ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABI

OF

CIVIL ENGINEERING

FOR

B.TECH REGULAR FOUR YEAR DEGREE COURSE

(for the batches admitted from 2014-2015)

&

for B.TECH LATERAL ENTRY COURSE

(for the batches admitted from 2015-2016)

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Affiliated to JNTU Anantapur, Approved by AICTE
Accredited by NBA; NAAC with 'A' grade)

Sree Sainath Nagar, A.Rangampet, Near Tirupati - 517 102. A.P.

VISION

To be one of the Nation's premier Engineering Colleges by achieving the highest order of excellence in Teaching and Research.

MISSION

- To foster intellectual curiosity, pursuit and dissemination of knowledge.
- To explore students' potential through academic freedom and integrity.
- To promote technical mastery and nurture skilled professionals to face competition in ever increasing complex world.

QUALITY POLICY

Sree Vidyanikethan Engineering College strives to establish a system of Quality Assurance to continuously address, monitor and evaluate the quality of education offered to students, thus promoting effective teaching processes for the benefit of students and making the College a Centre of Excellence for Engineering and Technological studies.

DEPARTMENT OF CIVIL ENGINEERING

VISION

To become a leading centre of excellence in Civil Engineering education through teaching and research.

MISSION

To impart strong basic and advanced knowledge for a success ful career in civil engineering and provide skills in state-of-the-art research and design for creating innovative solutions to serve industry and community. The Department is established to in culcate intellectual curiosity, integrity and technical & commu nication skills for individual development and produce outstand ing Civil Engineering graduates with highest ethics. The De partment organizes development programmes for faculty, staff and students to improve in their respective interested field of study and perform to the best of their abilities.

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduate will be able to:

1. Pursue higher education in the areas of their interest.

2. Address the contemporary issues in Civil Engineering and provide appropriate solutions through professional career.

3. Exhibit leadership qualities, participate in continuing educations programmes for lifelong learning and contribute individually and as a member in multidisciplinary teams to meet social and ethical constraints.

PROGRAM OUTCOMES

After the completion of the program, a successful student will be able to:

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

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

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

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

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

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

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

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

9. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. **(Individual and team work**)

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

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

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

Program Specific Outcomes

After the completion of the program, a successful student will be able to:

1. Apply knowledge of Construction Engineering, Environmental Engineering, Geotechnical Engineering, Structural Engineering, Surveying, Transportation Engineering and Water Resources Engineering in real time.

2. Analyse a system, component or process in sub-disciplines of civil engineering in real time problems.

3. Design a system, component, or process in more than one Civil Engineering context.

4. Conduct investigations and address complex civil engineering problems; Utilize and develop novel tools and techniques that are appropriate in civil engineering practice.

The Challenge of Change

*"**M**astery of change is in fact the challenge of moving human attention from an old state to a new state. Leaders can shift attention at the right time and to the right place. The real crisis of our times is the crisis of attention. Those who lead are the ones who can hold your attention and move it in a purposeful way. Transformation is nothing but a shift in attention from one form to another. The form of a beautiful butterfly breaks free from a crawling caterpillar. If you pay enough attention, you would be able to see how the butterfly hides within the caterpillar. The leader points out a butterfly when the follower sees only a caterpillar".*

- Debashis Chatterjee

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

(Affiliated to J.N.T. University Anantapur, Anantapuramu)

ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Program
(for the batches admitted from the academic year 2014–15)
&
B.Tech. (Lateral Entry Scheme)
(for the batches admitted from the academic year 2015–16)

For pursuing four year undergraduate Degree Program of study in Engineering (B.Tech) offered by Sree Vidyanikethan Engineering College under Autonomous status and herein after referred to as SVEC (Autonomous):

1. Applicability : All the rules specified herein, approved by the Academic Council, shall be in force and applicable to students admitted from the academic year 2014-2015 onwards. Any reference to "College" in these rules and regulations stands for SVEC (Autonomous).

2. Extent: All the rules and regulations, specified hereinafter shall be read as a whole for the purpose of interpretation and as and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, Principal, Sree Vidyanikethan Engineering College shall be the Chairman, Academic Council.

3. Admission :

3.1. Admission into first year of Four Year B.Tech. Degree Program of study in Engineering:

3.1.1. Eligibility: A candidate seeking admission into the First Year of four year B.Tech. Degree Program should have

(i) passed either Intermediate Public Examination (I.P.E.) conducted by the Board of Intermediate Education, Andhra Pradesh, with Mathematics, Physics and Chemistry as optional courses (or any equivalent examination recognized by JNTUA, Anantapuramu) or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or equivalent Diploma recognized by JNTUA, Anantapuramu) for admission as per the guidelines of Andhra Pradesh State Council of Higher Education (APSCHE).

(ii) secured a rank in the EAMCET examination conducted by APSCHE for allotment of a seat by the Convener, EAMCET, for admission.

3.1.2. Admission Procedure: Admissions shall be made into the first year of four year B.Tech. Degree Program as per the stipulations of APSCHE, Government of Andhra Pradesh:

(a) By the Convener, EAMCET, (for Category-A Seats).

(b) By the Management (for Category-B Seats).

3.2. Admission into the Second Year of Four year B.Tech Degree Program in Engineering

3.2.1. Eligibility: Candidates qualified in ECET and admitted by the Convener, ECET. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained.

3.2.2. Admission Procedure: **20%** of the sanctioned strength in each Program of study as lateral entry students or as stipulated by APSCHE shall be filled by the Convener, ECET.

4. Programs of study offered leading to the award of B.Tech. Degree

Following are the four year undergraduate Degree Programs of study offered in various branches in SVEC (Autonomous) leading to the award of B.Tech (Bachelor of Technology) Degree:

1) B.Tech (Civil Engineering)
2) B.Tech (Computer Science & Engineering)
3) B.Tech (Computer Science & Systems Engineering)
4) B.Tech (Electrical & Electronics Engineering)
5) B.Tech (Electronics & Communication Engineering)
6) B.Tech (Electronics & Instrumentation Engineering)
7) B.Tech (Information Technology)
8) B.Tech (Mechanical Engineering)

5. Academic Year: The College shall follow Year-wise pattern for the First year courses of four year B.Tech Program and semester system from second year onwards for conducting all its curricula. An academic year shall consist of a first semester and a second semester from second year onwards and the summer vacation follows in sequence.

The first year of four year B.Tech Program shall have duration to accommodate a minimum of **31** instructional weeks. The first and second semesters (from second year onwards) shall have the duration to accommodate a minimum of **16** instructional weeks per semester.

First Year B.Tech. (38 weeks)	Instruction Period: I Spell : 07 weeks II Spell : 12 weeks III Spell : 12 weeks	31 weeks
	Mid-term Examinations: I Mid : 1 week II Mid : 1 week III Mid : 1 week	3 weeks
	Preparation & Practical Examinations	2 weeks
	External Examinations	2 weeks
	Summer vacation	4 weeks
First Semester (22 weeks)	Instruction Period: I Spell : 7 weeks II Spell : 9 weeks	16 weeks
	Mid-term Examinations: I Mid : 1 week II Mid : 1 week	2 weeks
	Preparation & Practical Examinations	2 weeks
	External Examinations	2 weeks
	Semester Break	2 weeks
Second Semester (22 weeks)	Instruction Period: I Spell : 7 weeks II Spell : 9 weeks	16 weeks
	Mid-term Examinations: I Mid : 1 week II Mid : 1 week	2 weeks
	Preparation & Practical Examinations	2 weeks
	External Examinations	2 weeks
	Summer Vacation	6 weeks

6. Course Structure: Each Program of study shall consist of:

- General Courses comprising of the following:
  i. Language / Communication Skills
  ii. Humanities and Social Sciences
  iii. Economics and Principles of Management
  iv. Environmental Sciences

  The above areas are common to all branches.
- Basic Science Courses comprising of the following:
  i. Computer Programming with Numerical Analysis
  ii. Mathematics
  iii. Physics
  iv. Chemistry

  The above courses are common to all branches.

- Engineering Science Courses comprising of the following, pertaining to the branch:
    i. Engineering Graphics
    ii. Workshop Practice
    iii. Engineering Mechanics
    iv. Electrical Sciences
    v. Thermodynamics
    vi. Material Sciences and Engineering
    vii. Building Materials
    viii. Surveying
    ix. Basic Electronics
    x. Computer Programming and Data Structures
    xi. IT Workshop
    xii. Fluid Mechanics
- Professional core courses:
  The list of professional core courses are chosen as per the suggestions of the experts, to impart broad based knowledge needed in the concerned branch of study.
- Elective courses:
  Elective courses shall be offered to the students to diversify their spectrum of knowledge. The elective courses can be chosen based on the interest of the student to broaden his individual skills and knowledge.

Distribution of types of courses is indicated below:

General Courses	5-10%
Basic Science Courses	15-20%
Engineering Science Courses	15-20%
Professional Core Courses	40-50%
Elective Courses	10-15%

Contact Hours: Depending on the complexity and volume of the course, the number of contact hours per week shall be assigned.

7. Credit System: Credits are assigned based on the following norms as given in Table 1.

Table 1

Course	Year Pattern		Semester Pattern	
	Hour(s)/ Week	Credits	Hour(s)/ Week	Credit (s)
Theory	01	02	01	01
Practical	03	03	03	02
Seminar	--	--	--	02
Comprehensive Viva-Voce	--	--	--	02
Project Work	--	--	--	10

i. As a norm, for the theory courses, **one credit** for one contact hour per week is assigned in semester system. In yearly pattern **two credits** for one contact hour per week is assigned.
ii. As a norm, for practical courses **two credits** will be assigned for three contact hours per week in semester pattern. In yearly pattern **three credits** will be assigned for three contact hours per week.
iii. Tutorials do not carry any credits.
iv. For courses like Project/Seminar/Comprehensive Viva-Voce, where formal contact hours are not specified, credits are assigned based on the complexity of the work to be carried out.

The four year curriculum of any B. Tech. Program of study shall have total of **187** credits. However the curriculum for lateral entry students shall have a total of **142** credits.

8. Examination System: All components in any Program of study shall be evaluated through internal evaluation and/ or an external evaluation conducted as year-end/semester-end examination.

8.1. Distribution of Marks:

Sl. No.	Course	Marks	Examination and Evaluation	Scheme of examination
1.	Theory	70	Year-end / Semester-end examination of 3 hours duration (External evaluation)	The examination question paper in theory courses shall be for a maximum of 70 marks. The question paper shall be of descriptive type with 5 questions, taken one from each unit of syllabus, having internal choice and all 5 questions shall be answered. All questions carry equal marks.
		30	Mid-term Examination of 2 hours duration (Internal evaluation).	The question paper shall be of descriptive type with 4 essay type questions out of which 3 are to be answered and evaluated for 24 marks and also 6 short answer questions out of which all are to be answered and evaluated for 6 marks.
				For I B.Tech: Three (03) mid-term examinations, each for 30 marks are to be conducted. For a total of 30 marks, 75% of average of better two and 25% of the other examination are added and finalized. **Mid-I:** After first spell of instruction (I Unit). **Mid-II**: After second spell of instruction (II to III Units). **Mid-III**: After third spell of instruction (IV to V Units).
				For a Semester: Two mid-term examinations each for 30 marks are to be conducted. For a total of 30 marks, 75% of better one of the two and 25% of the other one are added and finalized. **Mid-I:** After first spell of instruction (I to II Units). **Mid-II**: After second spell of instruction (III to V Units).

Sl. No.	Course	Marks	Examination and Evaluation		Scheme of examination
2	Laboratory	50	Year-end / Semester-end Lab Examination for 3 hours duration (External evaluation)		50 marks are allotted for laboratory/drawing examination during year-end / semester-end. *Combined laboratories shall be conducted separately for 3 hours duration each.*
		25	15	Day-to-Day evaluation	Performance in laboratory experiments/drawing and Record.
			10	Internal evaluation	For first year three practical tests and for semester two practical tests shall be conducted. Average of the tests is to be finalized for 10 marks.
3	a) Seminar	50	Semester-end Examination		50 marks are allotted for Seminar during semester-end evaluation by the Departmental Committee (DC) as given in 8.2.1.
	b) Comprehensive Viva-Voce	100	Semester-end Examination		Comprehensive Viva-Voce examination shall be conducted at the end of IV Year II Semester by a committee as given in 8.2.2.
5	Project Work	200	140	External evaluation	Semester-end Project Viva-Voce Examination by Committee as detailed in 8.2.3.
			60	Internal evaluation	Continuous evaluation by the DC as detailed in 8.2.3.

8.2 Seminar/Comprehensive Viva-Voce/Project Work/ Design and Drawing of Irrigation Structures Evaluation:

8.2.1 For the seminar, the student shall collect information through literature survey on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the Department just before presentation. The report and the presentation shall be evaluated at the end of the semester by the Departmental Committee (**DC**) consisting of Head of the Department, concerned supervisor and a senior faculty member. The DC is constituted by the Principal on the recommendations of the Head of the Department.

8.2.2 Comprehensive Viva-Voce examination shall be conducted by a committee consisting of HOD and two senior faculty members.

8.2.3 The project Viva-Voce examination shall be conducted by a Committee consisting of External examiner (nominated by the Chief Controller of Examinations), HOD and concerned Supervisor. The evaluation of project work shall be conducted at the end of the IV year II semester. The Internal Evaluation shall be made by the DC, on the basis of two project reviews conducted on the topic of the project.

