Program structure & Detailed Syllabus

2023

For

Under Graduate Programme (B.Tech)

CIVIL ENGINEERING

(Applicable For Batches Admitted From 2023 – 2024)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY
(AUTONOMOUS)

DUVVADA - VISAKHAPATNAM – 530 049

(An Autonomous Institute, Accredited by NAAC, Affiliated to JNTUGV, Vizianagaram, AP)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY(A)
VISAKHAPATNAM
Academic Regulations (VR23) for B. Tech (Regular/Honors)

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

The admissions of the students into B.Tech. course shall be as per the Govt. of Andhra Pradesh rules.

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 program 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.
   For lateral entry scheme admission: Pursue a program of study
   For not less than three academic years and not more than six Academic years.

   (iii) Lateral entry candidate has to register for 120 credits from second year onwards and shall secure 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., 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. Programs of Study

The following B.Tech. Programs are offered:

S. No.	Program Code	Program & Abbreviation
01	01	Civil Engineering (CE)
02	02	Electrical and Electronics Engineering (EEE)
03	03	Mechanical Engineering (ME)
04	04	Electronics and Communication Engineering (ECE)
05	05	Computer Science and Engineering (CSE)
06	12	Information Technology (IT)
07	19	Electronics and Computer Engineering (E. Com E)
08	54	Artificial Intelligence and Data Science (AI&DS)
09	43	CSE–Artificial Intelligence
10	44	CSE –Data Science
11	46	CSE–Cyber Security

And any other Programs as approved by the authorities of the Institute from time to time.

6. Registration:

A student shall register for courses in each semester as per the courses offered in the specific B.Tech Program.

7. Curricular Program

The Curriculum of the four-year B. Tech Program has been designed to achieve a Healthy balance between theory and laboratory courses and Skills required for Industry. Further, focus is given to develop technical skills, Inter disciplinary skillsetc.,

8. Semester/Credits:

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

ii) The summer term is for minimum 4 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 for elective courses.

9. 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%
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	-

10. 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

11. Programme Pattern

i. Total duration of the of B. Tech (Regular/Honors) 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, 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 /NSS /Scouts & Guides / Communityservice activities are made mandatory as credit courses for all the under graduate 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 the elective component of the curriculum, with 5 Professional Elective courses and 5 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 4 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 interdisciplinary/job-oriented/domain skill courses which are relevant to the industry are integrated into the curriculum of all disciplines. There shall be 5 skill-oriented courses offered during III to VII semesters. Among the five skill courses, four courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.

xiii. Students shall undergo mandatory summer internships, for a minimum of 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 Institute for the students having good academic record.

xvi. Institution 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. Faculty shall assign as 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. 25% of course work for the theory courses in every semester may be conducted in the blended mode of learning.

12 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 400 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

For any course, student is considered to be passed upon securing minimum 35% marks in the external examination alone and minimum 40% marks from both internal and external examination put 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, 15 marks for subjective paper and 5 marks for assignment.

ii) Objective paper shall contain for 05 short answer questions with 2 marks each 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 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 mid term examination shall be conducted for Two and Half units of syllabus with one either or type question from each unit. The second mid term examination shall be conducted for remaining two and half 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 mid term 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.
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.

iii) 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 reexamination 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 and shall be produced to the Committees as and when the same are asked for.

13 Skill oriented Courses

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

b. 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.

c. 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.

d. 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.

e. 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.

f. The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the Institution at the beginning of the semester.

g. In case a student fails in any skill course, he/she may be permitted to register for same course or alternative course decided by department committee. For the course opted by department committee minimum 32 hrs of the class work will be conducted. The internal marks secured earlier will be nullified if the course is changed. The assessment procedure of skill-oriented course remains same.

h. 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 Institution.

14. Massive Open Online Courses (MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the institution. 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 for 2 credits or 12 weeks for 3 credits) 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 Institution

To award credits the student should get certificate after they have registered for written exam and successfully passed

(Or)

College will conduct the written examination / Viva – voce and award the credits and grades.

In case a student fails in any online course, he/she may be permitted to register for the same course or an alternate course decided by the department committee. For course opted by the department committee minimum 48 hours of class work will be conducted. The internal marks secured earlier will be nullified if the course is changed. The assessment procedure of MOOCs course remains same as general theory course.

Note:

1. The registered course must not be same as any of the courses listed in the program structure of their regulation till final year including electives.
2. Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

15. Credit Transfer Policy

Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the Institution 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 institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
vi. The institution 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 Institution shall ensure no overlap of MOOC exams with that examination schedules.
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 institution shall maintain the following to the examination section:

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 institution shall resolve any issues that may arise in the implementation of this 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 institution from time to time.

16. Academic Bank of Credits (ABC)

The institution 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 institutes 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 accumulated credits in ABC.
iv. execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

17. Mini project (EPICS/CSP):

It is to be carried out during the second year. Students have an option to choose their own area of interest related to problems impacting the society. It is evaluated for 50 marks.

i) Internal assessment - 20 marks

ii) Project submission and Viva-Voce - 30 marks

18. Mandatory Internships

Summer Internships:

Two summer internships either onsite or virtual each with a minimum of 4 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 50% 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 Institution.

Full Semester Internship and Project work:

In the final semester, the student should mandatorily register and undergo internship 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.

18.1. Evaluation Procedure for Main Project:

Main project work shall be carried out in the IV-year, second semester and evaluated for **200 marks**. Out of a total of **200 marks** for the project work, **80 marks** shall be for Internal Evaluation and **120 marks** for the End Semester Examination.

18.2. Evaluation Procedure for Internship:

Internship work shall be carried out in the IV-year, second semester and evaluated for **200** marks. Out of a total of **200 marks** for the project work, **80** marks shall be for Internal Evaluation and **120 marks** for the End Semester Examination.

19. Attendance Requirements:

a. It is desirable for a candidate to have 100% attendance in the class in all the courses. However, a candidate shall be permitted to appear for the end semester examination if he/she has a minimum of 75% aggregate attendance in the semester. Student will not be permitted to write Mid examination if the attendance percentage is less than 75 % during the stipulated instruction duration. However, Academic Committee in the institute level shall review the situation and take appropriate decision.

   Note: Special cases for students having extra ordinary performance at National and International level will be considered by the Academic Committee.

b. Condonation of shortage of attendance may be considered on Medical grounds maximum up to 10%, if the student provides the medical certificate to the HOD immediately after he /she recovers from the illness. Medical Certificate submitted afterwards shall not be permitted. Shortage of attendance equal to or above 65% and below 75%will be condoned on payment of fee as fixed by the competent authority and the student concerned will be permitted to take the end semester examination. ***This privilege is given only three times for regular student and only two times for lateral entry student during the entire program of study***.

c. Shortage of attendance may be considered for the students who participate in prestigious sports, co and extra-curricular activities if their attendance is in the minimum prescribed limit.

d. A student will be promoted to the next semester if satisfies attendance and credits requirement.

20. Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements. For any course, student is considered to be passed upon securing minimum 40% marks in the external examination alone and minimum 50% marks from both internal and external examination put together

21. Promotion Policy:

a. A student shall be promoted from first year to second year if he fulfills the minimum attendance requirements.

b. To promote to III year, a student has to secure minimum 40% of total credits from I &II- year courses

c. To promote to IV year, a student has to secure minimum 40% of total credits from I, II&III- year courses

d. In case of Lateral entry students, to promote to IV year, a student has to secure minimum 40% of total credits from II & III –year courses

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 most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee constituted by the Institution shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not.

23. Supplementary examinations:

Supplementary examinations for the odd Semester shall be conducted with the regular examinations of even semester and vice versa. In case a student fails in online courses/ industrial lecture(s), he/she may be permitted to register for another course /lecture(s).

24. Transitory Regulations

i. The student has to continue the course work along with the regular students of the respective semester in which the student getsre-admission.

ii. The student has to register for Substitute / Compulsory courses offered in place of courses studied earlier.

iii. The mode of internal evaluation and end-semester examinations shall be on par with the regular students, i.e., the student has to follow the mode of

internal evaluation and the then question paper model for the end – semester examinations along with the regular students of the respective semester in which the student gets re-admission. The marks secured in the internal and end-semester examinations will be pro-rated in accordance with the regulations under which the student was first admitted.

iv. For the courses studied under earlier regulations but failed, the student has to appear, pass and acquire credits from the supplementary examinations as and when conducted. The question paper model shall remain same as theone in which the student took examination during previous regulations.

v. The promotion criteria based on attendance as well as credits shall be in accordance with the regulations under which the student was first admitted.

vi. All other academic requirements shall be in accordance with the regulations under which the student was first admitted.

vii. The decision of the Principal is final on any other clarification in this regard.

viii. Transcripts: After successful completion of the entire program of study, a transcript containing performance of all academic years willbe issued as a final record. Partial transcript will also be issued up toany point of study to a student on request, after payment of requisitefee.

25. Minimum Instruction Days

The minimum instruction days for each semester shall be 16 weeks.

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

26. Examinations and Evaluation

a. General guidelines

i. All the semester end examinations are conducted for duration of three hours

ii. External examination shall be conducted for 70 marks consist of five questions of internal choice carrying 12 marks each.

iii. For laboratory examinations, the evaluation is done by internal examiner and an external examiner.

b. Revaluation There is a provision for revaluation of theory courses if student fulfils the following norms.

The request for revaluation must be made in the prescribed format duly recommended by the Chief Superintendent of Examinations through Additional Controller along with the prescribed revaluation fee.

27. Grading System:

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade Point 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
	Ab (Absent)	0

Computation of SGPA

The following procedure is to be adopted to compute the Semester Grade Point Average.

(SGPA) and Cumulative Grade Point Average (CGPA):

The 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 under gone by a student,i.e.

SGPA (Si) = Σ (CixGi)/ΣCi

Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th}course.

Computation of CGPA

- The CGPA is also calculated in the same manner considering all the courses undergone by a student overall the semesters of a programme, i.e.

CGPA=Σ(CixSi)/Σ Ci

Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that semester.

Conversion of CGPA to Percentage:

Equivalent Percentage= (CGPA– 0.75) X 10

28. 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 three classes:

Regular:

Class Awarded	CGPA to be secured	From the CGPA secured from160 Credits.
First Class with Distinction	≥7.75with no failures	
First Class	≥ 6.75	
Second Class	≥5.75to<6.75	

Lateral – entry scheme

Class Awarded	CGPA to be secured	From the CGPA secured
First Class with Distinction	≥7.75with no failures	
First Class	≥ 6.75	From 121 credits from II Year to IV Year
Second Class	≥5.75to<6.75	

29. General Instructions

i. Where the words 'he', 'him', 'his', occur, they imply 'she','her', 'hers', also.

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

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

iv. The college may change or amend the academic regulations or syllabi from time to time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the institution.

30. With holding of Results

If the student has not paid the dues, if any, to the institute or in any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

Note: All other regulations including attendance requirements related to four year **B.Tech Regular program will be applicable for B.Tech. Lateral Entry Scheme.**

31. Malpractices Rules

DISCIPLINARY ACTION FOR MAL PRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices/ Improper conduct	Punishment
1(a)	If the candidate possesses or keep accessible in examination hall, any paper, note book, programmable calculators,Cell phones, pager, palm computers or any other form of material concerned withor related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	If the candidate gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year.
		The Hall Ticket of the candidate is to be cancelled.

3	If the candidate impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the courses of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection withfor feature of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4	If the candidate smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with for feature of seat.
5	If the candidate uses objection able, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
6	If the candidate refuses too by the orders of the Chief Superintendent/Assistant - Superintendent / any Officer on dutyor misbehaves or creates disturbance of any kind in and around the examination hall or organizes a Walkout or instigates others to walkout,	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses of that semester / year. The candidates also

	or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation , assaults the officer – in –charge ,or any person on duty in or outside the examination hall or any of his relations, or in dulges in any other act of mis conduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7	If the candidate leaves the exam hall taking away answer script or intentionally tears of the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with for feature of seat.
8	If the candidate possesses any lethal weapon or fire are min the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year. The candidate is also debarred and forfeits the seat.
9	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6to8.	Student of the college, expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses

		of that semester / year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and. A police case will be registered against them.
10	If the candidate comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester / year.
11	Copying detected on the basis of internal evidence, such as, during valuation or during specials crutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester / year examinations.
12	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Academic committee of the Institute for further action to award suitable punishment.	

32. UGC RECOMMENDED PUNISHMENT FOR RAGGING

i. Suspension from attending classes and academic privileges
ii. With holding / withdrawing scholarships / fellowship and other benefits.
iii. Debarring from appearing in any test / examination or other evaluation process with holding results
iv. Debarring from representing the institution in any regional, national or international meet, tournament, youth festival etc.
v. Suspension / expulsion from the hostel
vi. Cancellation of admission
vii. Rustication from the institution for period ranging from 1 to 4 semesters.
viii. Expulsion from the institution and consequent debarring from admission to any other institution for a specified period.
ix. Fine may extend upto Rs. 2.5lakh.

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B.TECH. - CIVIL –COURSE STRUCTURE–VR23

	I Year I Semester						
S.No.	**Course Code**	**Category**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	1000231101	BS	Linear Algebra & Calculus	3	0	0	3
2.	1000231102	BS	Engineering Physics	3	0	0	3
3.	1000231104	HS	Communicative English	2	0	0	2
4.	1001231101	ES/CIVIL	Basic Civil & Mechanical Engineering	3	0	0	3
5.	1003231101	ES/MECH	Engineering Graphics	1	0	4	3
6.	1000231110	BS	Engineering Physics Lab	0	0	2	1
7.	1000231111	HS	Communicative English Lab	0	0	2	1
8.	1003231110	ES/MECH	Engineering Workshop	0	0	3	1.5
9.	1005231110	PC/CSE	IT Workshop	0	0	2	1
10.	1000231120	MC	NSS/NCC/Scouts &Guides/Community Service	0	0	1	0.5
Total Credits							**19**

	I Year II Semester						
S.No.	**Course Code**	**Category**	**Course Name**	**L**	**T**	**P**	**Credits**
1.	1000231201	BS	Differential Equations and Vector calculus	3	0	0	3
2.	1000231202	BS	Engineering Chemistry	3	0	0	3
3.	1005231101	ES/CSE	Introduction to Programming	3	0	0	3
4.	1002231101	ES/EEE	Basic Electrical &Electronics Engineering	3	0	0	3
5.	1003231201	PC/MECH	Engineering Mechanics	3	0	0	3
6.	1000231210	BS	Engineering Chemistry Lab	0	0	2	1
7.	1005231111	ES/CSE	Computer Programming Lab	0	0	3	1.5
8.	1002231110	ES/EEE	Electrical &Electronics Engineering workshop	0	0	3	1.5
9.	1003231210	PC/MECH	Engineering Mechanics Lab	0	0	3	1.5
10.	1000231121	MC	Health and Wellness, Yoga and Sports	0	0	1	0.5
Total Credits							**21**

I Year I Semester

SYLLABUS

I Year – I Semester	LINEAR ALGEBRA& CALCULUS (Common to All Branches of Engineering)	L	T	P	C
Course Code (1000231101)		3	0	0	3

Course Objectives:
To equip the students with standard concepts and tools of mathematics to handle various real-world problems and their applications.

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

- Develop matrix algebra techniques that is needed by engineers for practical applications.
- Familiarize with functions of several variables which is useful in optimization.
- Learn important tools of calculus in higher dimensions.
- Familiarize with double and triple integrals of functions of several variable sin two and three dimensions.

UNIT I Matrices
Rank of a matrix by echelon form, normal form. 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, Gauss Seidel Iteration Method.

UNIT II Linear Transformation and Orthogonal Transformation:
Eigen values, Eigen vectors and their properties (without proof), 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 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 on the above theorems.

UNIT IV Partial differentiation and Applications
Partial derivatives, total derivatives, chain rule, change of variables, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT V Multiple Integrals
Double integrals, triple integrals, change of order of integration, change of variables to polar coordinates. Finding areas and volumes in Cartesian coordinates.

