and impact machines
4. To explain the concept and method of foundation isolation
5. To understanding reciprocating and impact machines including liquefaction

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

1. Understand the influence of dynamic load in the machine foundation analysis and design
2. Use vibration theory in soil dynamics and ascertain soil behavior accordingly
3. Estimate dynamic soil properties based on laboratory and field tests
4. Do machine foundation analysis and design for reciprocating and impact machines including Liquefaction
5. Understand foundation isolation and its significance in machine foundation.

SYLLABUS

UNIT – I

THEORY OF VIBRATIONS: Basic definitions- Free and Forced vibrations with and without damping for Single degree freedom system- Resonance and its effect – Magnification – Logarithmic decrement – Transmissibility, Natural frequency of foundation soil system - Barkan's and IS methods – Pressure bulb concept

UNIT – II

WAVE PROPAGATION AND DYNAMIC SOIL PROPERTIES: Elastic waves in Rods – Waves in elastic Half space, Field and Laboratory methods of determination – Uphole, Down hole and Cross hole methods – Cyclic plate load test – Block vibration test.

UNIT – III

MACHINE FOUNDATIONS: Design criteria, Permissible amplitudes and Bearing pressure, Degrees of freedom - Analysis under different modes of vibration of block foundation.

UNIT – IV

DESIGN OF FOUNDATIONS FOR RECIPROCATING AND IMPACT MACHINES: Analysis of Two Degree freedom systems under free and forced vibrations -Principles of Design of Foundations for reciprocating and impact machines as per IS code.

UNIT – V

VIBRATION ISOLATION: Types and methods – Isolating materials and their properties.

TEXT BOOKS:

1. Barkan, D., “Dynamics of Bases and Foundations”, 2nd Edition McGraw Hill Publishing, 1970.
2. Shamsher Prakash, “Soil Dynamics”, 3rd Edition, John Wiley, 2000.

REFRENCE BOOK:

1. Shamsher Prakash, Soil Dynamics, McGraw - Hill, 1981.
2. Alexander Major, Dynamics in Soil Engineering,
3. Sreenivasalu and Varadarajan, Handbook of Machine Foundations, Tata McGraw -Hill, 2007.
4. IS 2974 -Part I and II,
5. Design Considerations for Machine Foundations
6. IS 5249: Method of Test for Determination of Dynamic Properties of Soils

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DEPARTMENT OF CIVIL ENGINEERING

Subject	SEISMIC ANALYSIS OF STRUCTURES				
HONOR		L	T	P	C
Regulation year	R - 23	3	0	0	3

Course Learning Objectives:

1. To Apply the principles of structural dynamics for building models
2. To Compare various methods of measurement of earthquakes
3. To Analyze the Structure using Equivalent Static Method
4. To Illustrate the vertical irregularities in buildings
5. To apply the ductile design and detailing provisions to beam, columns and shear walls

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

1. Discuss the equations of motion for undamped free vibrations for SDOF and 2DOF Systems
2. Explain the engineering seismology including causes and effects of earthquakes
3. Analyzed multistoried structure using Equivalent static method and Response Spectrum methods
4. Assess various irregularities in buildings
5. Apply the provisions of IS :13920 and IS:4326 to building structures

SYLLABUS

UNIT – I

STRUCTURAL DYNAMICS: Introduction – Physical and Mathematical Modelling – Discrete and continuum Modelling. Laws of Equilibrium – Newton's Law of Motion – D'Alembert's Principle and Principle of virtual displacement. - Types of Dynamic Loading. Single Degree of Freedom System (SDOF) – Undamped Free Vibrations – Damped Free Vibrations (concept only). Two Degree of Freedom System (2DOF) – Undamped Free Vibrations – Determination of Natural frequencies and Mode shapes.

UNIT – II

ENGINEERING SEISMOLOGY: Introduction- Internal structure of earth – Chemical properties – Physical properties – Continental drift theory – Plate tectonics – Movement of plate Boundaries – Movement of Indian plate – Faults – Types of faults – Elastic Rebound theory. Earthquakes – Earthquake terminology – Classification of Earthquakes – Causes and

effects of Earthquakes –Earthquake waves – Quantification of Earthquakes – Intensity and Magnitude – Recording Earthquakes.

UNIT – III

EARTHQUAKE RESISTANT DESIGN: Reviews of latest I.S : 1893 (Part 1) provisions for buildings - General principles and design criteria – Assumptions – Design Acceleration spectrum – Horizontal seismic coefficient – Design acceleration – Seismic zones of India – Importance factor – Response reduction factor – Design lateral force – Design imposed loads for Earthquake force calculation –Seismic weight – Analysis by Equivalent Static Method and Dynamic Method (Response Spectrum Method) – Storey drift limitation.

UNIT – IV

BUILDING CONFIGURATIONS: Introduction – Regular and Irregular Buildings. Plan Irregularities – Torsion Irregularity – Re-entrant corners - Floor slabs having excessive cut-outs or openings- Out of plane offsets in Vertical Elements – Non-parallel Lateral Force system. Vertical Irregularities – Stiffness Irregularity (soft storey) – Mass Irregularity – Vertical Geometric Irregularity – In-plane discontinuity in Vertical Elements resisting lateral force – strength Irregularity (weak storey) – Floating or stub columns – Irregular Modes of Oscillation in two Principle Plan Directions.

UNIT – V

DUCTILE DESIGN AND DETAILING: Review of Latest IS: 13920 provisions General specifications – Beams – Columns – Shear walls. Special confining reinforcement. Review of Latest IS: 4326 provisions - General principles – Special Construction features relating to separations of structures (above ground only).

TEXT BOOKS:

1. A.K. Jain “Dynamics of Structures with Mat Lab Applications” Pearson India Education Series Pvt.Ltd., Delhi, 2016
2. Pankaj Agarwal & Manish Shrikhande, “Earthquake Resistant Design of Structures”, 5th Edition Prentice Hall of India, New Delhi, 2011.
3. S.K.Duggal, “Earthquake Resistant Design of Structures”, Oxford University Press, 1st Edition, 2012.

REFERENCES:

1. Chopra A.K., "Dynamics of Structures", 5thEdition, Pearson Education, Indian Branch, Delhi, 2007.
2. Mario Paz, "Structural Dynamics - Theory and Computations", 6thEdition, Pearson Education, 2005.
3. IS 456: 2000 Indian Standard Plain and Reinforced Concrete – Code of Practice, Bureau of Indian Standard, New Delhi. (or latest).
4. IS 1893 (Part 1): 2016, Indian Standard "Criteria for Earthquake Resistant Design of Structures, Part 1, General provisions and Buildings (six revision) Bureau of Indian Standard, New Delhi. (or latest).
5. IS 13920: 2016 Indian Standard "Ductile Design and Detailing of Reinforced Concrete Structures, subjected to Seismic forces - Code of Practice, Bureau of Indian Standard, New Delhi. (or latest).
6. IS 4326: 2013 Indian Standard "Earthquake Resistant Design and Construction of Buildings - Code of Practice, Bureau of Indian Standard, N

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DEPARTMENT OF CIVIL ENGINEERING

Subject	COMPUTER AIDED PROJECT MANAGEMENT LABORATORY				
HONOR		L	T	P	C
Regulation year	R - 23	0	0	3	1.5

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.

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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