8.2.4. Mid-term examinations for Design and Drawing of Irrigation Structures shall be conducted similar to like in other theory courses. However, semester-end examination comprises of two questions and out of which one question has to be answered for 70 marks.

8.3. Eligibility to appear for the year-end / semester-end examination:

8.3.1 A student shall be eligible to appear for year-end / semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the courses in a year/ semester.

8.3.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in first year or each semester may be granted by the College Academic Committee.

8.3.3 Shortage of Attendance below 65% in aggregate shall in no case be condoned.

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

8.3.5 A student shall not be promoted to the next semester unless he satisfies the attendance requirements of the current year/ semester, as applicable. The student may seek readmission for the year/ semester when offered next. He will not be allowed to register for the courses of the year/semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that year/semester when offered next.

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

8.4. Evaluation: Following procedure governs the evaluation.

8.4.1. Marks for components evaluated internally by the faculty shall be submitted to the Controller of Examinations one week before the commencement of the End examinations. The marks for the internal evaluation components shall be added to the external evaluation marks secured in the Year-end/Semester-end examinations, to arrive at total marks for any course in that Year/semester.

8.4.2. Performance in all the courses is tabulated course-wise and shall be scrutinized by the Examination Committee and moderation is applied if needed, and course-wise marks are finalized. Total marks obtained in each course are converted into letter grades.

8.4.3. Student-wise tabulation shall be done and individual grade Sheet shall be generated and issued to the student.

8.5. Personal verification / Revaluation / Recounting:

Students shall be permitted for personal verification/request for recounting/ revaluation of the Year-end/Semester-end examination answer scripts within a stipulated period after payment of prescribed fee.

After recounting or revaluation, records are updated with changes if any and the student shall be issued a revised grade sheet. If there are no changes, the student shall be intimated the same through a notice.

8.6. Supplementary Examination:

In addition to the regular year-end / semester-end examinations conducted, the College may also schedule and conduct supplementary examinations for all the courses of other year/ semesters when feasible for the benefit of students. Such of the candidates writing supplementary examinations may have to write more than one examination per day.

9. Academic Requirements for promotion/ completion of regular B.Tech Program of study:

The following academic requirements have to be satisfied in addition to the attendance requirements for promotion/ completion of regular B.Tech Program of study.

For students admitted into B.Tech. (Regular) Program:

9.1 A student shall be deemed to have satisfied the minimum academic requirements for each theory, laboratory course and project work, if he secures not less than 40% of marks in the year-end/semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and Year-end/ Semester-end examination taken together. For the seminar and comprehensive Viva-Voce, he should secure not less than 40% of marks in the semester-end examination.

9.2 A student shall be promoted from second year to third year of Program of study only if he fulfills the academic requirement of securing **33** credits from

a. O ne regular and one supplementary examinations of first year.

b. One regular examination of second year first semester irrespective of whether or not the candidate appears for the year-end/semester-end examination as per the normal course of study.

9.3 A student shall be promoted from third year to fourth year of Program of study only if he fulfils the academic requirements of securing **58** credits from the following examinations,

a. Two regular and two supplementary examinations of first year
b. Two regular and one supplementary examinations of second year first semester
c. One regular and one supplementary examinations of second year second semester
d. One regular examination of third year first semester

irrespective of whether or not the candidate appears for the year-end/semester-end examination as per the normal course of study and in case of getting detained for want of credits by sections 9.2 and 9.3 above, the student may make up the credits through supplementary examinations.

9.4 A student shall register for all the **187** credits and earn all the **187** credits. Marks obtained in all the **187** credits shall be considered for the calculation of the DIVISION based on CGPA.

9.5 A student who fails to earn **187** credits as indicated in the course structure within **eight** academic years from the year of their admission shall forfeit his seat in B.Tech. Program and his admission stands cancelled.

For Lateral Entry Students (batches admitted from the academic year 2015–2016):

9.6 A student shall be deemed to have satisfied the minimum academic requirements for each theory, practical course and project, if he secures not less than 40% of marks in the semester-end examination and a minimum of 40% of marks in the sum total of the internal evaluation and semester-end examination taken together. For the seminar and comprehensive Viva-Voce, he should secure not less than 40% of marks in the semester-end examination.

9.7 A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing **36** credits from the following examinations.

a. Two regular and one supplementary examinations of II year I semester
b. One regular and one supplementary examinations of II year II semester
c. One regular examination of III year I semester.

irrespective of whether or not the candidate appears for the semester-end examination as per the normal course of study and in case of getting detained for want of credits the student may make up the credits through supplementary examinations.

9.8 A student shall register for all **142** credits and earn all the **142** credits. Marks obtained in all the **142** credits shall be considered for the calculation of the DIVISION based on CGPA.

9.9 A student who fails to earn **142** credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit his seat in B.Tech Program and his admission stands cancelled.

10. Transitory Regulations:

Students who got detained for want of attendance (**or**) who have not fulfilled academic requirements (**or**) who have failed after having undergone the Program in earlier regulations (**or**) who have discontinued and wish to continue the Program are eligible for admission into the unfinished semester from the date of commencement of class work with the same (**or**) equivalent courses as and when courses are offered and they will be in the academic regulations into which they are presently readmitted. A regular student has to satisfy all the eligibility requirements within the maximum stipulated period of **eight years**, and a lateral entry student within **six years**, for the award of B.Tech Degree.

11. Grades, Grade Point Average and Cumulative Grade Point Average:

11.1. Grade System: After all the components and sub-components of any course (including laboratory courses) are evaluated, the final total marks obtained shall be converted into letter grades on a "**10 point scale**" as described below.

Grades conversion and Grade points attached

% of Marks obtained	Grade	Description of Grade	Grade Points (GP)
> = 95	S	Superior	10
> = 85 to < 95	O	Outstanding	9
> = 75 to < 85	A	Excellent	8
> = 65 to < 75	B	Very Good	7
> = 55 to < 65	C	Good	6
> = 45 to < 55	D	Fair	5
> = 40 to < 45	E	Pass	4
< 40	F	Fail	0
Not Appeared	N	Absent	0

Pass Marks: A student shall be declared to have passed theory course, laboratory course and project work if he secures minimum of 40% marks in external examination, and a minimum of 40% marks in the sum total of internal evaluation and external examination taken together. For the seminar and comprehensive Viva-Voce, he shall be declared to have passed if he secures minimum of 40% of marks in the semester-end examination. Otherwise he shall be awarded fail grade - **F** in such a course irrespective of internal marks. **F** is considered as a fail grade indicating that the student has to pass the year-end/semester-end examination in that course in future and obtain a grade other than **F** and **N** for passing the course.

11.2. Grade Point Average (GPA):

Grade Point Average (GPA) shall be calculated as given below on a "10 point scale" as an index of the student's performance at the end of I year/ each semester:

$$\text{GPA} = \frac{\sum(C\ X\ GP)}{\sum C}$$

where ***C*** denotes the credits assigned to the courses undertaken in that Year/ semester and ***GP*** denotes the grade points earned by the student in the respective courses.

Note: *GPA is calculated only for the candidates who passed all the courses in that Year/Semester.*

11.3. Cumulative Grade Point Average (CGPA):

The CGPA for any student is awarded only when he completes the Program i.e., when the student passes in all the courses prescribed in the Program. The CGPA is computed on a 10 point scale as given below:

$$\text{CGPA} = \frac{\sum(C\ X\ GP)}{\sum C}$$

where ***C*** denotes the credits assigned to courses undertaken up to the end of the Program and ***GP*** denotes the grade points earned by the student in the respective courses.

12. Grade Sheet: A grade sheet (Marks Memorandum) shall be issued to each student indicating his performance in all courses registered in that semester/year indicating the **GPA.**

13. Transcripts: After successful completion of the entire Program of study, a transcript containing performance of all academic years shall be issued as a final record. Duplicate transcripts will also be issued, if required, after payment of requisite fee.
Partial transcript will also be issued upto any point of study to a student on request.

14. Award of Degree: The Degree shall be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Anantapuramu on the recommendations of the Chairman, Academic Council of SVEC (Autonomous).

14.1. Eligibility: A student shall be eligible for the award of B.Tech Degree if he fulfills all the following conditions:

- Registered and successfully completed all the components prescribed in the Program of study to which he is admitted.
- Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- Obtained CGPA greater than or equal to 4.0 (Minimum requirement for declaring as passed).
- Has no dues to the College, Hostel, Library etc. and to any other amenities provided by the College.
- No disciplinary action is pending against him.

14.2. Award of Division: Declaration of Division is based on CGPA.

Awarding of Division

CGPA	Division
> = 7.0	First Class with Distinction
> = 6.0 and < 7.0	First Class
> = 5.0 and < 6.0	Second Class
> = 4.0 and < 5.0	Pass Class

15. Additional academic regulations:

15.1 A student may appear for any number of supplementary examinations within the stipulated time to fulfill regulatory requirements for award of the degree.

15.2 In case of malpractice/improper conduct during the examinations, guidelines shall be followed as given in the **Annexure-I**.

15.3 Courses such as Project, Seminar and Comprehensive Viva-Voce may be repeated only by registering in supplementary examinations.

15.4 When a student is absent for any examination (Mid-term or Year-end/Semester-end) he shall be awarded **zero** marks in that component (course) and grading will be done accordingly.

15.5 When a component is cancelled as a penalty, he shall be awarded zero marks in that component.

16. Withholding of Results:

If the candidate has not paid dues to the College/University (or) if any case of indiscipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/promoted to the next higher year/semester.

17. Amendments to regulations:

The Academic Council of SVEC (Autonomous) reserves the right to revise, amend, or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., without prior notice.

18. Attendance for student development activity periods indicated in the class time tables shall be considered as in the case of a regular course for calculation of overall percentage of attendance in a year / semester.

19. General:

The words such as "he", "him", "his" and "himself" shall be understood to include all students irrespective of gender connotation.

Note: ***Failure to read and understand the regulations is not an excuse.***

Annexure-I

GUIDE LINES FOR DISCIPLINARY ACTION FOR MALPRACTICES / IMPROPER CONDUCT IN EXAMINATIONS

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the 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)	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.	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.	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 for four consecutive semesters from class work and all Year-end/Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the courses of the examination (including labs 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 four consecutive semesters from class work and all Year-end/Semester-end examinations, if his involvement is established. Otherwise, The candidate is debarred for two consecutive semesters from class work and all Year-end/Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

Rule No.	Nature of Malpractices/ Improper conduct	Punishment
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that 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 Year-end/Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course only.
6.	Refuses to obey the orders of the Chief Controller of Examinations/Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the Controller of Examinations 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 Controller of Examinations, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that 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. If the candidate physically assaults the invigilator/Controller of the Examinations, then the candidate is also debarred and forfeits his/her seat. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that 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 Year-end/Semester-end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that 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.

Note: Whenever the performance of a student is cancelled in any course(s) due to Malpractice, he has to register for Year-end/ Semester-end Examinations in that course(s) consequently and has to fulfill all the norms required for the award of Degree.

SREE VIDYANIKETHAN ENGINEERING COLLEGE

(Autonomous)

COURSE STRUCTURE (2014-2015)

CIVIL ENGINEERING

I Year B.Tech. (Yearly Pattern)

Code	Subject	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT1HS01	Technical English	2	-	-	4	30	70	100
14BT1BS01	Engineering Physics	2	1	-	4	30	70	100
14BT1BS02	Engineering Chemistry	2	1	-	4	30	70	100
14BT1BS03	Engineering Mathematics	3	1	-	6	30	70	100
14BT10301	Engineering Mechanics	3	1	-	6	30	70	100
14BT1ES01	Programming in C and Data Structures	3	1	-	6	30	70	100
14BT1ES03	Computer-Aided Engineering Drawing	-	1	3	3	25	50	75
14BT1BS05	Engineering Physics and Engineering Chemistry Lab.	-	-	3	3	25	50	75
14BT1ES04	Programming in C and Data Structures Lab.	-	-	3	3	25	50	75
14BT1ES06	Engineering and IT Workshop	-	-	3	3	25	50	75
14BT1HS02	English Language Communication Skills Lab.	-	-	3	3	25	50	75
	TOTAL	**15**	**6**	**15**	**45**	**305**	**670**	**975**

II B.Tech I Semester

Course code	Course Name	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT3BS01	Matrices & Numerical Methods	3	1	–	3	30	70	100
14BT30101	Engineering Geology	3	1	–	3	30	70	100
14BT30233	Basics of Electrical and Mechanical Technology	3	1	–	3	30	70	100
14BT30102	Mechanics of Solids	3	1	–	3	30	70	100
14BT30103	Building Materials and Concrete Technology	3	1	–	3	30	70	100
14BT30104	Fluid Mechanics–I	3	1	–	3	30	70	100
14BT30121	Engineering Geology Lab	–	–	3	2	25	50	75
14BT30122	Strength of Materials Lab	–	–	3	2	25	50	75
	Total:	**18**	**6**	**6**	**22**	**230**	**520**	**750**

II B.Tech II Semester

Course code	Course Name	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT3BS03	Probability & Statistics	3	1	–	3	30	70	100
14BT4HS01	Environmental Sciences	3	1	–	3	30	70	100
14BT5HS01	Business Communication and Presentation Skills	3	1	–	3	30	70	100
14BT40101	Structural Analysis – I	3	1	–	3	30	70	100
14BT40102	Construction, Planning & Project Management	3	1	–	3	30	70	100
14BT40103	Surveying	3	1	–	3	30	70	100
14BT40104	Fluid Mechanics–II	3	1	–	3	30	70	100
14BT40121	Surveying Lab	–	–	3	2	25	50	75
14BT40122	Fluid Mechanics & Hydraulic Machinery Lab	–	–	3	2	25	50	75
	Total	**21**	**7**	**6**	**25**	**260**	**590**	**850**