Textbooks:

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

Reference Books:

1. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science International Ltd., 2021 (9th reprint).
2. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 14/e, Pearson Publishers, 2018.
3. Glyn James, Advanced Modern Engineering Mathematics, 5/e, Pearson publishers, 2018.
4. Michael Green berg, Advanced Engineering Mathematics, 9th edition, Pearson edn
5. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand,2021

I Year – I Semester	ENGINEERING PHYSICS (Common for all branches of Engineering)	L	T	P	C
Course Code (1000231102)		3	0	0	3

COURSE OBJECTIVES

1. Bridging the gap between the Physics in school at 10+2 level and UG level engineering courses.
2. To identify the importance of the optical phenomenon. interference, diffraction and polarization related to its Engineering applications
3. Enlighten the periodic arrangement of atoms in Crystalline solids by Bragg's law
4. To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
5. Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of deBroglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals.
6. To Understand the Physics of Semiconductors and their working mechanism, Concept utilization of transport phenomenon of charge carriers in semiconductors.

COURSE OUTCOMES

CO1. **Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** the applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary refracted light and extraordinary refracted rays by their states of polarization (L2)

CO2. **Classify** various crystal systems (L2). **Identify** different planes in the crystal structure (L3). **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4).

CO3. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2).

CO4. **Describe** the dual nature of matter (L1). **Explain** the significance of wave function (L2). **Identify** the role of Schrodinger's time independent wave equation in studying particle in one- dimensional infinite potential well (L3). **Identify** the role of classical and quantum freeelectron theory in the study of electrical conductivity (L3).

CO5. **Classify** the crystalline solids (L2). **Outline** the properties of charge carriers in semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Apply** the concept of effective mass of electron (L3).

Unit-I: Wave Optics

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

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due tosingle slit, double slit & Diffraction Grating (Qualitative).

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

Unit Outcomes:

The students will be able to

- **Explain** the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference ($_2L_73$)
- **Illustrate** the concept of polarization of light and its applications (L2)

- **Distinguish** between ordinary polarized light and extraordinary polarized light (L2)

Unit II: Crystallography

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. Bragg's law - X-ray Diffractometer.

Unit Outcomes:
The students will be able to

- **Classify** various crystal systems (L2)
- **Identify** different planes in the crystal structure (L3)
- **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4)

Unit-III: Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius-Mossotti equation.
Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Classification of magnetic materials: Dia, para, Ferro, antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism (Qualitative) - Hysteresis - soft and hard magnetic materials.

Unit Outcomes:
The students will be able to

- **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **Summarize** various types of polarization in dielectrics (L2)
- **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence(L2)

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 freeelectron theory **-** Fermi-Dirac distribution and its temperature dependence.

Unit Outcomes:
The students will be able to

- **Explain** the concept of dual nature of matter (L2)
- **Understand** the significance of wave function (L2)
- **Interpret** the concepts of classical and quantum free electron theories (L2)

Unit – V: Semiconductors

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Extrinsic semiconductors: density of charge carriers - Drift and diffusion currents – Einstein's equation - Hall effect and its Applications.

Unit Outcomes:

The students will be able to

- **Outline** the properties of charge carriers in semiconductors (L2)
- **Understand** the carrier transportation in semiconductors (L2)
- **Identify** the type of semiconductor using in Hall effect (L2)

Text books:

- A Text book of Engineering Physics" - M. N. Avadhanulu, P.G.Kshirsagar & TVSArunMurthy, S.Chand Publications, 11th Edition 2019.
- "Engineering Physics" - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
- "Engineering Physics" - P.K.Palanisamy SciTech publications.

Reference Books:

- "Fundamentals of Physics" - Halliday, Resnick and Walker, John Wiley &Sons.
- "Engineering Physics" - M.R. Srinivasan, New Age international publishers (2009).
- "Engineering Physics" - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
- "Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
- "Semiconductor physics and devices:Basic principle" - A. Donald, Neamen, Mc GrawHill.
- "Engineering Physics" - B.K. Pandey and S. Chaturvedi, Cengage Learning
- "Solid state physics" – A.J.Dekker ,Pan Macmillan publishers
- "Introduction to Solid State Physics" -Charles Kittel ,Wiley

I Year – I Semester	**COMMUNICATIVE ENGLISH** (Common to All Branches of Engineering)	**L**	**T**	**P**	**C**
Course Code: (1000231104**)**		**2**	**0**	**0**	**2**

Course Objectives:

The main objective of introducing this course, *Communicative English,* is to facilitate using Listening, Reading, Speaking and Writing skills effectively by the students. It should result in their better comprehending abilities, oral presentations, reporting useful information and with enhanced knowledge of grammatical structures and vocabulary. This course helps the students in using speaking and writing (productive) skills more efficiently and to make them industry-ready.

Course Outcomes

- **By the end of the course the students will have** Learned how to understand the context, topic, and specificinformation from social or transactional dialogues.
- Remedially learn applying grammatical structures to formulate sentence sand use appropriate words andcorrect word forms.
- Using discourse markers to speak clearly on a specific topic in formal as well as informal discussions.
  (notrequired)
- Improved communicative competence in formal and informal contexts and for social and academicpurposes.
- Critically comprehending and appreciating reading/listening texts and to write summaries and reviews based on global comprehension of these texts.
- Writing coherent paragraphs, paraphrase, essays, letters/e-mails and resume.

Instructions:

1. The reading texts can be given as podcasts to the students so that their listening skills can be enhanced.
2. While listening and reading to the text can be given as homework, the class work for the students can be to discuss and critically evaluate the texts based on the context, purpose or writing the text and understandingit from the author's as well as reader's point of view.
3. Reading as habit for both academic and non-academic (pleasure) purposes has to be inculcated in the students. So, training has to be given in intensive and extensive reading strategies.
4. Writing for both academic (assignments, examinations, reports, e-mails/letters etc)
5. The writing tasks given in the class are to be self and peer evaluated by the students before they are finally graded by the faculty.

   Note: Please note that the texts given here are just contexts for teaching various language skills and sub skills. The students' ability to use language cannot be confined to comprehending or using the language related to the given texts (textbooks). The given texts can be used only for practice.
6. All the activities to develop language skills have to be integrated and interconnected, within each unitand across the units.
7. Use as many supplementary materials as possible in various modes (Audio, visual and printed versions) in the classroom so that the students get multimode input and will know how to use language skills in the absence of the teacher.

UNIT I

Lesson: HUMAN VALUES: A Power of a Plate of Rice by Ifeoma Okoye (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: E-Mail writing

Mechanics of Writing-Capitalization, Spellings, and Punctuation- Parts of Sentences. (*That has to be part of the bridge course- 2 weeks before the actual academic programme starts*)

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

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

UNIT II

Lesson: NATURE: Night of the Scorpion by Nissim Ezekiel (Indian and contemporary)

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 and Book/movie/article review.

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: Steve Jobs

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 specificcontext 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 graphical elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters

Grammar: 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: Writings 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.

Text books:

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

Suggestion: Instead of giving the syllabus in the form of textbooks it would be better to procure the soft copies of individual texts (stories or poems or biographies and non-fiction texts) by the university and make them available on the university website for registered students to access and download.

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**

https://dictionary.cambridge.org/grammar/british-grammar/

I Year – I Semester	BASIC CIVIL & MECHANICAL ENGINEERING (Common to CE, ME, IT, CSE, CSE(DS), CSE(CS), CSE(AI)	L	T	P	C
Course Code (1001231101)		3	0	0	3

Course Objectives:

- Get familiarized with the scope and importance of Civil Engineering sub - divisions.
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on
- Transportation and its importance in nation' s economy.
- Get familiarized with the importance of quality, conveyance and storage of water.
- Introduction to basic civil engineering materials and construction techniques.

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation ' s economy and the engineering measures related to Transportation.

CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNITI

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering-Structural Engineering-Geo- technical Engineering-Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline-Building Construction and Planning – Construction Materials - Cement – Aggregate –Bricks – Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

UNITII

Surveying: Objectives of Surveying - Horizontal Measurements – Angular Measurements-Introduction to Bearings leveling instruments used for level ling-Simple problem son leveling and bearings-Contour mapping.

UNITIII

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements-Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering

Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology- Rain water 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. Justoand Veeraraghavan, Nemchandand Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500 -2012.

PARTB: BASIC MECHANICAL ENGINEERING

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

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.
- 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

CO1: Understand the different manufacturing processes.
CO2: Explain the basics of thermal engineering and its applications.
CO3: Describe the working of different mechanical power transmission systems and power plants
CO4: Describe the basics of robotics and its applications.

UNITI

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 - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNITII

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines,3D printing, and Smart manufacturing.

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

UNITIII

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

I Year – I Semester	ENGINEERING GRAPHICS (Common to All branches of Engineering)	L	T	P	C
Course Code (1003231101)		1	0	4	3

Course Objectives:

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

Course Outcomes:

CO1: Understand the principles of engineering drawing, including engineering curves, scales,orthographic and isometric projections.

CO2: Draw and interpret orthographic projections of points, lines, planes and solids infront, top and side views.

CO3: Understand and draw projection of solids in various positions in first quadrant.

CO4: Explain principles behind development of surfaces.

CO5: Prepare isometric and perspective sections of simple solids.

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.

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 of objects 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,TataMcGraw Hill, 2017.

I Year – I Semester	ENGINEERING PHYSICS LAB (Common to All Branches of Engineering)	L	T	P	C
Course Code: (1000231110)		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: At the end of the course, the student will be able to:
CO1: Identify the mechanical behavior and mechanical parameters of materials.
CO2: Interpret some of the physical parameters based on optical phenomena.
CO3: Identify the characteristics of semiconducting materials, magnetic materials and dielectrics.
CO4: Estimate the parameters by diffraction techniques

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 for a dielectric substance using dielectric constant apparatus
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 photo cell.
8. Determination of the resistivity of semiconductors by four probe methods.
9. To study V-I characteristics of a PN junction diode in forward and reverse biasing conditions.
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 compoundpendulum.
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.
19. Study of V-I characteristics of solar cell
20. Determine of laser bean divergence and spot size of a diode laser beam

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

References:

- A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan,
- S. Chand Publishers, 2017.
- Physics Laboratory Manual for Undergraduate students – Dr. Santosh Kumar Alla,
- Dr. Ch. V. V. Ramana, Dr. T. Lakshmana Rao, Dr. R. Hanumantha Rao.

Web Resources

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

I Year – I Semester	COMMUNICATIVE ENGLISH LAB (Common to All Branches of Engineering)	L	T	P	C
Course Code: (1000231111)		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. (That can be for theory paper) is to train the students in oral communication skills in real situations. Students will get trained in the basic communication skills and also make them ready to face job interviews. They will be helped to overcome the mother tongue/local language influence and neutralize their accent which makes their speech more intelligible to all listeners.

Course Outcomes:

By the end of the course, the students will be having

- Understand the different aspects of the English language oral communication with emphasis on Listening and Speaking Skills.
- Apply communication skills through various language learning activities.
- Analyze the English speech sounds, stress, rhythm and intonation for better listening and speaking comprehension.
- Evaluate and exhibit professionalism in participating in debates and group discussions with polite turn taking strategies and sound more professional while communicating with others.
- Create effective resonate and prepare them to face interviews communicate appropriately in corporate settings.

List of Topics:

1. Vowels & Consonants (Not rules but use of them in various syllable structures)
2. Neutralization/Accent Rules (No rules again, required more practice)
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. Resume Writing
6. Group Discussions-Methods & Practice
7. Debates- Methods & Practice
8. PPT Presentations/ Poster Presentation
9. Interviews Skills

Suggested Software:

- Walden InfoTech
- Young India Films

Reference Books:

1. Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press.2018. (This can be for theory and not for lab)
2. Samson T: Innovate with English, Foundations
3. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016.
4. Jaya shree, M Let's Hear them speak: Developing Listening-Speaking skills in English. Sage Publications.
5. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012. (T h a t is for reading and writingand can be used in theory classes but not in Lab)
6. T.Bala Subramanyam, A Textbook of English Phonetics for Indian Students,(3rd Ed) Trinity Press. (Thisis all theory and can be for MA English students but not for B.Tech students)

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
12. https://www.linguahouse.com/en-GB
13. https://www.ted.com/watch/ted-ed

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/UCNfm92h83W2i2ijc5XwpIA

I Year – I Semester	ENGINEERING WORKSHOP	L	T	P	C
Course Code: (1003231110)	(Common to All branches of Engineering)	**0**	**0**	**3**	**1.5**

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Course Outcomes:

CO1: Identify workshop tools and their operational capabilities.
CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
CO3: Apply fitting operations in various applications.
CO4: 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 makethe following connections.
   a) Parallel and series b) Two-way switch c) Go down 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.

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 &
3. 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. & UpadhyayP.A.; AtulPrakashan, 2021-22.

I Year – I Semester	IT WORKSHOP	L	T	P	C
Course Code: (1005231110)	(Common to All branches of Engineering)	**0**	**0**	**2**	**1**

Course Objectives:

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

Course Outcomes:

CO1: Perform Hardware troubleshooting.

CO2: Understand Hardware components and inter dependencies.CO3: Safeguard computer systems from viruses/worms.

CO4: Document/ Presentation preparation.

CO5: Perform calculations using spreadsheets.

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 aspart 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 shouldverify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: 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 are no internet connectivity preparations need to be made by the instructors to simulate the WWWon 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 Tex and 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 inboth 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, DesignTemplates, Hidden slides.

AI TOOLS – Chat GPT

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providingincomplete 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 areyou 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, Pears on Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lam port, 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

I Year – I Semester	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to All branches of Engineering)	L	T	P	C
Course Code: (1000231120)		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

CO1: Understand the importance of discipline, character and service motto.

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.

CO3: Explore human relationships by analyzing social problems.

CO4: Determine to extend their help for the fellow beings and downtrodden people.

CO5: Develop leadership skills and civic responsibilities.

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) Organizing 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, DirectorateGeneral 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:

- Evaluated for a total of 100 marks.
- 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, totaling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

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I Year II Semester

SYLLABUS

I Year – II Semester	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (Common to All Branches of Engineering)	L	T	P	C
Course Code : (1000231201)		**3**	**0**	**0**	**3**

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- 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

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

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 Higher order Linear differential equations with Constant Coefficients

Definitions, homogenous and non-homogenous, complimentary function – particular integral ($Q(x) = e^{ax}, \sin ax, \cos ax, x^m$), general solution, method of variation of parameters. Simultaneous linear equations.

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. Second order Homogeneous Linear Partial differential equations with constant coefficients.

UNIT IV Vector differentiation

Scalar and vector point functions, del operator, Gradient – unit normal vector, angle between surfaces, directional derivative, Divergence - Solenoidal vector and Curl– irrotational., scalar potential.

UNIT V Vector integration

Liner integral – circulation – work done, - flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof) and problems on above theorems.

Text books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.
2. B.S.Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers,2017.

Reference Books:

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

I Year – II Semester	Engineering Chemistry (Common to Civil and Mechanical Engineering)	L	T	P	C
Course Code (1000231202)		3	0	0	3

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- 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

CO1: Demonstrate the corrosion prevention methods and factors affecting corrosion.
CO2: Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers.
CO3: Explain calorific values, octane number, refining of petroleum and cracking of oils.
CO4: Explain the setting and hardening of cement.
CO5: Summarize the concepts of colloids, micelle and nanomaterials.

UNIT- I Water technology

Soft and hardwater, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming**,** scale and sludge, Caustic embrittlement, 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 Bed worth 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.

Textbooks:

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

I Year – II Semester	INTRODUCTION TO PROGRAMMING (Common to All branches of Engineering)	L	T	P	C
Course Code: (1005231101)		3	0	0	3

Course Objectives:

The objectives of this course are to acquire knowledge on the

1. To impart adequate knowledge on the need of programming languages and problem-solving techniques and develop programming skills.
2. To enable effective usage of Control Structures and Implement different operations on arrays.
3. To demonstrate the use of Strings and Functions.
4. To impart the knowledge of pointers and understand the principles of dynamic memory allocation.
5. To understand structures and unions and illustrate the file concepts and its operations.
6. To impart the Knowledge Searching and Sorting Techniques

UNIT-I Introduction to Computer Problem Solving:
Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem. Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.