III B.Tech I Semester

Course code	Course Name	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT5HS02	Management Science	3	1	–	3	30	70	100
14BT4HS02	Professional Ethics	3	1	–	3	30	70	100
14BT50101	Structural Analysis – II	3	1	–	3	30	70	100
14BT50102	Reinforced Cement Concrete Structures – I	3	1	–	3	30	70	100
14BT50103	Water Supply Engineering	3	1	–	3	30	70	100
14BT50104	Soil Mechanics	3	1	–	3	30	70	100
14BT50105	Engineering Hydrology	3	1	–	3	30	70	100
14BT50121	Computer Aided Building Planning &Drawing Lab	–	–	3	2	25	50	75
14BT50122	Geotechnical Engineering Laboratory	–	–	3	2	25	50	75
		21	**7**	**6**	**25**	**260**	**590**	**850**

III B.Tech II Semester

Course code	Course Name	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT5HS01	Managerial Economics and Principles of Accountancy	3	1	–	3	30	70	100
14BT60101	Reinforced Cement Concrete Structures – II	3	1	–	3	30	70	100
14BT60102	Foundation Engineering	3	1	–	3	30	70	100
14BT60103	Transportation Engineering –I	3	1	–	3	30	70	100
14BT60104	Wastewater Technology	3	1	–	3	30	70	100
Professional Elective– I								
14BT60105	1. Advanced Structural Analysis	3	1	–	3	30	70	100
14BT60106	2. Geo-environmental Engineering							
14BT60107	3. Ground Water Development and Management							
14BT60108	4. Solid Waste Management							
14BT60121	Concrete and Highway Materials Lab	–	–	3	2	25	50	75
14BT60122	Environmental Engineering Lab	–	–	3	2	25	50	75
	Total:	**18**	**6**	**6**	**22**	**230**	**520**	**750**

IV B.Tech I Semester

Courses code	Course Name	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT70101	Steel Structures	3	1	–	3	30	70	100
14BT70102	Water Resources Engineering	3	1	–	3	30	70	100
14BT70103	Geospatial Technologies	3	1	–	3	30	70	100
14BT70104	Transportation Engineering–II	3	1	–	3	30	70	100
Open Elective								
OPEN ELECTIVES		3	1	–	3	30	70	100
Professional Elective II								
14BT70110	1. Structural Dynamics	3	1	–	3	30	70	100
14BT70111	2. Advanced Foundation Engineering							
14BT70112	3. Water Resources Systems Planning and Management							
14BT70113	4. Transportation Management							
14BT70114	5. Environmental Impact Assessment and Management							
14BT70121	Remote Sensing and Geographical Information Systems Lab	–	–	3	2	25	50	75
14BT70122	Computer Aided Design and Detailing Lab	–	–	3	2	25	50	75
14BT70123	Seminar	–	–	–	2	–	50	50
	Total	**18**	**6**	**6**	**24**	**230**	**570**	**800**

OPEN ELECTIVES

Offering Dept	Course Code	Course Title
BS&H	14BT6HS01	Banking and Insurance
BS&H	14BT6HS02	Cost Accounting and Financial Management
BS&H	14BT6HS03	Entrepreneurship for Micro, Small and Medium Enterprises
CE	14BT70105	Disaster Mitigation and Management
CE	14BT70106	Environmental Pollution and Control
CE	14BT70107	Contract Laws and Regulations
CE	14BT70108	Planning for Sustainable Development
CE	14BT70109	Rural Technology
ME	14BT60305	Artificial Intelligence and Robotics
ME	14BT60306	Global Strategy and Technology
ME	14BT60307	Intellectual Property Rights and Management
ME	14BT60308	Managing Innovation and Entrepreneurship
ME	14BT60309	Material Science
CSE	14BT60502	Engineering Systems Analysis and Design
EIE	14BT71005	Microelectromechanical Systems
IT	14BT61203	Bio-Informatics
IT	14BT61204	Cyber Security and Laws

IV B.Tech II Semester

Courses Code	Course Name	Periods per week			C	Scheme of Examination Max. Marks		
		L	T	P		Int.	Ext.	Total
14BT80101	Prestressed Concrete	3	1	–	3	30	70	100
14BT80102	Estimation, Costing & Valuation	3	1	–	3	30	70	100
Professional Elective– III								
14BT80103	1. Advanced Steel Structures	3	1	–	3	30	70	100
14BT80104	2. Soil Dynamics and Machine Foundations							
14BT80105	3. Watershed Management							
14BT80106	4. Industrial Waste Water Treatment							
14BT80107	5. Infrastructure Development and Management							
14BT80108	6. Earthquake Resistant Design of Structures							
Professional Elective– IV								
14BT80109	1. Bridge Engineering	3	1	–	3	30	70	100
14BT80110	2. Ground Improvement Techniques							
14BT80111	3. Rehabilitation and Retrofitting of Structures							
14BT80112	4. Design and Drawing of Irrigation Structures							
14BT80113	5. Architecture and Town Planning							
14BT80114	6. Railway, Harbour and Airport Engineering							
14BT80121	Comprehensive Viva–Voce	–	–	–	2	–	100	100
14BT80122	Project Work	–	–	20	10	60	140	200

B.Tech I Year

14BT1HS01: TECHNICAL ENGLISH

(Common to All Branches of Engineering)

Int. Marks: 30; Ext. Marks: 70; Total Marks: 100

L	T	P	C
2	-	-	4

PREREQUISITE: Basic Grammar and Fundamentals of Writing Skills

COURSE DESCRIPTION: The course consists of lessons which include characters, speeches and short stories: 'My Early Days', 'Speech by N. R. Narayana Murthy', 'Dr. C.V. Raman: The Celebrated Genius', 'The Town by the Sea' and 'The Model Millionaire'. The course also covers the principles of Language and Communication Skills (Listening, Speaking, Reading and Writing Skills).

COURSE OUTCOMES: After completion of the course, the students will be able to**:**

1. Acquire fundamental and functional knowledge of English Language, grammar and communication skills.
2. Identify and analyze productive skills (speaking and writing) and receptive skills (listening and reading) of English Language proficiency for effective communication and practice.
3. Design and develop functional skills for professional practice through English.
4. Communicate effectively with the engineering community and society to comprehend and deliver effective solutions.
5. Inculcate an attitude to upgrade competence of English knowledge and communication to engage in independent and lifelong learning.

Detailed Syllabus:

UNIT – I: (10 periods)

My Early Days by **A. P. J. Abdul Kalam** from **All About English** by Cambridge University Press India Pvt Ltd. 2014.

Communication: Importance of Communication – Language as a tool of Communication – Communicative Skills (Listening, Speaking, Reading and Writing) – Effective Communication – Verbal and Non-Verbal Communication.

UNIT – II: **(10 periods)**

A Speech by N. R. Narayana Murthy from **All About English** by Cambridge University Press India Pvt Ltd, 2014.

Listening: Meaning and Art of Listening – Importance of Listening – Traits of a Good Listener – Reasons for Poor Listening – Types of Listening– Barriers to Effective Listening

UNIT – III: **(10 periods)**

The Town by the Sea by Amitav Ghosh from **All About English** by Cambridge University Press India Pvt Ltd, 2014.

Speaking: Achieving Confidence, Clarity, and Fluency – Paralinguistic Features – Types of Speaking – Barriers to Speaking.

UNIT – IV: **(10 periods)**

Sir. C. V. Raman: The Celebrated Genius from **All About English** by Cambridge University Press India Pvt. Ltd, 2014.

Reading: Reading and Interpretation – Intensive and Extensive Reading– Critical Reading – Reading Comprehension – Techniques for Good Comprehension – SQ3R Reading Technique

UNIT – V: **(10 periods)**

The Model Millionaire by **Oscar Wilde** from **All About English** by Cambridge University Press India Pvt. Ltd, 2014.

Writing: Characteristics – Language – Elements of Style – Techniques for Good Technical Writing – Avoiding Plagiarism - Referencing and Styling.

Total Periods: 50

TEXT BOOKS:

1. **All About English***,* Cambridge University Press India Pvt. Ltd., First Edition, 2014.
2. Meenakshi Raman and Sangeetha Sharma, **Technical Communication**, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. M. Ashraf Rizvi, **Effective Technical Communication**, Tata McGraw–Hill, Publishing Company Limited, First Edition, 2005.
2. Martin Hewings, **Advanced English Grammar: A Self Study Reference and Practice Book for Advanced South Asian Students,** Cambridge University press, First South Asian Edition, New Delhi, 1999.

B.Tech. I Year
14BT1BS01: ENGINEERING PHYSICS

(Common to All Branches of Engineering)

Int. Marks: 30 Ext. Marks: 70 Total Marks: 100

L	T	P	C
2	1	-	4

PREREQUISITE: Intermediate/Senior Secondary Physics

COURSE DESCRIPTION: The course deals with different lasers, optical fibers and holograms, theory of relativity, acoustics of buildings, crystallography, principles of quantum mechanics, band theory of solids, properties of dielectric materials, semiconductors, properties and application of magnetic materials, nanomaterials, and superconductors.

COURSE OUTCOMES :

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

1. Acquire basic knowledge of lasers, optical fibers, holography, theory of relativity, acoustics, crystallography, quantum mechanics, dielectrics, magnetic materials, semiconductors, superconductors and nanomaterials.
2. Develop skills in designing of lasers, fiber optic cable, holograms, acoustically good hall, semiconductor devices and nanomaterials.
3. Develop problem solving skills in engineering context.

Detailed syllabus:

UNIT-I: LASERS, FIBER OPTICS AND HOLOGRAPHY (18 periods)

Lasers: Introduction, characteristics of laser, principles of lasing action, spontaneous and stimulated emission of radiation, Einstein's coefficients, population inversion, Ruby laser, Helium-Neon laser, semiconductor laser, applications of lasers.

Fiber optics: Introduction, construction and working principle of optical fiber, acceptance angle, acceptance cone and numerical aperture, types of optical fibers and refractive index profiles, attenuation and losses in fibers, optical fiber communication system, applications of optical fibers in sensors and medicine.

Holography: Introduction, construction of a hologram, reconstruction of image from hologram, applications.

UNIT-II: SPECIAL THEORY OF RELATIVITY, ACOUSTICS OF BUILDINGS AND CRYSTALLOGRAPHY (16 periods)

Special Theory of Relativity: Introduction, absolute frame of reference, time dilation, length contraction, addition of velocities, mass-energy equivalence, energy-momentum relation.

Acoustics of Buildings: Introduction, basic requirement of acoustically good hall, reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment), absorption coefficient of sound and its measurement, factors affecting the architectural acoustics and their remedies.

Crystallography: Introduction, crystal planes, crystal directions and Miller indices, separation between successive (hkl) planes, X-ray diffraction by crystal planes, Bragg's law, Laue and powder methods.

UNIT-III :PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS (17 periods)

Principles of Quantum Mechanics: Black body radiation – Wien's law, Rayleigh-Jeans law and Planck's law (qualitative treatment), waves and particles, matter waves, de-Broglie's hypothesis, G.P. Thomson experiment, Heisenberg's uncertainty principle, Schrödinger's one dimensional wave equation (time independent), significance of wave function, particle in a one dimensional potential box, Fermi-Dirac distribution and effect of temperature (qualitative treatment), scattering-source of electrical resistance.

Band Theory of Solids: Electron in a periodic potential, Kronig-Penney model (qualitative treatment), origin of energy band formation in solids, effective mass of electron, distinction between metals, semiconductors and insulators based on band theory.

UNIT-IV: DIELECTRIC PROPERTIES OF MATERIALS AND SEMICONDUCTORS (17 periods)

Dielectric Properties of Materials: Introduction, dielectric constant, electronic, ionic and orientation polarizations (qualitative treatment), local field, Clausius-Mossotti equation, frequency dependence of polarisability (qualitative treatment), ferro and piezo electricity.

Semiconductors: Introduction, intrinsic and extrinsic semiconductors, carrier concentration, electrical conductivity in semiconductors, drift and diffusion currents, Einstein's relation, Hall effect, direct and indirect band gap semiconductors, p-n junction, energy band diagram of p-n diode, diode equation (qualitative), LED, photo diode and solar cell.

UNIT-V :MAGNETIC PROPERTIES OF MATERIALS, SUPERCONDUCTIVITY AND NANOMATERIALS (17 periods)

Magnetic Properties of Materials: Introduction, origin of magnetic moment, classification of magnetic materials into dia, para, ferro, anti-ferro and ferri magnetism, hysteresis, soft and hard magnetic materials.

Superconductivity: General properties, Meissner effect, penetration depth, Type-I and Type-II superconductors, flux quantization, Josephson effects, BCS theory, applications of superconductors.

Nanomaterials: Introduction, surface area to volume ratio, quantum confinement, properties of nanomaterials, synthesis of nanomaterials by ball milling, plasma arcing, pulsed laser deposition and sol-gel methods, carbon nanotubes-properties and applications, applications of nanomaterials. **Total :85 periods**

TEXTBOOKS :

1. S. Mani Naidu, **Engineering Physics**, Pearson Education, 2013.
2. P. K. Palaniswamy, **Engineering Physics**, Scitech Publications

REFERENCE BOOKS:

1. R. K. Gaur and S. L. Gupta, **Engineering Physics,** DhanpatRai Publications (P) Ltd., 8th Edition, 2001.
2. M. R. Srinivasan, **Engineering Physics,** New Age International (P) Limited, Publishers, 1st Edition,2010.

B.Tech. I Year
14BT1BS02 : ENGINEERING CHEMISTRY

(Common to All Branches of Engineering)

Int. Marks: 30 Ext. Marks: 70 Total Marks: 100

L	T	P	C
2	1	-	4

PRE REQUISITE: Intermediate/Senior Secondary Chemistry

COURSE DESCRIPTION: This course deals with various engineering materials, electro-chemical cells, corrosion, water technology, fuel technology, lubricants, nano chemistry, and green chemistry.

COURSE OUTCOMES:

After successful completion of the course the student is able to:

1. Acquire basic knowledge in liquid crystals, conducting Polymers, Composites, Chemical sensors, insulators, Electro chemical cells, corrosion phenomenon, fuels, Nanomaterials and principles of Green Chemistry and Green Engineering.
2. Develop analytical skills in:
   a. Determination of hardness of water.
   b. Determination of viscosity, flame and fire points, cloud and pour points.
   c. Determination of calorific value of fuels.
3. Develop skills in design of:
   a. Methods for control of corrosion
   b. Chemical methods for the synthesis of Nanomaterials.
4. Develop skills for providing solutions through:
   a. Mitigation of hardness of water.
   b. Control of corrosion
   c. Newer Nanomaterials for specific applications
5. Acquire awareness to societal issues on:
   a. Chemical materials utility and their impact.
   b. Quality of water.
   c. Phenomenon of corrosion.
6. Imbibe attitude to practice engineering in compliance to environmentally benign techniques such as:
   a. Green computing
   b. Green construction
   c. Green manufacturing systems

Detailed syllabus:

UNIT – I: CHEMISTRY OF ENGINEERING MATERIALS (18 periods)

Liquid Crystals – Introduction, chemical structure, classification, engineering applications.

Conducting Polymers – Definition, types of conducting polymers and their engineering applications. **Composites** – Introduction, advantages of composites, constituents of composites, types of composites, applications of composites. **Sensors** - Introduction, types of sensors, electrochemical sensors, applications. **Insulators** – Definition, characteristic properties of insulators and classification of insulators.

UNIT–II: WATER TECHNOLOGY (15 periods)

Introduction, types of water, impurities in water and their consequences. Hardness of water, units of hardness, measurement of hardness by EDTA method, disadvantages of hardness. Softening methods – Ion exchange process, Zeolite process-Municipal water treatment. Boiler Troubles. Desalination of brackish water by Electro dialysis and Reverse osmosis. Numerical problems on measurement of hardness of water.

UNIT–III: ELECTROCHEMICAL CELLS AND CORROSION (17 periods)

Electrode potential, Nernst's equation, Electrochemical cells, EMF of an electrochemical cell. Reference electrodes- Standard Hydrogen Electrode (SHE), Calomel electrode.

Batteries: Introduction, types of Batteries. Ni-Cd battery, lithium – ion battery-applications.

Fuel Cells: Definition, $H_2 - O_2$ fuel cell, phosphoric acid fuel cells, proton exchange membrane fuel cells, solid oxide fuel cells. Applications of fuel cells.

Corrosion: Introduction, definition, types of corrosion, galvanic corrosion, concentration cell corrosion, control of corrosion – Electroplating method (Nickel electroplating).

UNIT–IV: LUBRICANTS AND FUEL TECHNOLOGY (18 periods)

Lubricants: Definition, functions of lubricants, mechanism of lubrication, classification of lubricants, properties of lubricants – viscosity, flash and fire points, cloud and pour points, aniline points, neutralization number and mechanical strength.

Fuel Technology: Introduction, classification, characteristics of a good fuel, calorific value, liquid fuels, petroleum, refining of petroleum, knocking, octane number, cetane number, power alcohol, synthetic petrol, gaseous fuels, important gaseous fuels.

UNIT–V: NANO CHEMISTRY AND GREEN CHEMISTRY (17 periods)

Nano Chemistry: Introduction, classification of nanomaterials, properties of nanomaterials, methods of synthesis – sol-gel process, Chemical Vapour Deposition (CVD), Plasma Enhanced Chemical Vapour Deposition (PECVD). Applications of nanomaterials.

Green Chemistry: Introduction, tools of Green chemistry, principles of green chemistry, examples of Green chemistry, principles of Green Engineering, Green computing, Green construction, Green manufacturing systems. **Total Periods : 85**

TEXT BOOKS:

1. P.C.Jain & Monika Jain, **Engineering Chemistry**, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 17th edition, 2013.
2. K.N. Jayaveera, G.V. Subba Reddy & C. Ramachandraiah **Engineering Chemistry**, Mc. Graw-Hill Higher Education, Hyderabad, 1st edition, 2013.

REFERENCE BOOKS:

1. A.K. Bandyopadhyay, **Hand book of Nanostructured materials and Nanotechnology**, New Age international publishers, 2nd edition, 2010.
2. Paul T. Anastas, John C Warner, **Green Chemistry: Theory and practice,** Oxford University Press, 2000.

B.Tech. I Year
14BT1BS03 : ENGINEERING MATHEMATICS
(Common to All Branches of Engineering)

Int. Marks: 30 ; Ext. Marks: 70 ; Total Marks: 100

L	T	P	C
3	1	-	6

PRE REQUISITE: Intermediate/ Senior Secondary Mathematics

COURSE DESCRIPTION: Engineering mathematics is an application oriented course for various fields of engineering. In this course, Differential equations, partial differentiation as applied to various engineering problems; Integration and its applications to find lengths, areas and volumes of objects, Laplace transforms and their applications, fundamentals of vector calculus are presented.

COURSE OUTCOMES:
After the completion of this course, a successful student is able to

1. Acquire knowledge in Differential equations, finding maximum and minimum values attained by functions of several variables, evaluating double and triple integrals, Laplace transforms and differentiation and integration of vector functions.
2. Develop analytical skills in solving problems involving
   (a) Non homogeneous linear differential equations
   (b) Flux and fluid mechanics by vector methods.
   (c) Complex integrations using Laplace transforms.
   (d) the length of curves, areas , surfaces and volumes of revolutions.
3. Develop skills in designing Mathematical models for
   (a) L-C and R-C circuits.
   (b) Newton's Law of cooling and heat transfer.
4. Develop skills in providing solutions for
   (a) problems involving L-R-C oscillatory circuits
   (b) linear, surface and volume integrals by vector methods
   (c) work done, flux through vector integrations

Detailed syllabus:

UNIT-I : DIFFERENTIAL EQUATIONS- APPLICATIONS (20 periods)

Ordinary differential equations – Linear and Bernoulli type – exact equations and reducible to exact. Orthogonal trajectories (both cartesian and polar forms). Newton's Law of cooling, Law of natural growth and decay. Non-homogeneous linear differential equations of second and higher order with constant coefficients. Methods of finding the particular integrals for Q(x) = e^{ax}, *sin ax*, *cos ax*, x^n, $e^{ax}V(x)$, $x\,V(x)$. Method of variation of parameters . Applications to L-R-C circuits.

UNIT-II: PARTIAL DIFFERENTIATION & APPLICATIONS OF DERIVATIVES (22 periods)

Functions of two or more variables – Homogeneous functions – total derivatives – derivatives of implicit function – Jacobian – maxima and minima of functions of two variables with and without constraints – Lagrange's method of undetermined multipliers. Radius ,centre and circle of curvature, tracing of curves in cartesian, parametric and polar forms.

UNIT-III: APPLICATIONS OF INTEGRATION (18 Periods)

Applications of integration to – length of curves, area of surfaces of revolution and volume of solids of revolution – Double integrals – change of variables and change of order of integration. Evaluation of Triple integrals -volume as double integral.

UNIT-IV: LAPLACE TRANSFORMS- APPLICATIONS (20 periods)

Laplace transforms of standard functions – Properties of Laplace transforms–First and second shifting Theorems. Laplace transforms of derivatives and integrals–Laplace transforms of periodic functions – Unit step function – Dirac delta function – Inverse transforms–Convolution theorem. Applications of Laplace transforms to linear differential equations with constant coefficients.

UNIT-V : VECTOR CALCULUS (20 periods)

Vector differentiation – gradient, divergence, curl and vector identities. Laplacian Operator. **Vector integration**: Line integrals independent of path – work done, conservative field and scalar potential functions. Surface integrals, flux and volume integrals. Verifications and applications of vector integral theorems: Greens theorem, Stokes theorem and Gauss divergence theorem (without proof).

Total periods : 100

TEXT BOOK:

1. T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, **Engineering Mathematics, Vol. 1**, S. Chand & Company, 12/e ,2013.

REFERENCE BOOKS:

1. Grewal, B.S., **Higher Engineering Mathematics**, Khanna Publishers, 42/e,2012.
2. Kreyszig, E., **Advanced Engineering Mathematics**, John Wiley and Sons, 8/e.2006

B.Tech. I Year
14BT10301: Engineering Mechanics

(Common to CE and ME)

Int. Marks: 30; Ext. Marks: 70; Total Marks: 100

L	T	P	C
3	1	—	6

PREREQUISITE : Intermediate/Senior Secondary Mathematics and Physics

COURSE DESCRIPTION: Engineering Mechanics is a foundation course for all other courses belonging to the broad knowledge area Design Engineering as applied to Civil Engineering and Mechanical Engineering. Basic concepts of statics and dynamics are presented in this course. Several aspects such as resultant of a system of forces, couple, support reactions, moment of inertia, member forces in trusses and preliminaries of friction, virtual work are included in the "statics" part of the course. Similarly characteristics of motion, cylindrical / Cartesian coordinates, centripetal acceleration and Newton's second law are included in the "dynamics" part of the course.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Apply the knowledge of Mathematics, Science, Engineering fundamentals to the solutions of complex engineering problems.
2. Analyse :
   (a) multi-body systems under equilibrium and under dynamic conditions.
   (b) systems involving dry friction and computing the efficiency of the system forces in trusses under suitable assumptions.
3. Design solutions to complex engineering problems using first principles of engineering mechanics.
4. Exercise awareness to assess the safety of system and other ethical issues related to engineering mechanics.
5. Communicate effectively engineering and allied information through free body diagram.
6. Sustain interest in Engineering Mechanics to upgrade knowledge and skills through self learning concepts in mechanics.

Detailed Syllabus:

UNIT I-BASIC CONCEPTS (24 periods)

Axioms of Mechanics – basic quantities of mechanics and their units, System of forces– Lami's theorem, Moment of forces and its Application, Couples and Resultant of Force System, concurrent force systems, parallel force systems, non-concurrent force systems. Free body diagrams, Friction as a force – Laws of dry friction – Wedge, screw-jack, and differential screw-jack, Introduction to Virtual work principle – Very simple and elementary problems using virtual work.

UNIT II-STRUCTURAL ANALYSIS (16 periods)

Types of Supports – Support reactions for beams with different types of loading, concentrated, uniformly distributed and uniformly varying loading Types of frames –perfect frames, Analysis of frames using method of joints and method of sections.

UNIT III-CENTROID, CENTER OF GRAVITY, MOMENTS OF INERTIA (18 periods)

Centroids of simple figures, Centroids of Composite figures, Centre of Gravity of bodies, Centre of Gravity of Composite figures. Parallel axis and perpendicular axis theorems, Theorems of Pappus and Guldinus, Moments of Inertia of Composite Figures, Mass Moment of Inertia of Simple solids, Moment of Inertia of composite masses.

UNIT IV-KINEMATICS (14 periods)

Rectilinear and Curvilinear motion – Velocity and Acceleration, motion of a projectile, Normal and tangential accelerations.

UNIT V-KINETICS (18 periods)

Analysis as particle and Analysis as a Rigid Body in Translation – Newton's laws, Work Energy Method – Equation for Translation, Work – Energy application to Particle Motion, Impulse-Momentum Equation, Fixed axis Rotation.

Total Periods: 90

TEXT BOOKS:

1. S.S. Bhavikatti and K.G. Rajashekarappa, **Engineering Mechanics**, New Age International (P) Ltd., 3rd edition, 2008
2. Basudeb Bhattacharya, **Engineering Mechanics**, Second Edition, Oxford University Press, 2nd Edition, 2014.

REFERENCE BOOKS:

1. S. Timoshenko, D.H. Young, and J.V. Rao, **Engineering Mechanics**, Tata McGraw-Hill Publishing Company Limited, Revised 4th Edition, 2007.
2. R.C. Hibbeler, **Engineering Mechanics - Statics and Dynamics**, Prentice Hall, 8th Edition, 1998
3. K. Vijaya Kumar Reddy and J. Suresh Kumar, **Singer's Engineering Mechanics – Statics and Dynamics**, BS Publications, 3rd Edition.

B.Tech. I Year
14BT1ES01: PROGRAMMING IN C & DATA STRUCTURES

(Common to ECE, EEE, EIE, ME and CE)

Int. Marks: 30; Ext. Marks: 70; Total Marks: 100

L	T	P	C
3	1	—	6

PREREQUISITE: - - -

COURSE DESCRIPTION: This course deals with fundamentals of programming in C language such as syntax of C, mechanisms of input and output processing, derived data types like arrays, strings and pointers. Also file in C and data structures are discussed.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Gain knowledge on developing algorithms and programming techniques.
2. Gain analytical skills on
    a. Searching and sorting
    b. File management functions.
    c. Various Data Structures
3. Design various applications using basic data structures like linked list, stacks and queues
4. Gain competence to represent and solve real time problems using tree data structures.