UNIT-II Introduction to C Programming:
Introduction, Structure of a C Program. Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements. Operators, Type Conversion. Control Flow, Relational Expressions: Conditional Branching Statements: if, if-else, if-else—if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, got statement.

UNIT-III Arrays:
Introduction, Operations on Arrays, Arrays as Function Arguments, Two Dimensional Arrays, Multidimensional Arrays. Pointers: Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function Arguments, Pointers and Arrays, Pointer to Pointer, DynamicMemory Allocation, Dangling Pointer, Command Line Arguments.

UNIT-IV Functions:
Introduction Function: Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes.Recursion. Strings: String Fundamentals, String Processing with and without Library Functions, Pointers and Strings.

UNIT-V
Structures, Unions, Bit Fields: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type — Enum variables, Using Typedef keyword, Bit Fields. Data Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

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

Course Outcomes: At the end of the Course, Student should be able to

1. Illustrate the Fundamental concepts of Computers and basics of computer programming and problem-solving approach
2. Understand the Control Structures, branching and looping statements
3. Use of Arrays and Pointers in solving complex problems.
4. Develop Modular program aspects and Strings fundamentals.
5. Demonstrate the ideas of User Defined Data types, files. Solve real world problems using the concept of Structures, Unions and File operations.

Text Books:

1. A Structured Programming Approach Using C, Forouzan, Gilberg, Cengage.
2. How to solve it by Computer, R. G. Dromey, and Pearson Education.
3. Programming in C A-Practia1 Approach. Ajay Mittal, Pearson

References:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. Computer Programming. Reema Thareja, Oxford University Press
3. The C Programming Language, Dennis Richie And Brian Kernighan, Pearson Education.
4. Programming In C, Ashok Kamthane, Second Edition, Pearson Publication.
5. Let us C ,YaswanthKanetkar, 16th Edition,BPB Publication.
6. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education,2008

Web References:

1. http://www.c4learn.com/
2. http://www.geeksforgeeks.org/c/
3. http://nptel.ac.in/courses/122104019/
4. http://www.learn-c.org/
5. https://www.tutorialspoint.com/cprogramming/

I Year – II Semester	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to All branches of Engineering)	L	T	P	C
Course Code 1002231101		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: After the completion of the course students will be able to

	Course Outcome
CO1	Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.
CO2	Understand the problem-solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.
CO3	Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.
CO4	Analyze different electrical circuits, performance of machines and measuring instruments.
CO5	Evaluate different circuit configurations, Machine performance and Power systems operation.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT-I: DC & AC circuits (8 Hours)

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 (8 Hours)

Machines: Construction, principle and operation of (i) DC Generator, (ii) Single Phase Transformer and (iii) Three Phase Induction Motor, 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: Electricity Bill & Safety Measures (8 Hours)

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.

Text 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

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.

E-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

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.

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. 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 BooleanAlgebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XORand XNOR. Simple combinational circuits–Half and Full Adders.

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, PearsonEducation, 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

I Year – II Semester	ENGINEERING MECHANICS	L	T	P	C
Course Code: (1003231201)	(Common to Civil and Mechanical Engineering)	**3**	**0**	**0**	**3**

Course Objectives:

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

CO1: Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.

CO2: Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.

CO3: Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.

CO4: Apply the principles of work- energy and impulse – momentum to solve the problems of rectilinear and curvilinear motion of a particle.

CO5: Solve the problems involving the translational and rotational motion of rigid bodies.

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 Theorem, 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, Analysis of plane trusses by using method of joints.

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.
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.

Text books:

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 Veera valli, University press. 2020. First Edition.
3. A Text book of Engineering Mechanics, S. S Bhavikatti. New age international publications 2018. 4th Edition.

Reference Books:

1. Engineering Mechanics, Statics and Dynamics, Rogers and MA. Nelson., McGraw Hill Education. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics ,I.H. Shames., PHI, 2002. 4thEdition.
3. Engineering Mechanics, Volume-I: Statics,Volume-II: Dynamics, J.L. Meriam and L. G. Kraige., John Wiley,2008.6thEdition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press,2014. Second Edition
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R. C., Pearson Education, Inc., New Delhi, 2022, 14th Edition

I Year – II Semester	Engineering Chemistry Laboratory (Common to Civil and Mechanical Engineering)	L	T	P	C
Course Code (1000231210)		0	0	3	1.5

Course Objectives:

- To verify the fundamental concepts with experiments

Course Outcomes: At the end of the course, the students will be able to
CO1: Determine the cell constant and conductance of solutions.
CO2: Prepare advanced polymer materials.
CO3: Determine the physical properties like surface tension, adsorption and viscosity.
CO4: Estimate the Iron and Calcium in cement.
CO5: 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 coal sample
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:

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

I Year – II Semester	COMPUTER PROGRAMMING LAB (Common to All branches of Engineering)	L	T	P	C
Course Code (1005231111)		0	0	3	1.5

Course Objectives:

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

Course Outcomes:
CO1: Read, understand, and trace the execution of programs written in C language.CO2: Select the right control structure for solving the problem.
CO3: Develop C programs which utilize memory efficiently using programming constructs likepointers.
CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

UNIT I

WEEK 1
Objective: Getting familiar with the programming environment on the computer and writingthe 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 seriesof 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 & constantsand operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity

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 eachof 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 alongwith 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
Lab10 : Bitfields, linked lists
Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the samewithout 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 numericalintegration

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 read() and f write ()
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

C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

IYear-II Semester	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to All branches of Engineering)	L	T	P	Credits
Course Code: 1002231110		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:

	Course Outcome
CO1	Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.
CO2	Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.
CO3	Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.
CO4	Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.
CO5	Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

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.
   - 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.
   - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
   - 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 ofelectron devices & its applications.

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

CO1: Identify & testing of various electronic components.

CO2: Understand the usage of electronic measuring instruments.

CO3: Plot and discuss the characteristics of various electron devices.

CO4: 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. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gatesusing ICs.
6. 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, PearsonEducation, 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: All the experiments shall be implementedusing both Hardware and Software

IYear-II Semester	ENGINEERING MECHANICS LAB (Common to Civil and Mechanical Engineering)	L	T	P	Credits
Course Code(1003231210)		0	0	3	1.5

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

- Verify the Law of Parallel ogram and Triangle of Forces.
- Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
- Analyse the system of Pulleys and Moment of Inertia of Compound Pendulum and Fly wheel.

Course Outcomes:

CO1: Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.
CO2: Verify Law of Polygon of forces and Law of Moment using force polygon and bell crank lever.
CO3: Determine the Centre of gravity and Moment of Inertia of different configurations.
CO4: Verify the equilibrium conditions of a rigid body under the action of different force systems.

Students have to perform any 10 of the following Experiments:

List of Experiments:

1. Verification of Law of Parallel ogram of Forces.
2. Verification of Law of Triangle of Forces.
3. Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.
4. Determination of coefficient of Static and Rolling Frictions
5. Determination of Centre of Gravity of different shaped Plane Lamina.
6. Verification of the conditions of equilibrium of a rigid body under the action of coplanar non –con current, parallel force system with the help of a simply supported beam.
7. Study of the systems of pulleys and draw the free body diagram of the system.
8. Determine the acceleration due to gravity using a compound pendulum.
9. Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass.
10. Determine the Moment of Inertia of a Fly wheel.
11. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

References:

1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.

2. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14thEdition, Pearson Education, Inc., New Delhi, 2022.

I Year – II Semester	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to All branches of Engineering)	L	T	P	C
Course Code (1000231121)		0	0	1	0.5

Course Objectives:

The main objective of introducing this course is to make the students maintain their mental andphysical 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

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.

CO2: Demonstrate an understanding of health-related fitness components.

CO3: Compare and contrast various activities that help enhance their health.

CO4: Assess current personal fitness levels.

CO5: Develop Positive Personality

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:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
Practicing general and specific warm up, aerobics
ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping andrunning.

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 SurvivingAnywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. HumanKinetics, 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 manyas Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- 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.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

B.TECH. - CIVIL –COURSE STRUCTURE–VR23

II Year I Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1.	1000232101	BS	Numerical and Statistical Methods	3	0	0	3
2.	1099232101	HSMC	Universal Human Values– Understanding Harmony & Ethical Human Conduct	2	1	0	3
3.	1001232101	ES	Surveying	3	0	0	3
4.	1001232102	PC	Strength of Materials	3	0	0	3
5.	1001232103	PC	Fluid Mechanics	3	0	0	3
6.	1001232110	PC	Surveying Lab	0	0	3	1.5
7.	1001232111	PC	Strength of Materials Lab	0	0	3	1.5
8.	1001232180	SC	Building Planning and Drawing	0	1	2	2
9.	1003232104	ES	Design Thinking & Innovation	1	0	2	2
		Total		**16**	**2**	**8**	**22**

II Year II Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1.	1099232201	ME-I	Managerial Economics and Financial Analysis	2	0	0	2
2.	1001232201	ES	Engineering Geology	3	0	0	3
3.	1001232202	PC	Building Materials and Concrete Technology	3	0	0	3
4.	1001232203	PC	Structural Analysis	3	0	0	3
5.	1001232204	PC	Hydraulics &Hydraulic Machinery	3	0	0	3
6.	1001232210	PC	Concrete Technology Lab	0	0	3	1.5
7.	1001232211	PC	Engineering Geology Lab	0	0	3	1.5
8.	1001232280	SC	Remote Sensing & Geographical Information Systems	0	1	2	2
9.	1001232125	Audit Course	Environmental Science	2	0	0	-
	Total			**15**	**1**	**10**	**19**
	Mandatory Community Service Project Internship of 08 weeks duration during summer vacation						

II-Year I-Semester

II Year – I Semester	NUMERICAL AND STATISTICAL METHODS	L	T	P	C
1000232101		3	0	0	3.0

Course Outcomes:

After successful completion of this course, the students should be able to:

- Apply numerical methods to solve algebraic and transcendental equations.
- Derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.
- To identify real life problems into Mathematical Models.
- To apply the probability theory and testing of hypothesis in the field of civil engineering Applications.

Pre-requisite: Basic algebraic Equations, Probability, random variables (discrete and continuous) and probability distributions.

UNIT I: Solution of Algebraic & Transcendental Equations

Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Gauss Elimination, Jacoby and Gauss Siedal method.

UNIT II: Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

UNIT III: **Solution of Initial value problems to Ordinary differential equations** Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

UNIT IV: Estimation and Testing of hypothesis, large sample tests

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

UNIT V: Small sample tests

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Textbooks:

1. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition
3. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.India.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Alpha ScienceInternational Ltd., 2021 5th Edition(9th reprint).
3. Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, PNIE
4. H. K Das, Er. Rajnish Verma,Higher Engineering Mathematics, S. Chand Publications,2014, Third Edition (Reprint 2021)

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview
3. http://nptel.ac.in/courses/111105090

II Year – I Semester	UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT	L	T	P	C
1099232101		3	0	0	3.0

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- 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.
- 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:

- Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)
- Identify one's self, and one's surroundings (family, society nature) (L1, L2)
- Apply what they have learnt to their own self in different day-to-day settings in real life (L3)
- Relate human values with human relationship and human society. (L4)
- Justify the need for universal human values and harmonious existence (L5)
- Develop as socially and ecologically responsible engineers (L3, L6)

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I

Introduction to Value Education (6 lectures and 3 tutorials for practice session)

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 (6 lectures and 3 tutorials for practice session)

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 (6 lectures and 3 tutorials for practice session)

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 (4 lectures and 2 tutorials for practice session)

Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment 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 (6 lectures and 3 tutorials for practice session)

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 fulfil 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

Readings:

Textbook and Teachers Manual

a. 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

b. 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)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending

on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-

Harmony%20in%20the%20Human%20Being.pdf

3. https://fdp-si.aicte-india.org/UHV-II%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/UHV-II%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%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.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-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

II Year – I Semester	SURVEYING	L	T	P	C
1001232101		3	0	0	3.0

Course Outcomes

- At the end of the course, the learners will be able to
- Utilize the principles & methods of surveying to measure horizontal & vertical distances and angles
- Diagnose sources of errors and implement rectification methods
- Employ surveying principles to calculate areas and volumes
- Set out curves and operate modern surveying equipment
- Apply the fundamentals of photogrammetry surveying in the field

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Surveying accessories. Introduction to Compass, leveling and Plane table surveying.

Lineardistances- 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

Leveling- 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 LiDARSurvey(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. Duggal S. K., Surveying (Vol. 1 & 2), Tata McGraw Hill Publishing Co. Ltd., New Delhi, 5th edition, 2019.

2. C. Venkatramaiah, Textbook of Surveying, Universities Press, 1st edition, 2011.

Reference Books:

1. B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Surveying (Vol. 1), Laxmi Publications (P) Ltd., New Delhi, 18th edition, 2024.
2. B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Surveying (Vol. 2), Laxmi Publications (P) Ltd., New Delhi, 17th edition, 2022.
3. B. C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Surveying (Vol. 3), Laxmi Publications (P) Ltd., New Delhi, 16th edition, 2023.
4. Chandra A. M., Plane Surveying and Higher Surveying, New Age International Pvt. Ltd., Publishers, New Delhi, 3rd edition, 2015.
5. N. Basak, Surveying and Levelling, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 4th edition, 2014.
6. Arora K. R., Surveying (Vol. 1, 2 & 3), Standard Book House, Delhi, 12th edition, 2015.

Web Resources:

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

II Year – I Semester	STRENGTH OF MATERIALS	L	T	P	C
1001232102		3	0	0	3.0

Course Outcomes

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

- Explain the basic materials' behavior under the influence of different external loading and support conditions.
- Illustrate diagrams indicating the variation of key performance features like axial forces, bending moments, and shear forces in structural members.
- Understand and calculate section modulus for determining stresses developed in beams.
- Analyze deflections due to various loading conditions.
- Evaluate stresses across sections of thin and thick cylinders and columns to determine optimum sections to withstand internal pressure using Lame's equation

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 and Shear Stresses: 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 and Cylindrical Shells: 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

Textbooks:

1.B. S. Basavarajaiah and P. Mahadevappa, Strength of Materials, Universities Press, 3rd edition, 2010.

2.L. S. Srinath, Advanced Mechanics of Solids, McGraw Hill Education, 3rd edition, 2017.

3.R. K. Bansal, Strength of Materials, Lakshmi Publications, 16th edition, 2022.

4.J. K. Gupta and S. K. Gupta, Strength of Materials, Cengage Publications, 2nd edition, 2024.

References:

1.Beer and Johnston, Mechanics of Materials, McGraw Hill India Pvt. Ltd., 8th edition (SI Units), 2020.

2.E. P. Popov, Mechanics of Solids, Prentice Hall, 2nd edition, 2015.

3.T. D. Gunneswara Rao and Mudimby Andal, Strength of Materials - Fundamentals and Applications, Cambridge University Press, 1st edition, 2018.

4.R. K. Rajput, A Textbook of Strength of Materials (Mechanics of Solids, SI Units), S. Chand & Co., New Delhi, 7th edition, 2022.

5.S. S. Ratan, Strength of Materials, Tata McGraw Hill Publications, 3rd edition, 2016.

II Year – I Semester	FLUID MECHANICS	L	T	P	C
1001232103		3	0	0	3.0

Course Outcomes:

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

- Explain the principles of fluid statics, kinematics, and dynamics.
- Apply the laws of fluid statics and concepts of buoyancy.
- Describe the fundamentals of fluid kinematics and differentiate between types of fluid flows.
- Apply the principle of conservation of energy for flow measurement.
- Analyze the losses in pipes and discharge through pipe networks

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 : Venturimeter, 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.

Textbooks:

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

II Year – I Semester	SURVEYING LABORATORY	L	T	P	C
1001232110		0	0	3	1.5

Course Outcomes:

- Operate various linear and angular measuring instruments. (Apply)
- Record linear and angular measurements accurately. (Apply)
- Calculate area and volume by analyzing data obtained from surveying activities. (Analyze)
- Utilize modern equipment such as a total station. (Apply)
- Compile field notes from survey data. (Create)

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

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

II Year – I Semester	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
1001232111		0	0	3	1.5

Course Outcomes

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

- Conduct tensile strength tests and illustrate stress-strain diagrams for ductile metals. (Apply)
- Perform bending tests and determine load-deflection curves for steel/wood. (Analyze)
- Conduct torsion tests and calculate torsion parameters. (Apply)
- Perform hardness, impact, and shear strength tests, and compute hardness numbers, impact, and shear strengths. (Evaluate)
- Conduct tests on closely coiled and open coiled springs and compute deflections. (Apply)

List of experiments:

1. Tension test on mild steel / HYSD bars
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
9. Izod / Charpy Impact test on metals
10. Shear test on metals
11. Continuous beam – deflection test

II Year – I Semester	BUILDING PLANNING AND DRAWING	L	T	P	C
1001232180		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:

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

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

Syllabus:

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
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. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
2. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, NewDelhi.
3. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai
4. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGrawHill Education (P)India Ltd. New Delhi.

II Year – I Semester	DESIGN THINKING & INNOVATION	L	T	P	C
1003232104		1	0	2	2

Course Objectives:

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes:

- Define the concepts related to design thinking. (L1, L2)
- Explain the fundamentals of Design Thinking and innovation (L1, L2)
- Apply the design thinking techniques for solving problems in various sectors. (L3)
- Analyse to work in a multidisciplinary environment (L4)
- Evaluate the value of creativity (L5)
- Formulate specific problem statements of real time issues (L3, L6)

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 modelling, 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.

Textbooks:

1. Tim Brown,Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough. H, The Era of Open Innovation – 2013

Online Learning Resources:

https://nptel.ac.in/courses/110/106/110106124/

https://nptel.ac.in/courses/109/104/109104109/

https://swayam.gov.in/nd1_noc19_mg60/preview

II Year I Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1.	1000232101	BS	Numerical and Statistical Methods	3	0	0	3
2.	1099232101	HSMC	Universal Human Values– Understanding Harmony & Ethical Human Conduct	2	1	0	3
3.	1001232101	ES	Surveying	3	0	0	3
4.	1001232102	PC	Strength of Materials	3	0	0	3
5.	1001232103	PC	Fluid Mechanics	3	0	0	3
6.	1001232110	PC	Surveying Lab	0	0	3	1.5
7.	1001232111	PC	Strength of Materials Lab	0	0	3	1.5
8.	1001232180	SC	Building Planning and Drawing	0	1	2	2
9.	1003232104	ES	Design Thinking & Innovation	1	0	2	2
		Total		**16**	**2**	**8**	**22**

II Year II Semester

S.No.	Course Code	Category	Title	L	T	P	Credits
1.	1099232201	ME-I	Managerial Economics and Financial Analysis	2	0	0	2
2.	1001232201	ES	Engineering Geology	3	0	0	3
3.	1001232202	PC	Building Materials and Concrete Technology	3	0	0	3
4.	1001232203	PC	Structural Analysis	3	0	0	3
5.	1001232204	PC	Hydraulics &Hydraulic Machinery	3	0	0	3
6.	1001232210	PC	Concrete Technology Lab	0	0	3	1.5
7.	1001232211	PC	Engineering Geology Lab	0	0	3	1.5
8.	1001232280	SC	Remote Sensing & Geographical Information Systems	0	1	2	2
9.	1001232125	Audit Course	Environmental Science	2	0	0	-
	Total			**15**	**1**	**10**	**19**
	Mandatory Community Service Project Internship of 08 weeks duration during summer vacation						

II Year II Semester Syllabus

II Year – II Semester	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	L	T	P	C
10099232201		2	0	0	2

Course Objectives:

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

Course Outcomes:

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

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.

Textbooks:

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.

Online Learning Resources:

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

II Year – II Semester	ENGINEERING GEOLOGY	L	T	P	C
1001232201		3	0	0	3

Course Outcomes:

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

- Explain the significance of geological agents on the Earth's surface and their importance in civil engineering. (Understand)
- Identify and understand the properties of megascopic minerals and rocks. (Understand)
- Describe the concepts of groundwater and its geophysical methods and apply knowledge to identify site parameters such as contour, slope, and aspect for topography. (Understand, Apply
- Classify earthquake-prone areas, landslides, and subsidence zones, and measure these hazards to practice hazard zonation. (Analyze)
- Investigate project sites for civil engineering projects, including site selection for mega projects like dams, reservoirs, and tunnels, using strike and dip problem-solving. (Evaluate, Analyze)

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, Sandstone, Limestone, Laterite, Quartzite, Gneiss, Schist, Marble, Khond alite 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.

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, Tourmaline, Calcite, Gypsum, etc…
   B. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyrolusite, Graphite, Chromite, etc
2. Megascopic description and identification of rocks
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.
   A. Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Porphyry, Basalt, etc.
   B. Sedimentary rocks – Sandstone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglomerate, etc.
   C. Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotite schist, Marble, Khondalite, etc.

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

Textbooks:

1. Parbin Singh, Engineering & General Geology, Katson Educational Series, 8th edition, 2023.
2. N. Chenna Kesavulu, Engineering Geology, Laxmi Publications, 2nd edition, 2014.

References

1. Subinoy Gangopadhay, Engineering Geology, Oxford University Press, 1st edition, 2012.
2. D. Venkat Reddy, Engineering Geology, Vikas Publishing, 2nd edition, 2017.
3. Alan E. Kehew, Geology for Engineers and Environmental Society, Pearson Publications, 3rd edition, 2013.
4. K. S. Valdiya, Environmental Geology, McGraw Hill Publications, 2nd edition, 2013.

II Year – II Semester	BUILDING MATERIALS AND CONCRETE TECHNOLOGY	L	T	P	C
1001232202		3	0	0	3.0

Course Outcomes:

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

- Know various engineering properties of building construction materials and suggest their suitability (Understand)
- Describe the basic ingredients of concrete and their role in its production and behavior in the field and Test the properties of fresh and hardened concrete. (Apply)
- Explain the basic concepts of concrete. (Understand)
- Design the concrete mix using the BIS method. (Apply)
- Evaluate the ingredients of concrete through lab test results and recognize the importance of concrete quality. (Evaluate)

Unit I:

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

Unit II:

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 III:

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.

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 and 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

Textbooks

1. S. K. Duggal, "Building Materials", 2nd Edition, New Age International Publishers, 2010.
2. S.C. Rangwala, "Engineering Materials", Charotar Publications, New Delhi, 2nd Edition.
3. M. S. Shetty, Concrete Technology, S. Chand & Co., 2004.
4. M. L. Gambhir, Concrete Technology, Tata McGraw Hill Publishers, New Delhi, 5th edition, 2013.
5. Job Thomas, Concrete Technology, Cengage Publications, 1st edition, 2015

References

1. A. R. Santha Kumar, Concrete Technology, Oxford University Press, New Delhi
2. M. Neville, Properties of Concrete, Pearson, 4th edition, 2019
3. P. K. Mehta and Moterio, Concrete Microstructure, Properties of Materials, McGraw Hill, 4th edition, 2014
4. P.C. Varghese, "Building Materials" by Prentice-Hall of India Private Ltd, 3rd Edition, New Delhi.

II Year – II Semester	STRUCTURAL ANALYSIS	L	T	P	C
1001232203		3	0	0	3.0

Course Outcomes:

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

- Apply energy theorems to evaluate trusses. (Apply)
- Analyze indeterminate structures using Castigliano's Second Theorem. (Analyze)
- Analyze the behavior of fixed and continuous beams. (Analyze)
- Evaluate continuous beams and portal frames using the slope-deflection method. (Evaluate)
- Evaluate continuous beams and portal frames using the moment-distribution method. (Evaluate)

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:

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 and Continuous Beams: Fixed beams: Analysis, SF and BM and calculations of deflections, effect of sinking and rotation of a support. Statically indeterminate (maximum of three span using three moment theorem) 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–

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 and single storeyed 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 Analysis of single bay and single storeyed portal frames without sway.

Textbooks:

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

Reference Books:

1. C. K. Wang, Intermediate Structural Analysis, McGraw Hill, 2017
2. Aslam Kassimali, Structural Analysis, Cengage Publications, 6th edition, 2020.
3. Dr. R. Vaidyanathan and Dr. P. Perumal, Structural Analysis Vol. I and II, Laxmi Publications, 3rd edition, 2016.
4. B. D. Nautiyal, Introduction to Structural Analysis, New Age International Publishers, New Delhi.
5. D. S. Prakasa Rao, Structural Analysis, University Press.
6. B. C. Punmia, Strength of Materials and Mechanics of Structures, Khanna Publications, New Delhi

II Year – II Semester	HYDRAULICS AND HYDRAULIC MACHINERY	L	T	P	C
1001232204		3	0	0	3.0

Course Outcomes:

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

- Explain the characteristics of laminar and turbulent flows. (Understand)
- Apply knowledge of fluid mechanics to solve uniform flow problems in open channels. (Apply)
- Analyze non-uniform flow problems & the hydraulic jump phenomenon in open channel flows. (Analyze)
- Evaluate the impact of jets on plates and design Pelton wheel, Francis, and Kaplan turbines. (Evaluate)
- Describe the principles, losses, and efficiencies of centrifugal pumps. (Understand)

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

Textbooks:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House, 22nd edition, 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. Frank M. White, Henry Xue, Fluid Mechanics, Tata McGraw Hill, 9th edition, 2022
3. C.S. P. Ojha, R. Berndtsson, P. N. Chandramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010
4. S. K. Som, Gautam Biswas, S. Chakraborty, Introduction to Fluid Mechanics & Fluid Machines, 3rd edition, 2011

II Year – II Semester	CONCRETE TECHNOLOGY LABORATORY	L	T	P	C
1001232210		0	0	3	1.5

Course Outcomes:

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

- Explain the importance of testing cement. (Understand)
- Describe the properties of cement. (Understand)
- Evaluate different properties of aggregates. (Evaluate)
- Analyze fresh concrete properties and their relevance to hardened concrete. (Analyze)
- Evaluate hardened concrete properties. (Evaluate)

List of experiments

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 and Coarse Aggregates**

A. Grading and fineness modulus of aggregate by sieve analysis.

B. Specific gravity of aggregate

C. Water absorption and bulking of sand.

3. **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.

4. **Tests on Hardened Concrete**

A. Compressive strength of cement concrete

B. Split tensile strength of concrete.

C. Modulus of rupture

D. Modulus of Elasticity and Poisson's Ratio

Non-Destructive testing on concrete Rebound hammer and UPV techniques and not limited to the above (for demonstration)

II Year – II Semester	ENGINEERING GEOLOGY LABORATORY	L	T	P	C
1001232211		0	0	3	1.5

Course Learning Objectives:

The objective of this course is:

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

Course Outcomes:

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

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.

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.

II Year – II Semester	REMOTE SENSING AND GIS	L	T	P	C
1001232280		2	0	0	2

Course Learning Objectives:

The course is designed to

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

Course outcomes

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

1. Ability to Perform Geo-Referencing and Digitization
2. Competence in Thematic Map Creation and Vector Analysis
3. Proficiency in Handling Multi-Source Geospatial Data
4. Advanced Remote Sensing and Spatial Analysis Techniques

List of Experiments:

1. Geo Referencing a Topo-sheet
2. Digitization of Point, Line & Polygon Data
3. Creation of Thematic Map
4. Vector Analysis-Buffering, Overlay and Network analysis
5. Importing maps and layers from various sources
6. Transportation Network Map – Route analysis.
7. Generation of False Color Composite (FCC)
8. Extracting area of Interest

Text Books**:**

1. Basudeb Bhatta (2021). 'Remote sensing and GIS', 3rdedn., 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', 7thedn., Wiley India Pvt. Ltd.
4. Demers, M.N, (2013) 'Fundamentals of Geographic Information Systems', 4thedn., Wiley India Pvt. Ltd.

GIS SOFTWARE: QGIS / ArcGIS

Textbook for Practical:

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:

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

II Year – II Semester	ENVIRONMENTAL SCIENCE	L	T	P	C
1001232125		2	0	2	3.0

Course Objectives:

- To make the students to get awareness on environment.
- 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 To save earth from the inventions by the engineers.

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 0 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..

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

References:

2. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
3. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
4. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
5. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice Hall of India Private limited
6. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
7. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited.

III YEAR I SEMESTER

S.No.	Course code	Category	Title	L	T	P	Credits
1	1001233101	PC	Water Resources Engineering	3	0	0	3
2	1001233102	PC	Design of Reinforced Concrete Structures	3	0	0	3
3	1001233103	PC	Geotechnical Engineering	3	0	0	3
4	1001233130	PE-I	A) Advanced Structural Analysis	3	0	0	3
	1001233131		B) Ground Improvement Techniques				
	1001233132		C) Watershed Development And Management				
5	1001233150	OE	A) Building Services	3	0	0	3
	1001233151		B) Green Buildings				
	1001233152		C) Construction technology and management				
6	1001233110	PC	Geotechnical Engineering Lab	0	0	3	1.5
7	1001233111	PC	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5
8	1001233180	Skill course	Estimation, Specifications & Contracts	0	1	2	2
9	1001233181	ES	Tinkering Lab	0	0	2	1
10	1001233170	Evaluation of Community Service Internship		-	-	-	2
	Total			15	1	10	23

III Year – I Semester	Water Resources Engineering	L	T	P	C
1001233101		3	0	0	3

COURSE OBJECTIVES:

Students will have

• To Explain Engineering Hydrology And Its Applications, Types And Forms Of Precipitation,

• To Explain the Abstractions From Precipitation

• To Explain Hydrograph, Separation Of Base Flow, Unit Hydrograph, ,S-Hydrograph,IUH

• To Explain Ground Water Occurrence, Aquifer Parameters, Types Of Wells, State Of low Into Wells

• To Explain Consumptive Use, Duty And Delta, Factors Affecting Duty, Methods Of Irrigation, Water Logging

COURSE OUTCOMES:

Students will get ability to

1. understand the process of hydrologic cycle, types and forms of precipitation,
2. understand about the abstractions from rainfall
3. analyze about hydrograph, unit hydrograph, s-hydrograph,IUH
4. determine ground water Occurrence, aquifer parameters, types of wells, and the discharge into a well
5. describe consumptive use, duty and delta and methods of irrigation, water logging

UNIT – I

Introduction- hydrologic cycle, water-budget equation, world water balance, applications in engineering. Precipitation- forms of precipitation, measurement of precipitation, rain gauge network, mean precipitation over an area, depth-area-duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP).

UNIT – II

Abstractions from precipitation- evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, Interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, classification of infiltration capacities, infiltration indices.

UNIT – III

Hydrograph: hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph, S-hydrograph, IUH.

UNIT – IV

Groundwater and well hydrology- forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests.

UNIT – V

Water withdrawals and uses–Analysis of surface water supply, Water requirement of crops, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, infiltration, consumptive use, estimation of evapo-transpiration, irrigation requirement. Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip

irrigation. Water logging: causes, effects and remedial measures.

Text Books:

- Engineering Hydrology,KSubramanya, Edition: 5, 2020,Mc-Graw Hill.
- Ground Water 3rd Edition 2007 By H M Raghunath,New Age International

Reference Books:

- Irrigation and Water Resources & Water Power by P.N.Modi, 11th edition (15 March 2019), Standard Book House.

III Year – I Semester	DESIGN OF REINFORCED CONCRETE STRUCTURES	L	T	P	C
1001233102		3	0	0	3

Course Objectives:

The objective of the course is to

- Explain the basics concepts of Limit state design.
- Describe the design of flexure.
- Explain the basic concepts such as shear, bond.
- Explain all types of simply supported slabs in detail.
- Explain the classification of columns. Explain isolated square and rectangular footing.

Course Outcomes:

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

1. Understand the concepts of limit state method.
2. Design of T-beam and doubly reinforced section
3. Demonstrate and design the basic concepts such as shear and bond.
4. Design different types of simply supported slabs by limit state method.
5. Design short columns by limit state method. Design different types of isolated footings by limit state method.

UNIT-I

Introduction of Limit State Design: Working Stress method (concepts) 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. Based on IS Code: 456-2000. Comparison of Limit state method with working stress and ultimate load method. Assumptions in limit state design – stress – block parameters.
Analysis of singly reinforced beams by LSM method.

UNIT-II

Design for Flexure limiting moment of Resistance, limit state design and analysis of doubly reinforced rectangular beams and T -beam sections with examples.