DETAILED SYLLABUS

Unit-I **(15 periods)**

Programming Languages- Compiler, Interpreter, Loader, and Linker- Program execution- Classification of programming-Algorithms and flowcharts .

Basics of C: Introduction, Standardizations of C language, Developing Programs in C, Structure of C program, Variables, Data Types, Declaration, Token, Operators and expressions, L values and R values, Type Conversion in C.

Unit-II **(20 periods)**

Input and Output: Basic screen and key board I/O in C , Non formatted input and output , Formatted Input and output. Control Statements: Specifying Test Condition for Selection and Iteration, Writing Test Expressions, Conditional Execution and Selection, Iterative and Repetitive Execution, GOTO Statement, Special Control statements, Nested loops.

Unit-III **(20 periods)**

Arrays and Strings: One dimensional Array, Strings: One-Dimensional Character Arrays, Multidimensional Arrays, Arrays of Strings. Functions: Concept of function, Call by Value Mechanism, passing arrays to Functions, Scope and extent, Storage classes, Inline function, Recursion, Searching and sorting.

Unit-IV **(25 periods)**

Pointers: Introduction, Understanding Memory Address, Address Operators, pointer, Void pointer, Null pointer, use of pointers, arrays and pointers, Pointer and strings, pointer arithmetic, pointers to pointers, pointer to arrays, Pointers to functions, Dynamic memory allocation, Pointer and const Qualifier. User-defined data types and variables: Structures, union, Enumerations types, Bitfields.

Files in C: Working with text files, Binary files, Random Access files, other file management functions, Command line arguments, C preprocessor, Type qualifier.

Unit-V **(20 periods)**

Linked Lists: Singly Linked Lists, Circular Linked lists, Doubly Linked list Applications of Linked Lists. Stacks and Applications, Queues, Other Variations of Queues, Applications, Tree-Binary tree, Traversals, Kinds of binary tress, Binary Search tree, Application of tree.

Total periods: 100

TEXT BOOK:

1. PradipDey and Manas Ghosh, "**Programming in C**,"Second Edition, Oxford University Press, New Delhi, 2007

REFERENCE BOOKS:

1. D. Samanta, "**Classic Data Structures**", Second Edition, PHI Learning, New Delhi, 2004
2. Behrouz A. Forouzan and Richard F. Gilberg, "**A Structured Programming Approach using C**,"Third Edition, Cengage Learning, New Delhi, 2007.

B.Tech. I Year
14BT1ES03: COMPUTER AIDED ENGINEERING DRAWING

(Common to All Branches of Engineering)

Int. Marks: 25; Ext. Marks: 50; Total Marks: 75

L	T	P	C
-	1	3	3

PREREQUISITE: - - -

COURSE DESCRIPTION: This course deals with the concepts of computer-aided sketching, and orthographic and isometric projections of geometric entities (both 2D and 3D) through computer aided drafting packages.

COURSE OUTCOMES: After completion of the course, a successful student is able to :

1. Produce different views and projection in drawing.
2. Use modern CAD software for different designs.
3. Create multi-view drawings suitable for presentation to a general audience.

Detailed Syllabus:

UNIT I – INTRODUCTION TO COMPUTER AIDED SKETCHING **(20 periods)**

Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning, Different types of lines, Material conventions and free hand practicing, Definitions of Principle planes and other planes. Computer screen, layout of the software, Creation of 2D/3D environment, Selection of drawing size and scale, Standard tool bar/menus, Coordinate system, and description of most commonly used toolbars, Navigational tools, Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity.

UNIT II – ORTHOGRAPHIC PROJECTIONS **(20 periods)**

Introduction, Definitions- Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), Projection of lines inclined to one plane, inclined to both the planes, finding true lengths and true inclinations (No application problems).

UNIT III – ORTHOGRAPHIC PROJECTIONS OF PLANE SURFACES (20 periods)

Introduction, Definitions-projections of plane surfaces-triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (Simple problems inclined to any one plane only)

UNIT IV – PROJECTIONS OF SOLIDS (20 periods)

Introduction, Projections of right regular prisms, pyramids, cylinders and cones in different positions. (Simple problems inclined to any one plane only). Isometric projections and isometric views.

UNIT V – SECTIONS AND DEVELOPMENT OF LATERAL SURFACES OF SOLIDS (20 periods)

Introduction, Section planes and sectional views of right regular solids - prisms, cylinder, pyramids and cone resting with base on HP. True shapes of the sections.

Development of Surfaces: Right regular solids – prisms, cylinder, pyramids, cone and their sectional parts.

Total Periods: 100

TEXT BOOKS:

1. D.M. Kulkarni, A.P. Rastogi and A.K. Sarkar, **Engineering Graphics with Auto CAD**, PHI Learning Private Limited, Revised Edition, August 2010.
2. N D Bhat & V M Panchal, **Engineering Drawing**, Charotar Publishing House, Gujarat, 51st edition, 2013.

REFERENCE BOOKS:

1. Sham Tickoo, **AutoCAD 2013 For Engineers And Designers**, Dreamtech Press, 2013
2. T Jeyapoovan, **Engineering Drawing and Graphics Using Autocad**, Vikas Publishing House, 3rd Edition, 2010.
3. Jolhe, **Engineering Drawing**, Tata McGraw Hill Education Private Limited, 1st Edition, 2007.
4. Basant Aggarwal, **Engineering Drawing**, Tata McGraw Hill Education Private Limited, 1st Edition, 2008.

B.Tech I Year

14BT1BS05: ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LABORATORY

(Common to All Branches of Engineering)

Int. Marks: 25 Ext. Marks: 50 Total Marks: 75

L	T	P	C
-	-	3	3

PREREQUISITE: Intermediate Physics & Chemistry

COURSE DESCRIPTION:

Engineering Physics: The course deals with experimental verification of characteristics of p-n junction diode, photodiode, LED, and semiconductor laser diode. It also covers experimental determination of energy gap and carrier concentration of a semiconductor material, wave length of a laser source, rigidity modulus of a material, size of fine particle, dielectric constant, numerical aperture of optical fibre, frequency of electrically vibrating tuning fork and magnetic field along axial line of a current carrying coil. Verification of transverse laws of stretched string is also included.

Engineering Chemistry: This course deals with the estimation of hardness, alkalinity and dissolved oxygen of water samples by volumetric methods. It provides hands-on experience on different instrumental methods such as conductivity meter, potentiometer, pH meter, and colorimeter. This course also deals with the methods of synthesis of nano metal-oxides and novalac resin.

COURSE OUTCOMES:

Engineering Physics:

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

1. Acquire analytical skills in the determination of
   a) Wave length of laser.
   b) Divergence angle for laser beam.
   c) Numerical aperture of an optical fibre.
   d) Hall coefficient for semiconductor material.
   e) Energy gap of semiconductor material.
   f) Verifying the laws of stretched string.
   g) Characteristics of p.n. junction diode, and light emitting diode.

Engineering Chemistry:

After completion of the course, a successful student is able to:

1. Acquire analytical skills in the estimation of hardness of water, alkalinity of water, dissolved oxygen in water and estimation of iron through wet laboratory methods.
2. Acquire analytical skills in the determination of P^H of a solution, EMF of a solution, spectrophotometric determination of iron and estimation of iron in cement through instrumental methods of analysis.
3. Develop skills in the designing of synthetic methods for the preparation of polymers and Nanomaterials.

List of experiments :

Engineering Physics:

Conduct a minimum of any **Ten** of the following experiments.

1. Determination of wavelength of a laser source using diffraction grating
2. Determination of numerical aperture of an optical fiber
3. I-V Characteristics of a p-n junction diode
4. Characteristics of LED source.
5. Hall effect
6. Photo diode – characteristics
7. Energy gap of a material of a p-n Junction
8. Magnetic field induction along the axis of a current carrying coil-Stewart and Gee's method
9. Melde's experiment - transverse & longitudinal modes
10. Verification of transverse laws of stretched string - Sonometer
11. Determination of dielectric constant
12. Characteristics of laser source.
13. Determination of particle size by using a laser source
14. Determination of the rigidity modulus of the material of wire using torsional pendulum

Engineering Chemistry:

List of Experiments:

A minimum of any **Ten** experiments are to be conducted among the following:

1. Estimation of Hardness of water by EDTA method.
2. Estimation of alkalinity of Water.
3. Estimation of Dissolved Oxygen in water.
4. Estimation of Ferrous Iron by Dichrometry.
5. Conductometric titration of strong acid Vs strong base
6. Determination of P^H of a given solution by P^H metry.
7. Estimation of Ferrous ion by Potentiometry.
8. Estimation of Ferric iron in cement by Colorimetric method.
9. Preparation of Novalac Resin.
10. Synthesis of Nano metal-oxide using sol– gel process.
11. Determination of the capacity of the given cation-exchange Resin.
12. Measurement of viscosity by Redwood viscometer.

Duration: 3 Periods for each experiment

Total periods: 30

TEXT BOOKS:

1. **Physics Laboratory Manual**
2. K. Mukkanti, **Practical Engineering Chemistry**, BS Publications, 2013.
3. K.N. Jayaveera, K.B. Chandra Sekhar, **Chemistry laboratory manual**, S.M. Enterprises Limited, 2013.

B.Tech I Year

14BT1ES04: PROGRAMMING IN C & DATA STRUCTURES LAB

(Common to ECE, EEE, EIE, ME and CE)

Int. Marks: 25 Ext. Marks: 50 Total Marks: 75

L	T	P	C
-	-	3	3

PREREQUISITE: - - -

COURSE DESCRIPTION: This course provides programming practice in C language specifically syntax of C, input-output processing, derived data types, file processing, and data structures.

COURSE OUTCOMES:

After the completion of this course, a successful student is able to

1. Design, code, test, debug and execute programs in C.
2. Implement and use common features found in C programs – arrays, pointers, strings, stacks and queues.
3. Select the appropriate data structure and algorithm design method for a specified problem.

Week 1:

a. Write a C program to print the string "SVEC" at four corners and center of the screen using single printf statement.

b. Mr. Gupta deposits Rs.1000 in a bank. The bank gives simple interest of 15% per annum. Write a program to determine the amount in Mr. Gupta's account at the end of 5 years. (Use the formula I=PTR/100)

c. Write a program to exchange the values of two variables without using the third variable.

Week 2:

a. A cashier has currency notes of denominations Rs.10, Rs. 50 and Rs. 100. If the amount to be withdrawn is input in hundreds, find the total number of notes of each denomination the cashier will have to give to the withdrawer.

b. In a town, the percentage of men is 52. The percentage of total literacy is 48. If total percentage of literate men is 35 of the total population, write a program to find the total number of illiterate men and women if the population of the town is 8000.

c. Assume that any month is of 30 days. Input total days through keyboard. Find out the exact number of Years, Months & Days.

Week-3

a. Write a program that reads in a number, then reads in a single digit and determines whether the first number contains the digit. If it does, the program should display how many times the digit occurs in the number.

b. Write a program to print Pythagoras triplets a = m* n , $b=(n^2 + m^2)/2$, $c=(n^2-m^2)/2$ where m = 1,3, 5 ……; n = m + 2, m + 4 ……

c. Write a program to produce the following pattern:

a.
```
1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9
1 2 3 4 5 6 7 8
1 2 3 4 5 6 7
1 2 3 4 5 6
1 2 3 4 5
1 2 3 4
1 2 3
1 2
1
```

b.
```
1 2 3 4 5 6 7 8 9 10
  2 3 4 5 6 7 8 9 10
    3 4 5 6 7 8 9 10
      4 5 6 7 8 9 10
        5 6 7 8 9 10
          6 7 8 9 10
            7 8 9 10
              8 9 10
                9 10
                  10
```

Week-4

a. Write a C program to generate Pascal's triangle.

b. Write a C program to construct a pyramid of numbers.

Week-5

a. The formula used to calculate the amount of interest on a bank account that compounds interest daily is

$$i = p (1 + r)^d - p$$

where:

i is the total interest earned,

p is the principal (the amount originally deposited in the account),

r is the rate of interest as a decimal less than 1 (for example, 15 percent is expressed as 0.15), and

d is the number of days the money is earning interest.

Write a program that accepts values for p, r and d and calculates the interest earned.

b. A character is entered through keyboard. Write a program to determine whether the character entered is a capital letter, a small case letter, a digit or a special symbol. The following table shows the range of ASCII values for various characters.

Characters	ASCII values
A - Z	65 - 90
a - z	97- 122
0 - 9	48 - 57
Special Symbols	0 - 47, 58 - 64, 91- 96, 123 - 127

c. Write a C program to convert a given decimal number into its equivalent

i. Binary Number

ii. Octal Number

iii. Hexadecimal Number

iv. Quinary Number(base 5)

Week-6

a. Write a program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, %, use switch statement)
b. Write a program to find the sum of individual digits of a positive integer.
c. A Fibonacci sequence is defined as follows: The first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a program to generate the first N terms of the sequence.
d. Write a program to generate all the prime numbers between 1 and N, where N is a value supplied by the user.

Week 7:

a. Write a program to find the largest and smallest number in a list of integers.
b. Write a program to perform the following:
   i) Addition of two matrices.
   ii) Multiplication of two matrices.

Week-8

a. Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
b. Write a C program to determine if the given string is a palindrome or not
c. Write a C Program to implement all string operations.
   1. Find the length of string 2. Reverse the string.
   3. Comparing the two strings. 4. Copy the string .