UNIT – III

Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions.

UNIT – IV

Slabs: Classification of slabs, design and detailing one - way slabs, two - way slabs, and continuous one way slabs using Coefficients (conventional) of IS code- all with respect to simply supported only.

UNIT-V

Design of Compression Members: Slenderness ratio, effective length of a column, design of short - under axial loads, uniaxial and biaxial bending (Use of SP 16), Design of slender column, P-M interaction (Only for Demonstration) – I S Code provisions.
Footings: types of footings. Distribution of base pressure. General Design considerations for footings. Design of Isolated rectangular, square footing.

NOTE: All the designs to be taught in Limit State Method (IS456-2000)

Text Books:

1. Design of reinforced concrete foundations by P.C. Varghese, PHI learning private Limited, 2009.
2. Reinforced concrete design by N. Subramanian, Oxford publication, New Delhi, 2017.
3. Reinforced concrete design by S.Unnikrishna Pillai &Devdas Menon, Tata Mc.GrawHill, New Delhi, 2016.

References:

1. Reinforced Concrete Structures by Park and Pauley, John Wiley and Sons, 1975.
2. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
3. Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, NewDelhi, 2008.
4. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi, 2006.

III Year – I Semester	GEOTECHNICAL ENGINEERING	L	T	P	C
1001233103		3	0	0	3

COURSE OBJECTIVES

Students will have

- Understand the soil formation and determine the index properties of these soils and classify them
- To impart the concept of seepage of water through soils and determine the discharge of water through soils.
- To impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
- Analyze the stress below the soils under different conditions.
- 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. To study and calculate the effective stress of soils at different depths

COURSE OUTCOMES:

After completion of this course students will be able to

1. Determine the index properties of soils, classify them and establish their inter-relationships.
2. Illustrate seepage of water through soils and determine the discharge of water through soils
3. Analyze the stress below the soils under different conditions
4. Determine the magnitude and the rate of consolidation settlement
5. Calculate the effective stress of soils at different depths. Determine the shear parameters of sands and clays and the areas of their application

UNIT I:

Type of Soils, Index Properties:

Inter-relationships and Soil Characterization Types of soil and soil formation, Geological cycle, Phase diagrams, Basic terms, Functional relationships based on index properties, Physical characterization of soil-Dry and Wet sieve analysis, Atterberg's Indices, Soil Structures, Soil Water and its types, Standard nomenclature & IS Soil Classification, Numericals.

UNIT II:

Permeability and Seepage:

Darcy's law and its validity, Factors affecting permeability, Laboratory permeability tests, Permeability of stratified soil masses, Seepage pressure, 2-D flow and Laplace's equation, Flow net construction, Quick condition, Piping Failure.

UNIT III:

Effective Stress And Pore Water Pressure:

Introduction, Stresses when No Flow Takes Place Through the Saturated Soil Mass, Stresses When Flow Takes Place Through the Soil from Top to Bottom, Stresses When Flow Takes Place Through the Soil from Bottom to Top,Effective Pressure Due to Capillary ,

UNIT IV:

Compaction & Consolidation of soil:

Definitions, Differentiate between compaction and consolidation, Compaction mechanism and

proctor tests, field compactions methods, factors affecting compaction, Consolidation mechanism through spring analogy, fundamental definitions, Terzaghi's one dimensional consolidation theory (only formula), Time factor, pre-consolidation pressure, consolidation

UNIT V:

Stress Distribution:

Causes of stresses in soil, Boussinesque's and Westergard's equation, Pressure Bulb, Stress distribution on horizontal and vertical planes, Stresses due to different shapes of footings, New-mark's influence chart, Numericals.

Shear Strength of Soil:

Mohr's strength theory, Mohr- coulomb's strength theory, Modified Mohr coulomb's theory, shears parameters through lab and field tests based on drainage conditions, Numericals. Tests will be covered in lab sessions.

Text Books:

1 Basic and Applied Soil Mechanics by Gopal Ranjan&ASR Rao, New age International Pvt . Ltd, New Delhi, Third edition, 2016
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi, 2009.
3. Soil Mechanics and Foundations by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi, Sixteenth edition, 2017.
4. Principles of Geo technical Engineering by B. N. Das and K.Sobhan, Cengage India Private Limited; Ninth edition, 2017

References:

1. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
3. Geotechnical Engineering by Purushotham Raj
4. Fundamentals of soil mechanics by D.W.Taylor
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

III Year – I Semester	ADVANCED STRUCTURAL ANALYSIS	L	T	P	C
100133130		2	0	2	3.0

(Professional Elective– I)

Course Objectives:
The objective of the course is

- To study slope deflection methods.
- To study moment distribution method.
- To learn problems on continuous beams and single bay portal frames by Kani's method.
- To study stiffness method applied to continuous beams.
- To study flexibility method applied to continuous beams portal frames. To study the plastic theory for different types of beams.

Course Outcomes:
Students will get ability to:

1. Analyze the moments of the members by slope deflection methods.
2. Analyze the moments of the members by distribution method
3. Analyze problems on continuous beams and single bay portal frames by Kani's method.
4. Analyze continuous beams by stiffness method
5. Analyze continuous beams and portal frames by flexibility method. To apply the plastic theory for different types of beams

UNIT – I

Slope deflection method: Assumptions in slope deflection method -application to the analysis of statically indeterminate beams with and without settlement of supports – rigid jointed plane frames with and without side sway.

UNIT – II

Moment Distributionmethod – Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – story portal frames – including Sway.

UNIT – III

Kani's method- Analysis of continuous beams – including without sinking and with sinking-analysis of single bay portal frames with and without sway.

UNIT – IV

Stiffness Method-Introduction- Analysis of continuous beams- portal frame non sway analysis. (Maximum of two unknowns). Simple space structures.

UNIT – V

Flexibility Method-Introduction- Analysis of continuous beams- Simple rigid frame non sway analysis. (Maximum of two unknowns).

Introduction to Plastic Analysis: Introduction-Assumption in plastic theory-plastic hinge-plastic moment or collapse moment-collapse load- load factor- shape factor- collapse load for Different types of beams i.e. simply supported beam with central point load- simply supported beam with udl,

TEXT BOOKS:

1. Structural Analysis by C.S. Reddy, Tata McGraw-Hill, New Delhi, 3rd edition 2010.
2. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers, 2nd edition, 2008.
3. Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi, 10th edition, 2009.
4. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan& Dr. P.Perumal-Laxmi Publications pvt. Ltd., New Delhi, 3rd edition 2016.
5. Statistical indeterminate structures by C.K.Wang, 1953.
6. Analysis of Structures – Vol. I & 2 by Bhavakatti, Vikas publications, 4th edition, 2010.
7. Indeterminate Structural Analysis by K.U. Muthu, H. Narendra, MagantiJanardhana, M. Vijayanand, I K International Publishing House, 2014

REFERENCES:

1. Theory of Structures by S.P. Timoshenko and D. H. Young, Tata Mc.Graw Hill publishers 2002.
2. Analysis of structures by Vazrani&Ratwani – Khanna Publications, 1994.
3. Theory of structures by Ramamutham, Dhanpatirai publications, 2014.
4. Structural analysis by T.S ThandavaMoorthy, Oxford University Press, 2011.
5. Structural analysis by R.C.Hibbler, 6th edition 2006.
6. Basic structural analysis by Muttu&Janarthan, 3rd edition 2019.

III Year – I Semester	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
1001233131		3	0	0	3

(Professional Elective– I)

COURSE OBJECTIVES:

- To explain in-situ densification techniques for granular and cohesive soils at surface level and at deeperlevel.
- To explain methods of stabilization for different types of soils.
- To illustrate different dewatering techniques to improve soil properties.
- To explain about geo synthetics and its applications and reinforced earth.
- To understand components of reinforced earth.
- To describe expansive soils and foundation considerations on expansive soils.

COURSE OUTCOMES:

After the completion of the course, students will be able to

1. Explain in-situ densification methods for granular and cohesive soils at surface level and at deeper level.
2. Explain methods of stabilization and applications.
3. Illustrate different dewatering techniques to improve soil properties.
4. Explain about geo synthetics and its applications.
5. Explain components of reinforced earth.
6. Illustrate different grouting methods under different conditions in soils.

UNIT – I

Insitu densification methods

Insitu densification methods in granular Soils: Vibration at the ground surface and at depth, Impact at the Ground Surface and at depth. Insitu densification methods in Cohesive soils: Preloading, Vertical drains – Sand Drains andgeodrains – Stone columns – thermal methods.

UNIT – II

Stabilization of Soils: Methods of stabilization-mechanical-cement-lime-bituminous and polymer stabilization-chemical stabilization with calcium chloride, sodium silicate and gypsum.

UNIT – III

Dewatering: Dewatering-sumps and interceptor ditches- single and multi stage well points-vacuum well points-Horizontal wells-criteria for selection of fill material around drains-electro osmosis.

UNIT –IV

Geosynthetics: Types, functions and applications of geotextiles (woven; nonwoven; knitted) geogrids, geonet, geomembranes, gabions, geocells and geosynthetic clay liners.

UNIT - V

Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

Grouting: Objectives of grouting- grouts and their applications- grouting methods- stages of grouting-hydraulic fracturing in soils and rocks- post grouttest.

TEXT BOOKS:

1. Hausmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Raj, P. Purushothama (2005), Ground improvement techniques., Laxmi Publications, NewDelhi

REFERENCES:

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons,New York, USA.
3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy,USA

III Year – I Semester	WATERSHED DEVELOPMENT AND MANAGEMENT	L	T	P	C
1001233132		3	0	0	3

(Professional Elective– I)

COURSE OBJECTIVES:

- To explain the concept, objectives, need &Integrated and multidisciplinary approach of watershed development, characteristics of watershed
- To explain the principles of erosion which include Types, factors affecting, Effects, estimation of soil loss of erosion etc.,
- To explain the different measures to control erosion which include contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control works, rock fill dams, brushwood dam, Gabion structures.
- to discuss the water harvesting which include Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks
- To explain the Land management which include Land use and Land capability classification, management of forest, agricultural, sustainable agriculture, dry land agriculture, Reclamation of saline and alkaline soils.To discuss the Ecosystem management which include Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, , bio-mass management, , silvi pasture, horticulture, grassland and wild land social forestry and afforestation.

COURSE OUTCOMES:

1. Understand concepts and characteristics of watershed management.
2. Discuss principles of erosion
3. Understand various measures to control erosion.
4. Describe about rain water harvesting and its structures.
5. Describe about land management.
6. Describe about ecosystem management.

UNIT-I

Introduction: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

Characteristics of watershed: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT-II

Principles of erosion: Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation, revised universal soil loss equation.

UNIT-III

Measures to control erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control works, rock fill dams, brushwood dam and Gabion structures.

UNIT-IV

Water harvesting: Rainwater harvesting and harvesting structures, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds,

percolation tanks.\

UNIT-V

Land management: Land use and Land capability classification, management of forest land, management of agricultural land, sustainable agriculture, dry land agriculture, Reclamation of saline and alkaline soils.

Ecosystem management: Role of Ecosystem, soil enrichment, cropping pattern, management of grassland and wild land, social forestry andafforestation.

TEXT BOOKS:

1. JVS Murthy (2017), Watershed Management, 2nd edition, New Age InternationalPublishers.
2. R. Awurbs and WP James (2015), Water Resource Engineering, 1st edition, Prentice HallPublishers.

REFERENCE:

1. VVN Murthy (2013), Land and Water Management, 6th edition KalyaniPublications.
2. D.K.Majumdar (2014), Irrigation and Water Management, 2nd revised edition, PrinticeHallIndia.

III Year – I Semester	BUILDING SERVICES	L	T	P	C
1001233150		2	0	2	3.0

(Open Elective– I)

Objectivesofthe Course:

- Building services are the essential services provided in the buildings for improving functioning of the buildings in efficient manner for the desired use of the building.
- The electrical services, mechanical services such as air conditioning, lighting, ventilation, fire protection, acoustics and sound insulations, elevators, escalators, as well as civil engineering services such as water supply, sanitary services, etc. have become most essential services for residential, industrial, high rise, hotels, motels, monumental buildings.
- Themain objectiveof thecourseis to teachstudents about theseservices.
- Nobuildingcanbeputinto effectiveutilisation withoutall these services.
- To develop skills in the students to prepare plan for various types of services in the building.

UNIT-I

IntroductiontoBuildingServices:

Definitions, Objective and uses of services, Applications of services for differenttypes building considering, Classification of building services, Types of services and selection of services, Natural and artificial lighting- principles and factors, Necessity of Ventilation, Types of ventilation – Natural and Mechanical, Factors to be considered in the design of Ventilation.

UNIT-II

ElectricalServicesandLayoutinDifferentTypesof Building:

Technical terms and symbols for electrical installations and accessories of wiring, Types of insulation, electrical layout for residence, small work shop, show room, school building, etc.

UNIT-III

MechanicalServicesinBuildings:

Introductionofmechanicalservices

Lift: Definition, Types of Lifts, Design Considerations, Location, Sizes, Component parts

Elevators &Escalators:Different types of elevators and Escalators, Freight elevators, Passenger elevators, Hospital elevators, Uses of different types of elevatorsEscalators.

Air Conditioning:Definition, Purpose, Principles, Temperature Control, Air Velocity

Control, Humidity Control, Air Distribution system, Cleaners, Filters, Spray washers, Electric preceptors, Types of Air Conditioners, (Central type, Window Type, Split Unit

UNIT-IV

Introduction, Causes of fire and Effects of fire,General Requirements of Fire Resisting Building as per IS: 1642:1989 and NBC 2005, Characteristics of Fire Resisting Materials , Maximum Travel Distance, Fire Fighting Installations for Horizontal Exit, Roof Exit / Fire Lifts, External Stairs

UNIT-V

Miscellaneous Services and Green Buildings Provisions:

Plan for Rain Water Harvesting in the New Buildings, Concept of GREEN Buildings, Components of GREEN Building, Components of Grey Water System, Management of Grey Water System and Distribution Pattern, Solar Power System

Textbook Reference Books:

1. R.Udaykumar; A textbook on Building Services; EswarPress,Chennai
2. S.M.Patil; Building Services; Seem a Publication,Mumbai Revised edition
3. Bureau of Indian Standards; National Building Codeo fIndia–2005;BIS,NewDelhi
4. Dr.B.C.Punmia;Building Construction; Laxmi Publications(P)Ltd.,New Delhi
5. P.C.Varghese; Building Construction;PHILearning(P) Ltd.,New Delhi
6. P.S.Gahlot; Building repair and Maintenance Management;CBSPublishers& Distribution(P) Ltd

Indian Codes of Practice:

1. IS:1642:1989, Code of Practice for Fire Safety of Building
2. NBC2016,National Building Code of India

III Year – I Semester	GREEN BUILDINGS	L	T	P	C
1001233151		3	0	0	3

(Open Elective– I)

Course objectives: This course will enable students to:

- UnderstandtheDefinition,Concept&Objectivesofthetermscosteffectiveconstruction and green building
- Apply cost effective techniques in construction
- 3.ApplycosteffectiveTechnologiesandMethodsinConstruction
- Understand the Problems due to Global Warming
- State the Concept of Green Building Understand Green Buildings

Course outcome

- Select different building materials for construction
- Apply effective environmental friendly building technology
- Analyze global warming due to different materials in construction
- Analyse buildings for green rating
- Use alternate source of energy and effective use water

UNIT-I

Introduction to the concept of cost effective construction -Uses of different types of materials and their availability -Stone - Burned Bricks- Concrete Blocks- Mud Blocks- Gypsum Board- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Recyclingofbuildingmaterials–Brick- Concrete-Steel-Plastics- Environmentalissuesrelatedto quarryingofbuildingmaterials.

UNIT-II

Environment friendly and cost effective Building Technologies - Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies

UNIT-III

Global Warming – Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical

benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in MaterialsGreen Materials- Comparison of Initial cost of GreenV/s Conventional Building-Lifecyclecostof Buildings.