Week -9:

a. 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
b. Write a C program to convert a Roman numeral to its decimal equivalent.

Week 10:

a. Write a C program to count the lines, words and characters in a given text.
b. Write a program that simulates a password entry.
c. Write a program to read a five letter word and generate all possible combinations of two-letter words using those five letters.

Week 11:

Write a program to perform the following:
   i) Linear search ii) Binary search

Week 12:

Write a program to perform the following:
   i) Selection sort ii) Insertion sort
   iii) merge Sort iv) Quick sort

Week 13:

Write programs to perform the following using recursion

i) To find the factorial of a given integer.

ii)To solve Towers of Hanoi problem

Week-14

a. Write a C Program to return a substring from a main string using pointers.

b. Write a C program to return character frequency count in a text using pointers

Week-15

a. Write a C program that uses functions to perform the following operations:

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

b. Write a Program to enter records of students display in sorted order according to ID number.

c. Define a structure to store employee's data with the following specifications:

Employee-Number, Employee-Name, Basic pay, Date of Joining

i) Write a function to store 10 employee details.

ii) Write a function to implement the following rules while revising the basic pay.

If Basic pay <= Rs.5000 then increase it by 15%.

If Basic pay > Rs.5000 and <= Rs.25000 then it increase by 10%.

If Basic pay > Rs.25000 then there is no change in basic pay.

iii) Write a function to print the details of employees who have completed 20 years of service from the date of joining.

Week-16

a. Write a program which copies one text file to another.

b. Write a program to reverse the first N characters of a given text file.

Note: The file name and N are specified through command line.

c. Consider the following text file:

Input File:

S.No.	Customer_ID	Item No.	Qty.	Price Per Item (Rs.)
1.	C01	I1	2	10
2.	C02	I2	5	50
3.	C03	I2	5	50
4.	C04	I4	10	10

Write a program to print the output in following format by giving the Customer_ID as an input.

Output:

S.V. PROVISION STORES TIRUPATI Customer_ID: C01		Date: 12-08-2010
Item	Qty	Price
I1	2	20
Total		20

Week - 17:

Write a program to implement the following operations on Singly Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week -18:

Write a program to implement the following operations on Circular Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week -19 :

Write a program to implement the following operations on Doubly Linked List

a. List Creation b. Insertion c. Deletion d. Display

Week- 20:

Write a program to implement stack operations using:

i) Arrays ii) Pointers

Week -21 :

Write a program to implement linear queue operations using:

i) Arrays ii) Pointers

Week -22:

a) Write a program to implement circular queue operations using arrays

b) Write a program to implement traversals of a Binary tree

i. Preorder ii. Post order iii. Inorder

Week- 23

Write a program to implement insertion and deletion in a binary search tree.

REFERENCE BOOKS:

1. Behrouz A. Forouzan and Richard F. Gilberg, "**A Structured Programming Approach using C**," Third Edition, Cengage Learning, New Delhi, 2007.
2. PradipDey and Manas Ghosh, "**Programming in C**", Second Edition, Oxford University Press, New Delhi, 2007
3. D. Samanta, "**Classic Data Structures**", Second Edition, PHI Learning, New Delhi, 2004.

B.Tech. I Year
14BT1ES06: ENGINEERING & IT WORKSHOP

(Common to All Branches of Engineering)

Int. Marks: 25 Ext. Marks: 50 Total Marks: 75

L	T	P	C
-	-	3	3

PREREQUISITE: - - -

COURSE DESCRIPTION:

Engineering Workshop: The course provides hands-on training in the trades Carpentry, Fitting, House-wiring, Tin Smithy, Foundry. Overview of metal cutting processes, plumbing and welding is provided through live demonstrations.

IT Workshop: This course deals with practice sessions on PC hardware, Internet, World Wide Web, MS-Word, Excel, Power Point and Publisher. Demonstrations on installations of system software such as MS-Windows, Linux and device drivers, hardware and software troubleshooting, and protecting the personal computer from viruses and other cyber attacks are include.

COURSE OUTCOMES:

ENGINEERING WORKSHOP:

After completion of the course, a successful student is able to :

1. Utilize workshop tools for engineering practice.
2. Employ skills for the production a component for real time applications.
3. Appreciate the hard work and intuitive knowledge of the manual workers.

IT WORKSHOP:

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

1. Acquire analytical skills in:
   (a) Identification of functional parts of PC
   (b) Internet and World Wide Web.
   (c) Computer security issues and preventive measures.
   (d) Operating Systems.
2. Design document and presentations effectively.
3. Apply modern tools to develop IT based applications.
4. Gain effective communication skills through IT tools.
5. Update knowledge and skills in PC maintenance and usage of latest Operating Systems and Office automation tools.

DETAILED SYLLABUS:

ENGINEERING WORKSHOP:

1. Trades for Exercise:

Any TWO jobs from each trade should be performed.

a)	**Carpentry Shop**	:	Cross lap joint, mortise and tenon, T-joint, dove tail joint.
b)	**Fitting Shop**	:	Square fit and V-fit, semi circular fit, dove tail fit.
c)	**Sheet Metal Shop**	:	Trapezoidal tray, square tin, funnel, cylinder.
d)	**House wiring**	:	Wiring for two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, tube light connection, godown wiring.
(e)	**Foundry**	:	Preparation of casting using single piece pattern, Preparation of casting using split piece pattern

2. Trades for Demonstration:

a) Welding

b) Metal Cutting

c) Plumbing

In addition to the above, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, plastics, steels, meters, gauges, equipment, first-aid and shop safety shall be demonstrated through charts, layouts, figures, circuits, CDs/DVDs.

IT WORKSHOP:

a) PC Hardware

Week 1: Identify the peripherals of a personal computer, components in a Central Processing Unit (CPU) and its functions, block diagram of CPU along with the configuration of each peripheral.

Week 2: Demonstrating assembling and disassembling of the Personal Computer.

Week 3: Introduction to Operating Systems, Components of OS, Installation of Microsoft Windows-XP Operating System.

Week 4: Introduction to LINUX OS, Installation of LINUX OS, Basic DOS commands – mkdir, cd, cls, del, copy, attrib, date, path, type, format, exit. Basic commands in LINUX - cat, ls, pwd, rm, rmdir, cd, cp, mv, who, date, cal, clear, man, wc.

Week 5: Hardware & Software Troubleshooting: Diagnosis of PC malfunction, types of faults, common issues and how to fix them. Basic Hardware & Software Troubleshooting steps, PC diagnostic tools.

b) MS-Office:

MS Word

Week 6: Introduction to MS-Word, Importance of Word as Word Processor, Overview of toolbars, Saving, Accessing files, Using help and resources. Create a word document using the features: Formatting fonts, Drop cap, Applying text effects, Using character spacing, Borders and shading, Inserting headers and footers, Using date and time option.

Week 7: Create a word document in MS-Word using the features: Inserting tables, Bullets and numbering, Changing text direction, Hyperlink, Images from files and Clipart, Drawing toolbar and Word art.

Week 8: Create an invitation using Mail Merge in MS-Word

MS Power Point:

Week 9: Introduction to MS-Power Point, Utilities, Overview of toolbars, PPT orientation, slide layouts, Types of views.

Create a Power Point Presentation using the features: Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows.

Week 10: Create a Power Point Presentation using the features: Auto content wizard, Hyperlinks, Inserting images, Clip art, Audio, Video, Custom animation, Slide hiding, Tables and Charts.

MS Excel:

Week 11: Introduction to MS-Excel as a Spreadsheet tool, Overview of toolbars, accessing, Saving excel files, Using help and resources.

Create a spreadsheet using the features: Gridlines, Format cells, Summation, Auto fill, Formatting text, Formulae in Excel Charts.

Week 12: Create a spreadsheet using the features: Split cells, Sorting, Conditional formatting, Freeze panes, Pivot tables, Data validation.

MS Publisher & World Wide Web

Week 13: Introduction to MS-Publisher, Overview of toolbars, Saving files, Templates, Layouts.

Create a website using the features: Home page, About us, Department, Contact page.

Internet & Computer Security

Week 14: Search Engines and Cyber Hygiene: Introduction to computer networking, Demonstration on network components, Drivers loading and Configuration settings, Mapping of IP addresses, Configuration of Internet and Wi-Fi. Bookmarks, Search toolbars and pop up blockers. Types of search engines and how to use search engines, Awareness of various threats on Internet, Types of attacks and how to overcome. Installation of antivirus software, Configuration of personal firewall and Windows update on Computers.

Total Periods: *48*

REFERENCE BOOKS:

ENGINEERING WORKSHOP:

1. V. Ramesh Babu, **Engineering Work shop practice**, VRB Publishers Private Limited, 2009.
2. P.Kannaiah and K.L.Narayana, **Work shop Manual**, SciTech Publishers, 2009.
3. K. Venkata Reddy, **Workshop Practice Manual**, BS Publications, 2008

IT WORKSHOP:

1. Vikas Gupta, "**Comdex Information Technology Course Tool Kit**," 2nd Edition, WILEY Dreamtech, New Delhi, 2006.
2. ITL Education, "**Introduction to Information Technology**," 2nd Edition, Pearson Education, New Delhi, 2005.
3. **IT Workshop Laboratory Manual**, Department of IT, SVEC, 2014.

B.Tech I Year

14BT1HS02: ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

(Common to All Branches of Engineering)

Int. Marks: 25; Ext. Marks: 50; Total Marks: 75

L	T	P	C
-	-	3	3

PREREQUISITE: Basic Speaking and Listening Skills.

COURSE DESCRIPTION: The course contains practice sessions which are classified into software based learning, grammar and activities. English Speech Sounds and Phonemic Transcription, Word Stress and Sentence Stress, Accent, Rhythm and Intonation, Paralinguistic Features, Vocabulary Building, are aided by software. Grammar sessions include Functional Grammar: Tenses, Speech, Voice, Error Correction and Essay Writing. Just a Minute, Impromptu Speech and Elocution, Role Plays, Telephonic Etiquette, Listening Skills, Describing People, Places and Objects, Presentation Skills and Information Transfer are activity oriented.

COURSE OUTCOMES:

On the successful completion of the course, the students will / should be able to

1. Gain practical knowledge in
   - English Speech Sounds
   - Stress Patterns in word and sentence
   - Intonation Patterns
   - Paralinguistic Features
   - Vocabulary Enrichment
2. Analyse the functional part of the grammatical elements for writing grammatically correct English in various academic and personal practices.
3. Develop various language functions to fulfil the purpose of speaking and writing in academic, professional and personal contexts.
4. Apply the knowledge of the usage of various language software for enhancing the language skills more and more thereby acquiring unconsciously the language functions and elements that are commonly used in various contexts.
5. Communicate effectively with engineering community and society in various formal, informal and neutral situations.
6. Demonstrate various language functions by participating in
   - Just A Minute
   - Impromptu Speech
   - Elocution
   - Role Plays
   - Presentations
7. Engage in lifelong learning for the development of the communicative competence
   for meeting the global challenges.

Detailed list of experiments / Lab practice Sessions:

1. English Speech Sounds and Phonemic Transcription
2. Word Stress and Sentence Stress
3. Accent, Rhythm and Intonation
4. Paralinguistic Features.
5. Vocabulary Building
   a. Importance of Vocabulary Enrichment in Speaking: Spelling
   b. Synonyms–Antonyms–Prefix–Suffixes–One Word Substitutes
   c. Idioms and Phrases–Homophones–Homonyms–Homographs.
6. Functional Grammar
   a. Parts of Speech
   b. Tenses
   c. Change of Speech
   d. Change of Voice
   e. Word Order and Error Correction
   f. Essay Writing
7. Just a Minute, Impromptu Speech and Elocution
8. Role Plays
9. Telephonic Etiquette
10. Listening Skills
11. Describing People, Places and Objects
12. Presentation Skills
13. Information Transfer

REFERENCES:

1. Departmental Lab Manual

SUGGESTED SOFTWARE:

1. Mastering English: Vocabulary, Grammar, Punctuation and Composition.
2. Dorling Kindersley Series of Grammar, Punctuation, Composition etc.
3. Language in Use 1, 2 and 3
4. Learning to Speak English 8.1, the Learning Company – 4 CDs.
5. English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6. English Pronunciation Dictionary by Daniel Jones
7. Speech Solutions
8. Cambridge Advanced Learner's Dictionary - 3rd Edition
9. Centronix - Phonetics
10. Rosetta Stone
11. Let's Talk English, Regional Institute of English South India.

II B.Tech I Semester
14BT3BS01: MATRICES AND NUMERICAL METHODS

(Common to CE and ME)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Intermediate/Senior secondary Mathematics

COURSE DESCRIPTION: Matrices, Systems of Equations; Eigen Values, Eigen Vectors; Solutions of Algebraic and Transcendental Equations, Curve Fitting, Interpolation, Numerical Differentiation and Integration, Numerical Solutions of Ordinary Differential Equations ,Fourier Series and Integrals, Partial Differential Equations.

COURSE OUTCOMES:

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

1:Acquire knowledge in
- (a)Estimating ranks and solutions of linear equations through matrices.
- (b) Solutions of algebraic and transcendental equations
- (c) Fitting of different curves to discrete data.
- (d) Estimating the unknown values of different parameters through interpolation.
- (e) Estimating values of derivatives from the given data
- (f) Numerical differentiation and integration
- (g) Numerical solutions of differential equations
- (h) Fourier series, Fourier transforms and partial differential equations.