UNIT-IV

Green Building rating Systems- BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight age. Green Design – Definition - Principles of sustainable development in BuildingDesign-CharacteristicsofSustainableBuildings– Sustainably managed Materials -IntegratedLifecycledesignofMaterialsandStructures (Concepts only)

UNIT-V

Utility of Solar Energy in Buildings

Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.

Green Composites for Buildings

Concepts of Green Composites, Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.

Text Books

1. HarharaIyer G,Green Building Fundamentals,NotionPress
2. Dr.Adv.HarshulSavla, Green Building: Principles & Practices

III Year – I Semester	CONSTRUCTION TECHNOLOGY AND MANAGEMENT	L	T	P	C
1001233152		3	0	0	3.0

(Open Elective– I)

COURSE OBJECTIVES:

1. To explain the basics of scientific management and project planning, clearance and procedures
2. To explain project scheduling CPM PERT
3. To explain project monitoring and controlling and reporting techniques
4. To explain work study and work measurement
5. To explain safety engineering, safety policies and practices
6. To explain administration of incentive schemes

COURSE OUTCOMES:

After the completion of the course, students will be able to

1. illustrate the basics of scientific management and project planning, clearance and procedures
2. demonstrate project scheduling CPM PERT
3. illustrate project monitoring and controlling and reporting techniques
4. appreciate work study and work measurement
5. sensitize safety engineering, safety policies and practices
6. illustrate administration of incentive schemes

Unit–1

Basics of Management: Modern scientific management, Management Functions, Management Styles, SWOT Analysis in construction

Project Management: Basic forms of organization with emphasis on Project and matrix structures; project life cycle, planning for achieving time, cost, quality, project feasibility reports based on socio-techno-economic environmental impact analysis, project clearance procedures and necessary documentation for major works like dams, multistoried structures, ports, tunnels, Qualities, role and responsibilities of project manager, Role of Project Management Consultants, Enterprise Resource Planning (ERP)

Unit 2

Project Scheduling: Construction Scheduling, Work break down structure, activity cost and time estimation in CPM, PERT,RPM (Repetitive Project Modeling) techniques. Precedence Network Analysis, software in Construction scheduling (MSP, primavera, Construction manager).

Unit 3

Project Controlling: Monitoring and Control, Crashing, Resource Leveling, Updating. Site mobilization – demobilization aspects, various Resources management based on funds availability, coordinating, communicating & reporting Techniques, Application of MIS to construction, Training forConstruction Managers ,Engineers , Supervisors

Unit -4

Work Study: Definition, Objectives, basic procedure, method study and work measurement, Work study applications in Civil Engineering.
Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams.
Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating. Activity sampling, time-lapse , photography technique, Analytical production studies

Unit -5
Safety Engineering: Causes of Accidents on various sites, safety measures and safety policies to be adopted, determination of safety parameters, personal protective equipment. Workmen Compensation Act, Minimum wages act.
Safety Organization –Safety Policy, Safety Record Keeping, Safety Culture, Safety and First Line Supervisors, Middle Managers, Top Management Practices, Sub contractual obligation, Project Coordination and Safety Procedure

Administration of Incentive Schemes: Necessity, Merit rating, job evaluation, installation, modification and maintaining of incentive schemes based on implementation experience.

Text Books
1. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
2.Chitkara,K.K., Construction Project Management, Tata McGraw Hill Publishing Co, Ltd., New Delhi, 1998.
3.Punmia,B,C., Project Planning and Control with PERT and CPM, Laxmi Publications, new delhi,1987.
Reference books
1. Construction Planning & management By P S Gahlot& B M Dhir , New Age InternationalLimited Publishers
2. Construction Project planning & Scheduling By Charles Patrick, Pearson, 2012
3. Construction Project Management Theory & practice --- Kumar Neeraj Jha,Pearson,2012
4. Construction management Fundamantals by Knutson,Schexnayder, Fiori, Mayo, TataMcGraw Hill, 2ndEdition, 201

III Year – I Semester	GEOTECHNICAL ENGINEERING LAB	L	T	P	C
1001233110		0	0	3	1.5

COURSE OBJECTIVES:
Students will have

- To know how to find Atterberg's Limits, Field Density, Relative density of sand.
- To know how to do Grain size analysis, compaction test, CBR Test.
- To know how to do Unconfined Compression test, Triaxial Compression test.
- To know how to do Direct Shear test, Vane Shear test etc.,
- To know how to ddetermine Consolidation of soil.

COURSE OUTCOMES:
Get ability to

1. Evaluate Atterberg's limits and Differential free swell for clayey soils.
2. Examine relative density, dry density & moisture contents in the field and laboratory by core cutter, sand replacement and compaction tests.
3. Determine permeability of soils
4. Analyze coarse and fine grain sizes in laboratory.
5. Determine shear strength and shear strength parameters by vane shear, tri-axial, direct shear & unconfined compression tests in laboratory.
6. Measure CBR value and consolidation settlement & swell pressure in laboratory.

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field Density-Core cutter and Sand replacement methods
3. Specific gravity of soil
4. Grain size analysis - Sieve Analysis and Hydrometer analysis
5. Permeability of soil - Constant and Variable head tests
6. Compaction test
7. Consolidation Test
8. CBR test
9. Unconfined Compression test
10. Direct Shear test.
11. Vane Shear test.
12. Differential free swell (DFS)

III Year – I Semester	FLUID MECHANICS & HYDRAULIC MACHINES LAB	L	T	P	C
1001233111		0	0	3	1.5

COURSE OBJECTIVES:

Students will have

• to study how to calibrate of venturimeter& orifice meter.

• to study how to determine of coefficient of discharge for a small orifice and external mouth piece by a constant head method.

• to study how to calibrate of Trapezoidal Notch and /or Triangular Notch.

• to study how to determine Coefficient of loss of head in a sudden contraction and friction factor and impact of jet on vanes.

• To study how to determine efficiency of Pelton wheel turbine, centrifugal pump and reciprocating pump.

COURSE OUTCOMES:

After completion of this course students will be able to

1. Evaluate Coefficient of discharge of Venturimeter and Orifice meter.
2. Examine Coefficient of discharge for a small orifice and external mouth piece by a constant head method.
3. Compute Coefficient of discharge of Trapezoidal Notch and /or Triangular Notch.
4. Determine loss of head in a sudden contraction and friction factor and force exerted by jet onvanes.
5. Measure efficiency of Pelton wheel turbine
6. Calculate efficiency of centrifugal pump and reciprocating pump.

LIST OF EXPERIMENTS

1. Calibration of Venturimeter
2. Calibration of Orifice meter.
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by constant head method.
5. Calibration of contracted Trapezoidal Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Impact of jet on vanes.
8. Performance test on Pelton wheel turbine
9. Efficiency test on centrifugal pump.
10. Efficiency test on reciprocating pump.

III Year – I Semester	ESTIMATION, SPECIFICATION & CONTRACTS	L	T	P	C
1001233180		0	1	2	2

COURSE OBJECTIVES:

1. To identify standard specifications for detailed estimation of building.
2. To estimate earthwork excavation for roads and canals.
3. To determine the rates of various aspects of buildings.
4. To compute the cost of the various items of civil works.
5. To recognize preparation of the tenders and Valuation of buildings.

COURSE OUTCOMES:

After the completion of the course, students will be able to

1. Prepare detailed and abstract estimate of buildings.
2. Compute earthwork excavation for roads and canals.
3. Estimate the cost of the various items of civil works.
4. Estimate reinforcement for bar bending and prepare bar bending schedules.
5. Understand the basics of BIM
6. Prepare tenders and Valuation of buildings.

UNIT – I

General items of work in Building: Standard Units, Principles of working out quantities for detailed and abstract estimates - Detailed Estimates of Buildings.

UNIT – II

Earthwork for roads and canals: Lead and Lift – Types of methods – Mid Sectional area method – Mean sectional area method – Simpson's rule method

UNIT – III

Rate Analysis: Standard specifications for different items of building construction. Working out data for Brick Masonry, R.R. Masonry, Plastering, Plain Concrete, R.C.C., and Distempering.

UNIT-IV

Reinforcement bar bending schedule: Footing, Pedestal, column, plinth beam, slab beam and slab and bar requirement schedules.

UNIT – V

Contracts – types of contracts- tenders – Tender Schedule–.BIM-Basics of BIM – Advantages and Dis advantages of BIM – Objects of BIM

Valuation - Valuation of buildings – Depreciation –Types of Depreciation of industrial building, commercial Buildings-Private Buildings.

TEXT BOOKS

1. B.N. Dutta (2016), Estimating and Costing, 28th Revised Edition, UBS publishers
2. G.S. Birdie (2014) Estimating and Costing, Sixth edition, Dhanpat Rai Publishing Company Private

Limited
3. Bimal Kumar (2016), A Practical Guide to Adopting BIM in Construction Projects, Whittles Publishing

REFERENCES:

1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works.
3. M. Chakraborthi (2010), Estimation, Costing and Specifications, 24th Edition, M.K. Publishers
4. National Building Code, 2016

REFERENCE CODE BOOKS:

1. ISO 19650-1:2018
2. ISO 19650-2:2

III Year – I Semester	TINKERING LAB	L	T	P	C
1001233181		0	0	2	1

Course Objectives:

- To develop a mindset for innovation, creativity, and problem-solving through hands-on activities.
- To introduce students to basic tools, components, and systems used in prototyping (electronics, mechanical, software).
- To encourage interdisciplinary thinking and collaborative project development.
- To provide exposure to modern tools such as Arduino, Raspberry Pi, sensors, 3D printing, and simple mechanical assemblies.
- To build confidence in experimenting with ideas and transforming them into working prototypes.

List of Experiments

1. Familiarization with lab tools – Breadboard, multimeter, soldering station, power supply.
2. Basic electronic circuits – Series, parallel circuits, use of resistors, capacitors, LEDs.
3. Introduction to Arduino – Writing and uploading simple sketches.
4. Sensor interfacing – Temperature, light, motion, ultrasonic sensors.
5. Actuator control – Servo motor, DC motor, relay modules.
6. Serial communication – Between Arduino and PC.
7. Simple IOT application – Sending data to cloud (e.g., using ThingSpeak or Blynk).
8. Mobile App Integration – Basic app to control devices using Bluetooth.
9. Mechanical prototyping – Introduction to 3D printing and simple CAD modeling.

Textbooks

1. "Getting Started with Arduino" – Massimo Banzi and Michael Shiloh.
2. "Make: Electronics – Learning Through Discovery" – Charles Platt.
3. "Exploring Arduino" – Jeremy Blum.

Reference Books:

1. "Practical Electronics for Inventors" – Paul Scherz and Simon Monk.
1. "Arduino Cookbook" – Michael Margolis and Brian Jepson.
2. "Make: Sensors" – Tero Karvinen, Kimmo Karvinen, and Ville Valtokari.
3. "Python Programming for Raspberry Pi" – Tim Cox (if Raspberry Pi is included).

E resources: Arduino (www.arduino.cc), Raspberry Pi (www.raspberrypi.org), Instructables (www.instructables.com), and Tinkercad.

Course Outcomes

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

- Identify and use basic electronic components and prototyping tools.
- Design and implement simple circuits and embedded systems using microcontrollers.
- Use sensors and actuators to create interactive systems.

Apply mechanical fabrication techniques using 3D printers and simple mechanical tools.

- Collaborate effectively to build innovative, interdisciplinary prototypes or mini-projects.
- Present and communicate their design ideas and implementation clearly.

III YEAR II SEMESTER

S.No.	Course code	Category	Title	L	T	P	Credits
1	1001233204	PC	Design of Steel Structures	3	0	0	3
2	1001233205	PC	Transportation Engineering	3	0	0	3
3	1001233206	PC	Environmental Engineering	3	0	0	3
4	1001233233	PE-II	A) Earthquake Resistant Design Of Structures	3	0	0	3
	1001233234		B) Geotechnical Engineering-2				
	1001233235		C) Transportation Safety And Environment				
5	1001233236	PE-III	D)Bridge Engineering	3	0	0	3
	1001233237		E) Hydraulics and irrigation structures				
	1001233238		F) Repair and Retrofitting of structures				
6	1001233253	OE-II	A) Disaster management	3	0	0	3
7	1001233254		B) Watershed Management				
8	1001233212	PC	Environmental Engineering Lab	0	0	3	1.5
9	1001233213	PC	Transportation Engineering Lab	0	0	3	1.5
10	1001233282	Skill course	Building Information Modelling	0	1	2	2
11	11001233226	ES	Technical paper writing & IPR	2	0	0	-
			Total	20	1	8	23
			Mandatory Industry Internship of 08 weeks duration during summer vacation				

III Year – II Semester	DESIGN OF STEEL STRUCTURES	L	T	P	C
1001233204		3	0	0	3.0

COURSE OBJECTIVES:

The objective of the course is to

- Understand the basics concepts of bolted connections and designs welded connections
- Design supported, unsupported and plated simply supported beams
- Explain designing tension members as per IS codes
- Explaindesigning of compression members as per IS code provisions
- Explain designing of welded plate girder

COURSE OUTCOMES:

Students will get ability to

1. Design IS code bolted connections and designs welded connections.
2. Design beams including detailing.
3. Design tension members including detailing.
4. Design compression members including detailing.
5. Design plate girder including detailing.

UNIT– I

Basics of bolted/riveted connections: Bolted/riveted connections, Types of bolts, Types of bolted joints, Failure of bolted joints, Specifications of bolted joints, Design of bolted connections.

Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-

Butt and fillet welds. IS Code requirements? Design strength of fillet welds 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 laterally supported and unsupported beams. Design of plated beams.

UNIT –III

Tension members: Introduction, Types of tension members, Net sectional Area, Effective net area,

Types of failures, Design of tension members.

UNIT – IV

Design of Compression members: Introduction, Effective length of columns, Slenderness ratio, Design of compression members, Built-up sections- Design of lacings and battens. Design Principles of Eccentrically loaded columns and splicing of columns.

UNIT – V

Plate Girder: Introduction, Elements of plate girder, Design consideration – I S Code recommendations, Design of plate welded plate girder- post-critical method, stiffeners.

NOTE- All Designs should be in LIMIT STATE Method

Text Books:

1. Limit state design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi, 2nd edition, 2017.

2. Design of Steel Structures by Ramachandra. Vol – 1, Scientific Publishers, 2016.
3. Design of Steel structures by Limit state method as per IS-800:2007, S.S.Bhavakatti, I K International Publishing House Pvt. Ltd, 4th edition, 2014.
4. Steel Structures and Design and practices by N.Subramanya, Oxford publications, 2010.
5. Structural Design and Drawing by N.Krishna Raju; University Press, 2009.

III Year – II Semester	TRANSPORTATION ENGINEERING	L	T	P	C
1001233205		3	0	0	3.0

COURSEOBJECTIVES:

The objective of the course is to

- Explain about highway development and planning in India, highway alignment and engineering surveys.
- Explain about various elements of highway geometric design.
- Explain about highway materials such as soil, aggregates, bitumen and bituminous mix design.
- Explain about construction of different types of roads and highway maintenance.
- Explain about basic traffic engineering characteristics such as volume, speed, density, accidents and about Intersections. Explain about Highway Capacity.

COURSEOUTCOMES:

On completion of the course, the students able to:

1. Understand the importance of highway development and different road classifications.
2. Evaluate the Geometric design elements of the highway.
3. Identify and gain knowledge about highway materials used in highway construction.
4. Understanding the mechanism of different types of roads and their construction.
5. Apply basic parameters of traffic, parking studies, road accident analysis and identifying grade and grade separated intersections. Analyse about Highway Capacity.

UNITI

Highway development and planning: Invention of wheel - Different modes of transportation, role of highway transportation in India, Necessity for Highway Planning - Different Road Development Plans - Classification of Roads, Road Network Patterns.

Highway Alignment: Alignment - Factors controlling Alignment, Engineering Surveys for Highways - Drawings and Reports.

UNITII

Geometric design: Importance of Geometric Design, Highway Cross Section Elements – Pavement Surface Characteristics, Sight Distance - 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, Grade Compensation.

UNITIII

Highway materials: Soil, Aggregate, Bitumen and Tar, Tests on aggregates ‑Aggregate Properties and their Importance, Tar properties - Differentiation between Tar and Bitumen, Bitumen - different forms of bitumen - tests on bitumen - Bituminous Concrete, requirements of Design Mix - Marshalls Method of Bituminous Mix design, Modified Hubbard Field method of mix design.