2:Develop analytical skills in providing solutions to the problems involving
- (a) Differential equations through numerical methods
- (b) Partial differential equations

3:Develop skills in analyzing
- (a) Properties of functions through Fourier series.
- (b) numerical techniques in differentiation and integration of higher complexity

4:Develop skills in the design of mathematical equations and arrive at numerical solutions involving
- (a) Curves that best fits the given data
- (b) Integrations of higher complexity
- (c) Ordinary differential equations
- (d) Oscillatory motion and heat transformations.

DETAILED SYLLABUS:

UNIT I **(10 periods)**

MATRIX THEORY & APPLICATIONS: Matrices– rank of a matrix, echelon form, Normal form – Inverse of a matrix by row operations. Homogenous and non–homogenous linear systems, consistency and solutions of linear system of equations. Solutions of equations by Gauss elimination method. Eigen values , Eigen vectors – properties. Cayley – Hamilton theorem (without proof). Inverse and powers of a matrix using Cayley– Hamilton theorem.

UNIT II **(09 periods)**

NUMERICAL SOLUTIONS, CURVE FITTING AND INTERPOLATION: Solutions of algebraic and transcendental equations by bisection method, Regula–falsi method, Newton–Raphson method. Curve fitting by the principle of least squares – fitting of a straight line, parabola, exponential curves. Interpolation –Newton's forward formula, Newton's backward formula, Lagrange's interpolation formula.

UNIT III **(08 periods)**

NUMERICAL DIFFERENTIATION, INTEGRATION AND SOLUTIONS OF O D E: Numerical differentiation using Newton's forward formula, Newton's backward formula. Numerical integration using trapezoidal rule, Simpsons 1/3rd Rule, Simpsons 3/8th Rule. Numerical solutions of first order ordinary differential equations by Euler's method, Euler's modified method, Runge – Kutta method (4th order only).

UNIT IV **(09 periods)**

FOURIER SERIES AND FOURIER INTEGRALS: Fourier series of functions in (0, 2n), (-n, n), (0, 2*l*), (-*l*, *l*) . Determination of Fourier coefficients by Euler's formulae. Even and odd functions, Fourier series for periodic functions. Half – range Fourier sine and cosine expansions. Fourier integral theorem (statement only). Fourier sine and cosine integrals – Fourier sine and cosine transforms.

UNIT V **(09periods)**

PARTIAL DIFFERENTIAL EQUATIONS: Formation of partial differential equations. Method of separation of variables for second order partial differential equations. Solutions of one dimensional wave equation– heat equation.

TEXTBOOKS **Total Periods: 45**

1. T.K.V. Iyenger, B. Krishna Gandhi, S.Ranganadham and M.V.S.S.N.Prasad, *Mathematical Methods,* 8th Edition, S.Chand and Company, 2013.

REFERENCE BOOKS

1. B.S. Grewal, *Higher Engineering Mathematics*, 42nd Edition, Khanna publishers, 2012.
2. S.S.Sastry, *Introductory methods of Numerical Analysis*, 4th Edition, Prentice Hall of India, 2005.

II B.Tech I Semester
14BT30101 : ENGINEERING GEOLOGY

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

COURSE DESCRIPTION: Importance of Geology in the Civil Engineering– Weathering – Mineralogy, Petrology – Structural Geology, Geophysical Studies – Ground Water, Earthquakes and Landslides – Geological Considerations for Dams, Reservoirs and Tunnels.

COURSE OUTCOMES:

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

1. Apply the knowledge of geological features, the properties of rocks and their suitability as building stones for various civil engineering constructions .
2. Analyze the failure of structures using geological studies .
3. Conduct investigations and give recommendations for the effective use of rocks, minerals for construction .
4. Use modern methods and apply suitable techniques for carrying out geophysical studies .
5. Explain causes of earthquakes and give remedial measures to the society for the safety .

DETAILED SYLLABUS:

UNIT I

GENERAL GEOLOGY: Importance of geology from civil engineering point of view – Brief study of case histories of failure of some civil engineering constructions due to geological draw backs – Importance of physical geology, petrology and structural geology, Weathering: Agents of weathering, Effects of weathering of rocks – Importance of weathering with reference to dams, reservoirs and tunnels.

UNIT II

MINERALOGY AND PETROLOGY: Definition of mineral – Importance of study of minerals – Different methods of study of minerals– Advantages of study of minerals by physical properties – Identification of minerals – Physical properties of common rock forming minerals: Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite – Study of other common economic minerals: Pyrite, Hematite, Magnetite, Galena, Pyrolusite, Graphite, Magnesite and Bauxite – Origin, Geological classification into Igneous, Sedimentary and Metamorphic rocks – Common structures, textures of Igneous, Sedimentary and Metamorphic rocks – Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT III **(10 Periods)**

STRUCTURAL GEOLOGY AND GEOPHYSICAL STUDIES: Out crop – Strike and dip – Classification and recognition of folds, faults, unconformities, and joints – Importance of geophysical studies – Principles of geophysical studies – Gravity methods –Magnetic methods – Electrical resistivity methods – Seismic refraction methods – Radiometric methods and geothermal method – Special importance of electrical resistivity methods and seismic refraction methods.

UNIT IV **(8 Periods)**

GROUNDWATER, EARTHQUAKE AND LANDSLIDES

Groundwater : Hydrological cycle, Water table, Common types of groundwater, Cone of depression, Geological controls of groundwater movement – Hydrological properties of rocks: porosity, permeability, storativity, specific yield and specific retention – Earthquakes: causes and effects – shield areas and seismic zones – Seismic waves – Richter scale – Precautions to be taken for building construction in seismic areas – Landslides: their causes and effect – Measures to be taken to prevent their occurrence.

UNIT V **(8 Periods)**

GEOLOGY OF DAMS, RESERVOIRS AND TUNNELS : Types of dams – Geological considerations in the selection of a dam site – Analysis of dam failures of the past – Factors contributing to the success of a reservoir – Purposes of tunneling – Effects of tunneling on the ground – Geological considerations (i.e., Lithological, structural and groundwater) in tunneling, over break and lining in tunnels.

Total Periods: 45

TEXT BOOKS

1. N. Chenna kesavulu, *Engineering Geology,* 2nd Edition, Mc–Millan India Ltd., 2014.
2. Parbin Singh, *A Text Book of Engineering and General Geology,* 8th Edition, S.K. Kataria and Sons, 2012.

REFERENCE BOOKS

1. D. Venkata Reddy, *Engineering Geology*, 1st Edition, Vikas Publications, 2014.
2. K.V.G.K. Gokhale, *Principles of Engineering Geology*, 1st Edition, B.S. Publications, 2013.
3. F.G. Bell, *Fundamental of Engineering Geology*, 2nd Edition, B.S. Publications, 2007.
4. S.K. Garg, *Physical and Engineering Geology*, 4th Edition, Khanna Publishers, 2013.

II B.Tech I Semester
14BT30233: BASICS OF ELECTRICAL AND MECHANICAL TECHNOLOGY

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
30	70	100	3	1	--	3

ELECTRICAL TECHNOLOGY (PART-A)

PRE-REQUISITES: Engineering Physics

COURSE DESCRIPTION:
Basics concepts of electrical circuits; layout for electrical wiring; construction and operating principle of single phase transformer, three phase induction motor, single phase induction motor and alternator; earthing & illumination.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Understand various circuit elements, the working of various electrical machines, filament & fluorescent lamps and types of earthing
2. Analyze the electrical circuits to know their response
3. Design layout for wiring circuit depending upon the requirement
4. Evaluate the electrical parameters
5. Apply IE rules while designing electrical wiring

DETAILED SYLLABUS:

UNIT I (11 Periods)

ELECTRICAL CIRCUITS AND WIRING : Concepts of network - active and passive elements, Ohm's law, Kirchhoff's laws, resistive networks, inductive networks, capacitive networks - series and parallel configuration, star-delta transformation problems, conductors and insulators.

AC fundamentals - introduction to alternating quantities, RMS values, phasor representation, active, reactive and apparent power, power factor – problems.

Wiring - systems of wiring- cleat wiring, conduit winding. General rules related to wiring - IE rules for internal wiring estimation. Wiring layout of electrical installations for residential buildings, commercial buildings and small industries.

UNIT II **(9 Periods)**

EARTHING, ILLUMINATION AND BASICS OF AC MACHINES :

Earthing - rod earthing, pipe earthing and plate earthing.

Illumination - incandescent lamp, fluorescent lamp.

Construction and operating principle of single phase transformer, three phase induction motor, single phase capacitor start induction motor and alternator.

Total Periods : 20

TEXT BOOKS:

1. D.P. Kothari, *Basic Electrical Engineering, 3rd edition,* Tata McGraw Hill, 2012.
2. K. B. Raina, *Electrical Design Estimating and Costing*, New Age International, 2007.

REFERENCE BOOKS:

1. V.K. Mehta and Rohit Mehta, *Principles of Electrical Engineering*, S. Chand and Company Ltd., New Delhi, 2006.
2. M.S Naidu and S. Kamakshaiah, *Introduction to Electrical Engineering*, Tata McGraw-Hill Publications Ltd., New Delhi, 2009.
3. J.B. Gupta, *Electrical Installation Estimating & Costing*, S. K. Kataria & Sons, 2009.
4. H.Parthab, *Art and science of utilization of electrical energy,* Dhanpat rai & Co., 2010.

MECHANICAL TECHNOLOGY (PART-B)

PRE-REQUISITES: Engineering physics, Engineering chemistry, Engineering workshop.

COURSE DESCRIPTION:

Welding; Types of Welding techniques; IC engines and its classifications; Types of Lubrication Systems; Refrigeration Systems and its classifications; Types of Refrigerants; Types of Air conditioning system; Types of Air compressors; Earth Moving Machines and its Applications.

COURSE OUTCOMES:

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

1. Employ the suitable welding technique in the joining of metals,working of IC engines, refrigeration, air conditioning systems, and air compressors.

2. Identify the manageable areas in welding processes, I.C engines for their effective utilization.
3. Analyze and apply the various types of earth moving machines for the operation of various projects in Civil Engineering.

DETAILED SYLLABUS:

UNIT III **(10 periods)**

WELDING PROCESSES & INTERNAL COMBUSTION ENGINES: Introduction, Classification of Welding processes: Arc Welding processes, Gas Welding processes, and Equipments, Submerged arc welding, TIG processes, MIG processes; Soldering and Brazing processes, applications; I.C engines: Introduction, Classification , components of IC Engines; Working principle of S.I and C.I engines; Four stroke and Two stroke I.C engines ;Comparison of Four stroke and Two stroke engines ; Comparison of S.I and C.I engines – Lubrication, and cooling systems of S.I and C.I Engines.

UNIT IV **(8 periods)**

REFRIGERATION & AIR–CONDITIONING SYSTEMS : Refrigerants and their Desirable properties; Vapor Compression and Vapor Absorption refrigeration Systems, comparison of Vapor Compression and Vapor Absorption refrigeration Systems; air conditioning: Need of Air conditioning , window air conditioning systems,summer, and winter air conditioning systems, and year round air conditioning system.

UNIT V **(7 periods)**

AIR COMPRESSORS & EARTH MOVING MACHINERY: Introduction, classification, Working principle of reciprocating air compressor; Working principle of Single & Multi stage compressors, applications; Need of Earth Moving Machines: Mechanical handling equipment; Bull dozers; Power shovels; Excavators; Concrete mixer; Belt and bucket conveyors; applications.

Total Periods: 25

TEXT BOOKS:

1. R. K. Rajput, *Thermal Engineering* , 8th Edition, Laxmi Publications, 2010.
2. P. C. Sharma, *Production technology*, 7th edition, S. Chand, 2006.

REFERENCE BOOKS:

1. R. S Khurmi & J.K Gupta, *Refrigeration & Air conditioning*, S. Chand & company ltd, Fifth Revised Edition, 2011.
2. S.K.Hajra Choudhary & S.K.Bose, *Elements of Workshop Technology*, Vol. I, Asia Publishing House, Bombay, 2nd Edition. V. Ganesan, I.C Engines, TMH, 3rd edition , 2007.

II B.Tech I Semester
14BT30102: **MECHANICS OF SOLIDS**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Engineering Mechanics

COURSE DESCRIPTION: Simple Stresses and Strains; Strain Energy – Shear Force and Bending Moment – Stresses in Beams – Combined Direct and Bending Stresses; Torsion – Springs and Shafts – Thin Cylinders and Thick Cylinders.

COURSE OUTCOMES:

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

1. Understand the concepts on stresses, strains, and displacements in structures due to different types of loading conditions .
2. Analyze the stress distribution of simple structural elements such as bars, beams under specific external load .
3. Design simple bars, beams and circular shafts for various loading conditions .

DETAILED SYLLABUS:

UNIT I **(09Periods)**

SIMPLE STRESSES AND STRAINS: Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress–strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – Composite bars – Temperature stresses – Strain energy – Resilience – Gradual, sudden and impact loadings – Simple applications.

UNIT II **(10 Periods)**

SHEAR FORCE AND BENDING MOMENT: Types of beams, supports and loads – Concept of shear force and bending moment – SF and BM diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load and combination of these loads – Point of contra–flexure – Relation between SF, BM and rate of loading at a section of beam.

UNIT III **(10 Periods)**

STRESSES IN BEAMS: Theory of simple bending – Basic bending equation– Neutral axis – Bending stresses – Section modulus of rectangular, circular section, I, T, Angle and Channel sections – Design of simple beam sections – Strain energy due to bending. Basic shear stress

equation – Shear stress distribution; Rectangular, circular, triangular, I, T, Angle sections – Strain energy due to shear.