UNITIV

Highway Construction: Construction of Roads -Earthen roads, W.B.M. Roads, Bituminous Roads - distresses; Cement Concrete roads -Tie bars and Dowel bars, distresses. Highway Maintenance, Highway drainage ‑Arborical culture ‑Street lighting.

UNITV

Traffic engineering: Elements of Traffic Engineering - Vehicle & Road User Characteristics, Accessibility & Mobility concept, Traffic Volume studies & methods, Speed Studies – Time

Mean Speed, Space Mean Speed, Travel time and Delay studies, Origin - Destination studies, **Highway capacity:** Highway capacity and level of service (LOS) - capacity of urban and rural roads, PCU concept and its limitations.

TEXTBOOKS:

1.S.K.Khanna, C.E.G.Justo& A. Veeraragavan "Highway Engineering", Nemchand& Bros., 10th Edition, 2017.

1. Dr. L.R.Kadiyali and Lal " Traffic Engineering & Transport Planning" Khanna Publications, 7th Edition, 2012.
2. V.N.Vazirani and S.P.Chandra, "Transportation Engineering- Vol. I", Khanna Publications, 4th Edition, 1994.

REFERENCES:

1. S.P.Bindra, "Highway Engineering" Dhanpat Rai & Sons. – 4th Edition (1981)
2. ITE Hand Book, Highway Engineering Hand Book, Mc Graw - Hill
3. Indian Road Congress, Ministry of Road Transport and Highways, and Special Publications

III Year – II Semester	ENVIRONMENTAL ENGINEERING	L	T	P	C
1001233206		3	0	0	3.0

Course Objectives:

This course enables the students:

1. To describe the importance of water quality and quantity and interpret the design of water supply systems.
2. To apply the appropriate technologies for water treatment.
3. To interpret the concepts of water supply systems designing and management.
4. To explain the impacts of sewage and select conveyance systems for sewage and storm water.
5. To identify and apply suitable process for the sewage treatment and sludge management.

Course Outcomes:

After completion of this course, students will be able to:

1. Examine and explain various sources of water, water quality and quantity estimation.
2. Analyze the appropriate water treatment technology.
3. Interpret the concepts of water supply systems designing and management.
4. Understand and determine the fundamentals of wastewater generation, conveyance system, wastewater quality and different discharge standards.
5. Explain and illustrate various methods of wastewater and sewage sludge treatment.

Unit-I:

Introduction: Sources of Water - Comparison from quality and quantity – intakes, infiltration galleries. Waterborne diseases - protected water supply - population forecasting methods, design period - types of water demand - factors affecting – fluctuations - fire demand - storage capacity, drinking water quality standards: IS 10500.

Unit-II:

Water Treatment Process, Filtration and Disinfection: Layout and general outline of water treatment units – Aeration, sedimentation – principles – design factors – coagulation - jar test, flocculation, clarifier design – coagulants – feeding arrangements. Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation – disinfection – theory of chlorination, chlorine demand – other disinfection practices.

Unit-III:

Water Supply Systems: Requirements - methods and layouts - Design of distribution systems - Hardy Cross and equivalent pipe methods - Service reservoirs - Capacity by Mass Curve Method. Joints, sluice valves, air valves. Scour valves and check valves, water meters.

Unit-IV:

Conservancy and Water Carriage Systems: Sewage and storm water estimation - characteristics of sewage – decomposition of sewage, examination of sewage – B.O.D. Equation. C.O.D. Design of sewers – shapes and materials – sewer appurtenances, manholes – inverted siphon – catch basins – flushing tanks – ejectors, pumps and pump houses.

Unit-V:

Layout and General Outline of Waste Water Treatment Plants and Disposal of Sewage: Waste water treatment plant – Flow diagram – primary treatment - design of screens – grit chambers – skimming tanks – sedimentation tanks – biological treatment – trickling filters – Activated sludge processes (ASP). Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying - septic tanks working principles and design – soak pits.

Text Books:

1. Water Supply Engineering: Environmental Engineering - Vol. I, by S.K. Garg, Khanna Publishers, New Delhi
2. Sewage Disposal and Air Pollution Engineering: Environmental Engineering - Vol. II, S.K. Garg, Khanna Publishers, New Delhi
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers, 1996
4. Water supply and sanitary Engineering by G.S. Birdi, Birdie J. S Dhanpat Rai & Sons Publishers, 2010.
5. Water Supply Engineering, Vol. 1, B.C.Punmia, Ashok Kr. Jain, Arun Kumar Jain, Laxmi Publications Pvt.Ltd New Delhi, 2 edition, 1994
6. Environmental Engineering, Peavy, H., Rowe, D.R, Tchobanoglous, G. Mc-Graw - Hill International

Reference Books:

1. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.
2. Encyclopedia of Environmental Science and Engineering, McGraw-Hill, Inc.3rd edition-1993.
3. Water Supply Engineering: S. K. Garg, Khanna Publishers, New Delhi.
4. Water supply: Don D. Ratnayaka Malcolm, J. Brandt, Michael Johnson, 6th edition, 2009
5. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi
6. Metcalfe and Eddy. Wastewater Engineering, Treatment, Disposal and Reuse, Tata McGraw-Hill, New Delhi.
7. Water and Wastewater Engineering – designs, principle and practice, Mackenzie L. Davis. McGraw-Hill Education

III Year – II Semester	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	L	T	P	C
1001233233		3	0	0	3.0

(Professional Elective– II)

Course Outcomes:

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

- Discuss the equations of motion for undamped free vibrations for SDOF and 2DOF systems
- Explaintheengineeringseismologyincludingcausesandeffectsofearthquakes
- Analyse a multi-storeyed structure using Equivalent Static Method and Response Spectrum methods
- Assess various irregularities in buildings
- ApplytheprovisionsofIS:13920andIS:4326tobuildingstructures

UNIT-I STRUCTURALDYNAMICS:

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 ENGINEERINGSEISMOLOGY:

Introduction- Internal structure of earth – Chemical properties – Physical properties – Continentaldrifttheory–Platetectonics–MovementofplateBoundaries–Movementof 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 *EARTHQUAKERESISTANTDESIGN:*

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 *BUILDINGCONFIGURATIONS:*

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 DUCTILEDESIGNANDDETAILING:

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).

TEXTBOOKS:

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, New Delhi. (or latest).

III Year – II Semester	GEOTECHNICAL ENGINEERING-2	L	T	P	C
1001233234		3	0	0	3.0

Course Objective:

- Toprovideacoherentdevelopmenttothestudentsforthecoursesinsectorof Geotechnical Engineering& Soil Improvement Techniques etc.
- TopresentthefoundationsofmanybasicEngineeringtoolsandconceptsrelated Geotechnical Engineering.
- To give an experience in the implementation of Engineering concepts which are applied in field of Geotechnical Engineering
- Toinvolvetheapplicationofscientificandtechnicalprinciplesofplanning,analysis, design of foundation along with soil improvement techniques.

UNIT-I Stability of slopes:

Infinite and finite slopes, factor of safety, type of slope failure, stability of infinite slopes, finite slopes forms of slip surfaces, limit equilibrium method and critical stage instability analysis, effects of tension crack and submergence, C-analysis-method of slices, taylor's stability no., use of Bishop's method.

UNIT-II Earth Pressure:

Types of lateral earth pressure, Rankine's and Coulomb's earth pressure, theory andtheir application for determination of lateral earth pressure under different conditions, Rebhann's and culminnn's Graphical methods of determination of lateral earth pressures.

Basics of foundation:

Types of foundation, Factors affecting the selection of type of foundations, steps in choosing types of foundation.

UNIT-III Subsurface Investigation:

Objectives of exploration, planning of exploration program, soil samples and soil samplers, field penetration tests : SPT, SCPT, DCPT. Introduction to geophysical methods, Bore log and report writing.

UNIT-IV Bearing Capacity of Shallow Foundation:

Introduction, significant depth, design criteria, modes of shear failures. Detail study of bearing capacity theories (Prandtl, Rankine, Terzaghi, Skempton), bearing capacity determination using IS Code, Presumptive bearing capacity. Settlement, components of settlement & its estimation, permissible settlement, allowable bearing pressure. Bearing capacity by use of penetration test data and by plate load test. Bearing capacity of raft. Factors affecting bearing capacity including Water- Table. Contact pressure under rigid and flexible footings. Floating foundation. Types of pavements & its design.

UNIT-V Pile Foundations :

Introduction, load transfer mechanism, types of piles according to their composition, their method of installation and their load carrying characteristics, piles subjected to vertical loads- pile load carrying capacity from static formula, dynamic formulae (ENR and Hiley), penetration test data & Pile load test. Pile group: carrying capacity, efficiency and settlement. Negative skin friction. Under reamed pile foundation-its concept, design& field installation.

Text Books:

1. P.PurushothamaRaj;SoilMechanicsandFoundationEngineering;PearsonEducation.

2. Alamsingh; Soil Mechanics &Foundation Engineering;CBS Publishers & Distributors,Delhi
3. TaylorD.W.;FundamentalsofSoilMechanics;AsiaPublishingHouse,Mumbai
4. V.N.S.Murthy;SoilMechanics&FoundationEngineering;CRSPress,Taylor& FrancisGroup, New York
5. GopalRanjan,RaoA.S.R.;Basicandappliedsoilmechanics;Newageint.(p)ltd.
6. DasBrajaM;PrinciplesofGeotechnicalEngineering;ThomsonAsiaPvt.Ltd.

III Year – II Semester	TRANSPORTATION SAFETY AND ENVIRONMENT	L	T	P	C
1001233235		3	0	0	3.0

(Professional Elective– II)

UNIT-I

Trends in roads and highways development. Problem of road accidents in India.Characteristicsof road accidents.Causes of accidents. Global and Indian road safety scenario. Factors responsiblefor successstoriesinroadsafety.Role ofhighway professionalsinhighwaysafety.

UNIT-II

Planning ofroads for safety. Land use planning andzoning. Developmentcontrol and encroachment.
Networkhierarchy.Routeplanningthroughcommunities.Accesscontrol.Trafficsegregation.Traffic calming designing for safety: road link design, alignment design. Cross-sectional elements. Traffic control devices. Road side safety. Road side facilities. Somecritical elements. Junction design Basic principles.Selection ofjunctiontype. Factors affecting safety at various junctiontypes. Elements to improveroadsafety.Provisions forvulnerable roadusers.

UNIT-III

Road safety audit. Concepts of road safety audit, Road safety auditors & key personnel in RSA. Organizingandconductingaroadsafetyaudit.Exampleandcommonlyidentified. IssuesduringRSA, Roadsafetyauditreport. Development ofcost-effectiveofroadsafetyauditaccidentinvestigation and prevention. Basic strategies for accident reduction. Significance of accidentdata.Accident investigation and identification of potential sites for treatment. Problem diagnosis. Selection of countermeasures.Example of selection of counter measures. Detaileddesign and implementation of countermeasures.

UNIT-IV

Monitoring and evaluation non-engineering measures for road safety, behavioral counter measures, education.Trainingandpublicity. The goalofpolice traffic control activities. Strategyforroad safety management by police. Role of NGOs in road safety. Legal framework for roadsafety transport related pollution, noise pollution, air pollution, effects of weather conditions, vehicular emission parameters, pollution standards.

UNIT-V

EIA requirements of highway projects, world bank guidelines, EIA practices inIndia. Fuel crisis andtransportation, factors affecting fuel consumption, fuel economy in various modes of transportation,various types of alternative fuels.

RecommendedBooks:

(i) Traffic Engg.AndTransportPlanningbyL.R.Kadiyali,KhannaPublishers,Delhi.
(ii) HighwayEngg.ByS.K.Khanna&C.E.G.Justo,NewChandBros.,Roorkee.

III Year – II Semester	BRIDGE ENGINEERING	L	T	P	C
1001233236		3	0	0	3.0

Course Outcomes:

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

- DiscusstheIRCstandardliveloadsanddesignthedeckslabbridge.
- Analyse and box ,pipe culverts for the given loading and detail the boxculverts.
- Design and detail the T-Beambridges.
- Design and check the stability of piers and abutments.
- Discuss about the construction techniques of precastmembers.

UNIT-I GENERALCONSIDERATIONSFORROADBRIDGES:

Introduction – Site selection – Soil exploration for site – Selection of bridge type – Economical span – Number of spans – Determination of HFL – General arrangement drawing.

STANDARDSPECIFICATIONSFORROADBRIDGES:

Width of carriageway- Clearances- Loads to be considered- Dead load– I.R.C. standard live loads- Impact effect- Review of I.R.C. loadings- Application of live loads on deck slabs – Wind load–Longitudinal forces-Centrifugal forces-Horizontal forces due to water currents.

UNIT-II CULVERTS:

Introduction, Analysis and design of box culverts- slab culverts – pipe culverts- Reinforcement detailing and bar bending schedule need to be prepared.

UNIT-III REINFORCEDCONCRETET-BEAMBRIDGES:

Introduction–Analysis and Design of T – Beam Girder bridges- Reinforcement detailing and bar bending schedule need to be prepared.

UNIT-IV DESIGN OF SUBSTRUCTURE:

Analysis and Design of Abutments and pier- Reinforcement detailing to be prepared.

UNIT-V BRIDGE BEARINGS:

Bearings, forces on bearings, types of bearings design of elastomeric bearings, basics for selection of bearings. Construction techniques for Via–Ducts, Methods of erection - Pre-cast girders, Launching procedures, design of launching girders.

TextBooks:

1. Johnson victor D, Essentials of Bridge Engineering, 7th Edition, Oxford, IBH Publishing Co., Ltd., 2006.
2. Ponnuswamy,BridgeEngineering,4thEdition,McGraw-HillPublication,2008.
3. KrishnamRaju N., Design of Bridges, 4thEdition, Oxford and IBH Publishing Co., Ltd.,2008.

References:

1. Vazirani,Ratvani&Aswani,DesignofConcreteBridges,5thEdition,Khanna

Publishers,2006.
2. JagadishT.R.&M.A.Jayaram,DesignofBridgeStructures,2nd Edition,2009.
3. 3. Swami Saran, Analysis and Design ofsub-structures,2nd Edition,OxfordIBH Publishing co Ltd.,2006.

III Year – II Semester	HYDRAULIC AND IRRIGATION STRUCTURES	L	T	P	C
1001233237		3	0	0	3.0

(Professional Elective– III)

Course Objectives:

- To Study Modes Of Failure, Stability Analysis And Design Of Gravity Dam And Earth Dams.
- To Study Various Types Of Spillways And Their Suitability, Energy Dissipation Below Spillways
- To Study Seepage Theories And Their Applications In The Design Of Weirs On Permeable
- Foundations. To Study Functions, Types And Suitable Locations For Canal Falls, Canal Regulators And Cross Drainage Works.
- To Study about Component Parts and Their Functions.

Course Outcomes:

At The End Of The Course The Student Will Be Able To:

- Analyze The Stability Analysis And Design Of Gravity Dam And An Earth Dam.
- Suggest A Suitable Spillway At A Dam Site And Understand The Criteria For Design Of Stilling Basin For Energy Dissipation Under Spillway.
- Understand The Functions And Suitable Locations Of Canal Outlets, Canal Falls, and Canal Regulators And Cross Drainage Works And Design Of Weirs.
- Understand The Functions Of Component Parts Of A Hydroelectric Power Scheme.

Unit-I

Storage Works: Classification of Dams, Factors Governing Selection of Types of Dam, Selection of Site, Preliminary Investigation.

Gravity Dams: Forces acting on a Gravity Dam, Stability Criteria, Modes of Failure – Elementary and Practical Profiles, Stability Analysis, Principal and Shear Stress – Construction Joints, Openings in Dams – Galleries, Foundation Treatment of Gravity Dam.

Earth Dams: Types, Foundation for Earth Dams, Design of Earth Dams, Causes for Failure of Earth Dams, Criteria for Safe Design, Phreatic Line, Seepage Analysis – Seepage Control Through Body and Foundation.

Unit-II

Spillways: Essential Requirements, Spillway Capacity, Components, Types of Spillways and Their Working, Design of Ogee Spillway, Energy Dissipation Below Spill Way, Scour Protection, Use of Hydraulic Jump as Energy Dissipater – Design of Stilling Basins – USBR and IS Standard Basins; Spillway Crest Gates – Different Types.

Unit-III

Diversion Head Works: Types, Location and Components, Effects of Construction of Weirs on Permeable Foundation, Bligh's, Lanes and Khosla's Theories, Method of Independent Variables,

Design Principles of Weirs and Barrages, Design of Weirs on Permeable Foundations, Design of Vertical Drop Weir, and Silt Control Devices.

Unit-IV

Regulation Works: Canal Falls – Definition, Necessity and Location, Classification of Falls, Design Principles of Syphon Well Drop, Notch Fall, Sarada Fall, Straight Glacis Fall; Offtake Alignment; Cross Regulator and Distributary Head Regulator – Design of Cross Regulator and Distributor Head Regulator.

Unit-V

River Training Works: River Training and its Objectives, Classification of River Training Works, Marginal Embankment, Guide Banks, Groynes, Cutoffs, Bank Pitching, Launching Aprons, Miscellaneous Types of River Training Works.

Water Power Engineering: Development of Hydro Power in India, Assessment of Available Power, Utilization Factor, Load Factor, Diversity Factor, Storage and Pondage; Types of Hydro Power Schemes; Components of Hydel Schemes – Fore Bay, Intake Structure, Trash Racks, Surge Tanks; Water Hammer Pressure, Substructure and Superstructure of Power House..

Text Books

1. Irrigation and Water PowerEngineering byPunmia, B.C. and P.B.B. Lal, Laxmi Publications Pvt. Ltd.
2. Irrigation Water Resources and Water Power Engineering by Modi, P.N., Standard Book House.
3. Irrigation and Hydraulic Structures by Garg, S.K., Khanna Publishers.

Reference Book

1. Hand book of Applied Hydrology,Chow, V.T., McGraw-Hill Book Co.of a hydel project.

III Year – II Semester	REPAIR AND RETROFITTING OF STRUCTURES	L	T	P	C
1001233238		3	0	0	3.0

(Professional Elective– III)

Course Objectives:

To learn various distress and damages to concrete and masonry structures

- To understand the importance of maintenance of structures
- To study the various types and properties of repair materials
- To assess the damage to structures using various tests
- To learn the importance and methods of substrate preparation
- To learn various repair techniques of damaged structures, corroded structures

Course Outcomes:

At the end of the course student will be able to

- Understand the properties of fresh and hardened concrete.
- Know the strategies of maintenance and repair.
- Get an idea of repair techniques.
- Understand the properties of repair materials
- Understand the retrofitting strategies and techniques

Unit-I

Materials: Construction chemicals, Mineral admixtures, Composites, Fibre reinforced concrete, High performance concrete, polymer-impregnated concrete.

Unit-II

Techniques to test the existing strengths: Destructive and non destructive tests on concrete.

Unit-III

Repairs of Multistory structures: Cracks in concrete, possible damages to the structural element- beams, slab, Column, Footings, etc., Repairing techniques like Jacketing, Grouting, External prestressing, Use of chemical admixtures, Repairs to the fire damaged structures.

Unit-IV

Foundation problems: Settlement of shallow foundations – repairs, sinking of piles, wells – repairs.

Unit-V

Corrosion of Reinforcement: Preventive measures – coatings –use of SBR modified cementitious mortar, Epoxy resin mortar, Acrylic modified cementitious mortar, flowing concrete.

Reference Books

1. Deterioration, Maintenance and Repair of Structures" by Johnson, McGraw Hill.
2. Concrete Structures: Repairs, water proofing and protection" by Philip H. Perkins, Applied sciences publications Ltd., London, pp.302

3.Durability of concrete structure: Investigation, Repair, Protection" Edited by Geoffmang., E. & FN SPON, An imprint of Chapman & Hall, pp.270.

4. Deterioration, maintenance and Repair of structures" by Johnson, McGraw Hill, pp.375

III Year – II Semester	DISASTER MANAGEMENT	L	T	P	C
1001233253		3	0	0	3.0

(Open Elective– II)

Course Outcomes:

- At the end of the course, the student shall be able to:
- Explain about concepts of disaster management and types of disasters
- Explain the Vulnerability profile of India & legal framework in India
- Discuss about early warning systems for disaster risk reductions
- Describe the policy and programmers for disaster risk reductions in India
- Demonstrate rescue and relief operation in India during disaster

UNIT–I INTRODUCTIONTO DISASTER MANAGEMENT:

Definitions and concepts of Hazard, Vulnerability, Risk, Resilience, Concept of Disaster Management Cycle – Response, Recovery, Mitigation and Preparedness, Introduction to Various Hazards both Natural and Man-Made Hazards – Earthquakes, Cyclones, Droughts, Floods, Volcanoes, Coastal Hazards, Landslides, Forest Fires, Industrial Accidents, Biological Disasters, etc.., Climate Change, Global Warming.

UNIT–II DISASTER MANAGEMENT IN INDIA:

Hazard and vulnerability profile of India, Disaster Management Act 2005, National Disaster Mitigation and Management Guideline on -National Policy on Disaster Management 2009, NDMA guidelines on Cyclones specifically, besides earthquakes, floods, urban floods, information systems, communication systems etc., Introduction to State Disaster Management Authorities.

Disaster Management in the World Scenario: Role of UNDRR, Role of UNISDR

UNIT–III HAZARD ANALYSIS:

Estimation of potential causes, characteristics and impact of Hazards. Geological Processes leading to natural hazards, Multi- Hazard Assessment, Short term and Long Term Prediction,

Early warning system for different hazards, Risk Analysis for Individuals,communities etc.Role of Remote Sensing &GIS in Disaster Management and its applications, CaseStudies.

UNIT–IV DISASTER RISK REDUCTION (DRR):

Assessing Vulnerabilities, Risk Assessment, Preparation of Exposure and Risk Database, Prevention and mitigation strategies for DRR, Framework of Disaster Risk Reduction.

Capacity Building Measures, Community Participation, Contemporary studies and work towards disaster risk reduction, Disaster Risk Reduction Plan.

UNIT-V RESPONSE AND RECOVERY OPERATIONS:

Role of NDRF, Training of personnel, equipment necessary, public awareness creation, Mass Casualty Management, agencies involved in mass casualty management, Qualification and Duties of professionals, Response policy, Case Studies.

TEXT BOOKS:

1. H.K.Guptha,―Disaster management‖,2nd Edition,University Press,2001.
2. R.B.Singh(Ed),―Disaster Management‖,Rawat Publication,New Delhi,2000.

REFERENCES

1. S.Seetharaman,―Construction EngineeringandManagement‖,4thEdition,Umesh publications, New Delhi, 1999
2. Gupta,M.C.,―Manualson Natural Disaster management in India‖,National Centrefor Disaster Management, IIPA, New Delhi, 2002.
3. Disaster Management Guidelines.GOI-UNDPDisasterRiskReductionProgramme(2009-2012).

III Year – II Semester	WATERSHED MANAGEMENT	L	T	P	C
1001233254		3	0	0	3.0

Course Objectives:

- To give an overview of watershed management and principles of WSM.
- To impart knowledge on water resources and conjunction use of ground water and
- Surface water to meet water demand. To impart knowledge on river basin watershed management and ground water management.
- To expose students about social aspects of WSM such as public aspects participation and integrated development.
- To emphasis on conservation of water through recycle and reuse of waste water, water harvesting.
- To explain the interference of integrated watershed management for sustainable development.
- To expose students to applications of RS and GIS for watershed management.

Course Outcomes:

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

- Plan for sustainable development by proper use of all available water resources of a watershed for optimum production with minimum hazards to natural resources.
- Determine the various solutions to meet the water demand.
- Implement damage mitigation measures to control soil erosion.
- Adopt appropriate techniques or methods for water harvesting.
- Knowledge on determining effective watershed modeling.

SYLLABUS

Unit-I

Principles of Watershed Management: Basics concepts, Hydrology and water availability, Surface water, Groundwater, Conjunctive use, Human influences in the water resources system, Water demand, Integrated water resources system River basins Watershed Management Practices in Arid and Semi-arid Regions, Watershed management through wells, Management of water supply - Case studies, short term and long term strategic planning

Unit-II

Conservation of Water: Perspective on recycle and reuse, Waste water reclamation 25 Social Aspects of Watershed Management: Community participation, Private sector participation, Institutional issues, Socio-economy, Integrated development, Water legislation and implementations, Case studies

Unit-III

Sustainable Watershed Approach: Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, Soil erosion and conservation

Unit-IV

Water Harvesting: Rainwater management - conservation, storage and effective utilization of rainwater, Structures for rainwater harvesting, roof catchment system, check dams, aquifer storage

Unit-V

Applications of Geographical Information System and Remote Sensing in Watershed Management, Role of Decision Support System in Watershed Management.

Text Books:

1. Murthy, J.V.S., Watershed Management in India, Wiley Eastern, New Delhi, 1994.
2. Murty, J.V.S., Watershed Management, New Age Intl., New Delhi 1998.

Reference Books:

3. Allam, G.I.Y., Decision Support System for Integrated Watershed Management, Colorado State University, 1994.
4. Vir Singh, R., Watershed Planning and Management, Yash Publishing House, Bikaner, 2000.

American Society of Civil Engineers, Watershed Management, American Soc. of Civil Engineers, New York, 1975

III Year – II Semester	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
1001233212		3	0	0	3.0

COURSE OBJECTIVES:

Students will have:

1. To perform sampling procedure, determine pH, Conductivity of given water sample in the laboratory
2. To determine and estimate Hardness, Alkalinity, Acidity of given water sample in the laboratory
3. To determine and estimate Dissolved Oxygen, Turbidity, Total Solids, Total Dissolved Solids, Total Suspended Solids etc., of given water sample in the laboratory
4. To determine and estimate Iron, Nitrogen, Total Phosphorous, B.O.D, C.O.D of given waste water sample in the laboratory
5. To determine Optimum Coagulant Dose, Chlorides, Chlorine Demand, Coli form of given drinking water sample in the laboratory
6. To determine Percent of Available Chlorine in Bleaching, Residual Chlorine of given drinking water sample in the laboratory

COURSE OUTCOMES:

Upon successful completion of this course, students will get ability to:

1. Demonstrate sampling procedure and determine pH, Conductivity of given water sample in the laboratory
2. Estimate Hardness, Alkalinity, Acidity of given water sample in the laboratory
3. Estimate Dissolved Oxygen, Turbidity, Total Solids, Total Dissolved Solids, Total Suspended Solids etc., of given water sample in the laboratory
4. Estimate Iron, Nitrogen, Total Phosphorous, B.O.D, C.O.D of given waste water sample in the laboratory
5. Determine Optimum Coagulant Dose, Chlorides, Chlorine Demand, Coli form of given drinking water sample in the laboratory
6. Determine Percent of Available Chlorine in Bleaching, Residual Chlorine of given drinking water sample in the laboratory

Exp. No	Name of the Experiment
0	Water sampling methods for lab analysis
1	pH Metric Estimation of Acid By Base
2	Determination of Total Hardness By EDTA Method
3	Determination of Acidity Of Water Sample
4	Determination of Alkalinity Of Water Sample
5	Estimation of Dissolved Oxygen in Water Sample
6	Determination of Turbidity of Water
7	Determination of Iron By Thiocyanate Colorimetry
8	Conduct metric Estimation Of Acid By Base
9	Determination of Biochemical Oxygen Demand
10	Determination of Total Solids, Total Dissolved Solids and Total Suspended Solids
11	Determination of Optimum Coagulant Dosage
12	Determination of Chloride Content in the Given Sample

13 Determination of the percentage of Available Chlorine in Bleaching Powder
14 Determination of the Residual Chlorine

III Year – II Semester	TRANSPORTATION ENGG. LAB	L	T	P	C
1001233213		3	0	0	3.0

COURSE OBJECTIVES:

Students will have

- To demonstrate tests on road aggregates which include, aggregate crushing value and
- Impact
- To demonstrate test on aggregate,specific gravity and water absorption, attrition test, abrasion test, shape tests to practice tests on bituminous materials which include viscosity test
- To demonstrate ductility test.
- To demonstrate softening point test
- To demonstrate flash and fire point tests
- To demonstrate penetration test, stripping test

COURSE OUTCOMES:

Students will get ability to:

- Determine coarse aggregate impact, crushing, abrasion and attrition values using different laboratory testing machines.
- Determine specific gravity, elongation and flakiness index values of coarse aggregates.
- Determine the attrition and water absorption of aggregate.
- Determine viscosity, flash and fire point and softening point of bitumen in laboratory.
- Determine ductility and penetration of bitumen using ductility testing machine & standard penetrometer respectively.
- Determine stripping value of bitumen in laboratory.

LIST OF EXPERIMENTS

A) ON ROAD AGGREGATES:

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

B) *ON BITUMINOUS MATERIALS:*

1. Viscosity Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Penetration test
6. Stripping test

References:

1. S.K.Khanna&C.E.G.Justo Highway Engineering Lab manual

III Year – II Semester	BUILDING INFORMATION MODELLING	L	T	P	C
1001233282		**3**	**0**	**0**	**3.0**

III Year – II Semester	TECHNICAL PAPER WRITING & IPR	L	T	P	C
1001233226		2	0	0	

Course Objectives

1. To develop an understanding of the structure, style, and ethics of technical and scientific writing.

2. To train students in effective academic communication, including research paper, thesis, and project report writing.

3. To create awareness about various forms of intellectual property and the process of securing IP rights.

4. To provide foundational knowledge on patents, copyrights, trademarks, and design rights.

5. To sensitize students about innovation, commercialization, and legal aspects of research.

Unit I:

Fundamentals of Technical Writing: Basics of technical communication, Types of technical documents: research papers, project reports, theses, Structure and components of a technical paper (Abstract, Introduction, Methods, Results, Discussion), Clarity, precision, and language usage in scientific writing, Ethics in writing: plagiarism, data falsification, multiple submissions

Unit II:

Writing for Publication Selection of journal/conference, understanding journal impact factor, indexing, and scope, Manuscript preparation and formatting guidelines, Submission process and peer review system, responding to reviewers and revisions

Unit III:

Presentation and Dissemination Preparing abstracts, posters, and oral presentations,Tools for formatting and referencing (LaTeX, MS Word, EndNote, Mendeley, Zotero), Best practices for graphical and tabular data representation, Collaboration and authorship ethics, Copyright and open-access publishing

Unit IV:

Introduction to IPR Definition and need for Intellectual Property, Categories: Patents, Copyrights, Trademarks, Trade Secrets, and Industrial Designs, Basic principles of patentability: novelty, non-obviousness, utility, National and international IPR organizations (WIPO, IPO, USPTO, EPO), IPR protection mechanisms in India

Unit V:

Patent Filing and Innovation Management Patent filing process in India and abroad, Patent search using free databases (Google Patents, Espace net, WIPO), Patent drafting basics: claims, specifications, drawings, Technology transfer and commercialization of IP, Role of incubation centers and start-up policy

Textbooks

1. M. Ashok Kumar & R. Murugesan, Research Methodology and IPR, Charulatha Publications.
2. R. N. Khandare, Research Methodology & IPR, S. Chand Publishing.
3. Michael Alley, The Craft of Scientific Writing, Springer.

Reference Books

1. B.L. Wadehra, Law Relating to Intellectual Property, Universal Law Publishing Co.
2. Deborah E. Bouchoux, Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets, Cengage Learning.
3. Day & Gastel, How to Write and Publish a Scientific Paper, Cambridge University Press.
4. Robin Jeffery & Michael Wilkinson, Publishing Research Successfully, SAGE.
5. Government of India: IPR Policy Documents and Patent Office Guidelines (available on
6. https://ipindia.gov.in)

Course Outcomes

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

- Write effective technical papers and reports that conform to academic and professional standards.
- Present technical information clearly and ethically in various formats (papers, posters, presentations).
- Understand the process of peer review and publishing in journals/conferences.
- Identify and explain different types of intellectual property and how they are protected.
- Apply knowledge of IPR to protect and commercialize their innovations responsibly.