COMBINED DIRECT AND BENDING STRESSES: Stresses under the combined action of direct loading and bending moment – Core of a section – Stresses in chimneys, retaining walls and dams – Conditions for stability – Stresses due to direct loading and bending moment about both axes.

UNIT IV **(09 Periods)**

TORSION: Theory of pure torsion – Torsional equation – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending, torsion and end thrust – Design of shafts.

SPRINGS: Deflection of close and open coiled helical springs under axial load and axial twist – Springs in series and in parallel.

UNIT V **(07 Periods)**

THIN CYLINDERS: Thin cylindrical shells – Longitudinal and circumferential stresses – Hoop, longitudinal and volumetric strains – Changes in diameter and volume of thin cylinders

THICK CYLINDERS: Lame's theory – Distribution of hoop and radial stresses across thickness – Design of thick cylinders – Compound cylinders – Difference of radii for shrinkage.

Total Periods: 45

TEXT BOOKS

1. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *Mechanics of Materials*, 1st Edition, Laxmi Publications Pvt. Ltd., 2001.
2. Basavarajaiah, B.S. and Mahadevappa. P, *Strength of Materials*, 3rd Edition, Universities Press (India) Pvt. Ltd., 2010.

REFERENCE BOOKS

1. Rajput, R.K., *Strength of Materials (Mechanics of Solids)*, 5th Edition, S. Chand & company LTD, New Delhi, 2006.
2. Junnarkar, S. B. and Shah, H. J., *Mechanics of Structures– Vol. I* (Strength of Materials), 27th Revised and Enlarged Edition, Charotar Publishing House Pvt. Ltd., 2008.
3. Bhavikatti, S. S., *Strength of Materials*, 3rd Edition, Vikas Publishing House, 2010
4. Khurmi, R. S., *Strength of Materials,* 23rd Edition, S. Chand & Company Ltd., 2005.

II B. Tech I Semester
14BT30103 : BUILDING MATERIALS AND CONCRETE TECHNOLOGY

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Engineering Chemistry

COURSE DESCRIPTION: Bricks and Tiles – Timber – Lime and Other Materials for Construction – Cement and Concrete – Hardened Concrete and Tests on Hardened Concrete – Elasticity, Creep and Shrinkage, Mix Design.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Understand various types and properties of building materials and procedure for making mix design.
2. Analyze building materials
3. Design a concrete mix for the given construction materials
4. Assess the properties of concrete mixes for various construction activities and suggest proper building materials for construction purposes .

DETAILED SYLLABUS:

UNIT I (07 Periods)

STONES, BRICKS AND TILES: Properties of Building Stones and Structural Requirements – Classification of Stones – Stone Quarrying – Blasting and Dressing of Stones Composition of good brick earth- – Various methods of manufacture of bricks – Qualities of a good brick – Efflorescence in bricks – Classification of bricks – Characteristics of good tile – Manufacturing methods – Types of tiles.

TIMBER: Structure – Properties – Seasoning of timber – Classification of various types of woods used in buildings – Defects in timber – Decay of timber – Mechanical treatment – Paints – Varnishes – Distempers – Bituminous wooden products in construction.

UNIT II (07 Periods)

LIME AND MISCELENIOUS MATERIALS FOR CONSTRUCTION: Various ingredients of lime – Constituents of lime stone – Classification of lime – Various methods of manufacture of lime – Use of Materials like galvanized iron, steel, aluminum, gypsum, copper, glass, bituminous materials, rubber, fiber–reinforced plastics, ceramic products, asbestos and their quality.

UNIT III (12 Periods)

CEMENT AND CEMENT CONCRETE: Ingredients of cement – Manufacture of OPC –Types of cement and their properties – Various field and laboratory tests on cement.

Various ingredients of cement concrete and their importance – Proportioning of concrete – Water–cement ratio – Workability of concrete – Factors influencing workability – Measurement of workability – Effect of time and temperature on workability – Segregation and bleeding – Mixing and vibration of concrete – Quality of mixing water.

UNIT IV **(10 Periods)**

HARDENED CONCRETE AND TESTS ON HARDENED CONCRETE: Nature of strength of concrete – Maturity concept – Strength in tension and compression– Factors affecting strength –– Relation between compression and tensile strength – Curing – Numerical Problems – Compression t est – Tension test – Factors affecting strength – Flexure test – Non–destructive testing methods.

UNIT V **(09 Periods)**

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

MIX DESIGN: Factors in the choice of mix proportions – BIS method of mix design.–Numerical Problems on Mix Design.

Total Periods: 45

TEXT BOOKS

1. S. K. Duggal, *Building Materials*, 4th Edition, New Age International Publishers, 2010.
2. M.S. Shetty, *Concrete Technology*, 7th Edition, S. Chand and Company Ltd., 2011.

REFERENCES

1. Rajput R.K., *Engineering Materials*, 3rd Edition, S. Chand and Company Ltd., 2006.
2. A.R. Santha Kumar, *Concrete Technology*, 7th Edition, Oxford University Press, New Delhi, 2011.
3. A.M. Neville, *Properties of Concrete*, 5th Edition, Pearson Education, 2012.
4. M.L. Gambhir, *Concrete Technology*, 5th Edition, Mc.Graw Hill Education (India) Private Limited, 2013.

NOTE. Booklet containing relevant extracts from Standards and Codes, should be made available to Students during examinations

II B. Tech I Semester

14BT30104: **FLUID MECHANICS – I**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Engineering Physics and Engineering Mathematics

COURSE DESCRIPTION: Properties of Fluids and Pressure Measurement – Hydrostatic Forces – Fluid Kinematics – Fluid Dynamics – Closed Conduit Flow – Measurement of Flow – Laminar and Turbulent Flow – Hydraulic Similitude and Model Testing.

COURSE OUTCOMES:
After completion of this course, a successful student will be able to:

1. Demonstrate the knowledge of Fluid properties, buoyancy,hydrostatic pressure, fluid flow and solve problems using fundamentals of Physics and mathematics .
2. Analyze various types of flows and interpret the data .
3. Evaluate losses in pipes and design a piping system as per requirement .
4. Address the fault in the prototype preparation using the model analysis and provide suitable solutions .

DETAILED SYLLABUS:

UNIT I (10 Periods)

PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS: Dimensions and units – Physical properties of fluids – Pressure at a point – Pascal's law – Hydrostatic law – Atmospheric, gauge and absolute pressures – Measurement of pressure – Manometers – Differential and micro manometers – Hydrostatic forces on submerged plane surfaces – Total pressure and centre of pressure on plane and curved surfaces – Buoyancy – Centre of Buoyancy.

UNTI II (10 Periods)

FLUID KINEMATICS AND DYNAMICS: Description of fluid flow – Stream line – Path line and streak line – Stream tube – Classification of flows – Equation of continuity – Stream and Velocity potential functions – Flow net and its uses – Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line – Momentum equation and its application – Momentum and kinetic Energy correction factors – Forces on pipe bend.

UNIT III (09 Periods)

CLOSED CONDUIT AND MEASUREMENT OF FLOW: Laws of fluid friction – Darcy–Weisbach equation – Minor losses – Pipes in series – Pipes in parallel – Total energy line and hydraulic gradient line – Moody's chart – Pitot tube – Venturimeter and orifice meter – Orifices and mouthpieces – Rectangular, triangular and trapezoidal notches – Broad crested weir.

UNIT IV **(08 Periods)**

LAMINAR AND TURBULENT FLOW: Reynolds's experiment – Hagen Posieullie equation – Characteristics of laminar and turbulent flows – Laminar flow through circular pipes – Flow between parallel plates – Hydro dynamically smooth and rough boundaries.

UNIT V **(08 Periods)**

HYDRAULIC SIMILITUDE : Dimensional analysis – Rayleigh's method and Buckingham's ð theorem – Model studies – Geometric, kinematic and dynamic similarities – Dimensionless numbers – Model laws – Scale effects.

Total Periods: 45

TEXT BOOKS

1. R.K. Rajput, *A Textbook of Fluid Mechanics*, 5th Edition, S. Chand Publishers, 2013.
2. R.K. Bansal, *Fluid Mechanics a*nd *Hydraulic Machines*, 9th Edition, Laxmi Publishers, 2011.

REFERENCE BOOKS

1. P.N. Modi and S.M. Seth, *Hydraulics and Fluid Mechanics Including Hydraulic Machines,* 20th Edition, Standard Book House, 2011.
2. J.F. Douglas, J.M. Gaserek and J.A. Swaffirld*, Fluid Mechanics,* 5th Edition, Longman, 2010.
3. S.K. Som and G. Biswas*, Introduction to Fluid Machines*, 2nd Edition, Tata McGraw–Hill Publishers Pvt. Ltd, 2010.
4. Domkundwar and Domkundwar, A *Textbook of Fluid Mechanics a*nd *Hydraulic Machines*, 6th Edition, Dhanpat Rai and Co, 2014.

II B.Tech I Semester

14BT30121: **ENGINEERING GEOLOGY LAB**

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: –

COURSE DESCRIPTION: Study of Physicl Properties of Rocks and Minerals – Geological Maps – Problems on Structural Geology – Norm Form Calculations.

COURSE OUTCOMES:
After the completion of this course, a successful student will be able to:

1. Apply the knowledge of physical properties of minerals and rocks to the suitability of the construction materials .
2. Analyze the structural geology problems; and geological map for a given area
3. Conduct investigations on the availability ground water using resistivity meter
4. Function effectively as an individual, and as a member or leader in teams to solve engineering geology problems
5. Communicate effectively on geological information in written, oral and graphical forms

LIST OF EXPERIMENTS:

1. Study of physical properties and identification of rock forming minerals
2. Study of physical properties and identification of ore forming minerals
3. Study of physical properties and identification of common igneous rocks
4. Study of physical properties and identification of common sedimentary rocks
5. Study of physical properties and identification of common metamorphic rocks
6. Study of geological maps, drawing and interpretation of geological sections
7. Simple structural geology problems
8. Norm form calculations

II B.Tech I Semester

14BT30122: STRENGTH OF MATERIALS LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: Engineering Mechanics

COURSE OUTCOMES:

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

1. Acquire the knowledge on conducting experiments for testing strength of materials
2. Determine the strength of structural elements under different loading conditions
3. Function effectively as an individually and as a team member in construction material testing
4. Present report on the strength properties of the materials in written and oral form

LIST OF EXPERIMENTS:

1. Tension test on mild steel / HYSD bar
2. Compression test on wood
3. Compression test on coiled spring
4. Tension test on coiled spring
5. Bending test on carriage spring
6. Brinell and Rockwell hardness tests
7. Charpy and Izod impact tests
8. Shear test on mild steel
9. Bending test on simply supported beam
10. Bending test on cantilever beam
11. Bending test on fixed beam
12. Bending test on continuous beam
13. Verification of Maxwell's reciprocal theorem
14. Torsion test on mild steel

II B.Tech II Semester
14BT3BS03: **PROBABILITY AND STATISTICS**

(Common to Mechanical and Civil Engineering)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITE: Engineering Mathematics

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

CO 1 Acquire basic knowledge in
- (a) probability distributions, correlation and regressions,
- (b) statistical quality control and testing of hypotheses.
- (c) finding regression coefficients ,elucidating relationships in bivariate data
- (d) tests of significance for small and large samples

CO 2 (i) Develop analytical skills for the problems involving
- (a) means, probability distributions and standard deviations
- (b) sampling techniques for decision making in uncertain environments

(ii) Develop skills for analyzing the data with
- (a) suitable tests of significance for practical situations.
- (b) through probability distributions for practical situations.

CO 3 Develop skills in applying
- (a) statistical techniques employed for quality control and maintenance of uniform quality in the manufacturing processes.

DETAILED SYLLABUS:

UNIT – I **(9 periods)**

PROBABILITY & MATHEMATICAL EXPECTATIONS: Probability-Conditional probability. Bayes theorem. **Random Variables:** Discrete and Continuous random variables, Distribution function of random variable, Properties, Probability mass function, Probability density function, Mathematical expectation, Properties of Mathematical expectations, Mean and Variance.

UNIT - II **(9 periods)**

PROBABILITY DISTRIBUTIONS:

Discrete Distributions: Binomial Distribution, Mean and Standard Deviations of Binomial Distribution, Poisson distribution, Mean and Standard Deviations of Poisson Distribution.

Continuous Distributions: Normal Distribution, Mean, Variance and area properties.

UNIT-III **(9 periods)**

STATISTICAL QUALITY CONTROL AND CORRELATION-REGRESSION: Introduction, Advantages and limitations of statistical quality control, Control charts, specification limits, $\bar{X}$, R, p, np and c charts. Definition of correlation, correlation coefficient, Rank correlation. Simple linear regression, regression lines and properties.

UNIT-IV **(9 periods)**

SAMPLING DISTRIBUTIONS AND TESTS OF SIGNIFICANCE FOR LARGE SAMPLES: Population and Sample, Parameter and Statistic, Sampling Distribution of Statistic, Standard Error of Statistic, Null and Alternative Hypothesis, Type I and II errors, Level of Significance, Critical region, Degrees of freedom. Test of Significance for Single Proportion, Difference of Proportions, Single Mean, Difference of Means.

UNIT-V **(9 periods)**

TESTS OF SIGNIFICANCE FOR SMALL SAMPLES

Student's t-test: single mean, difference of means, F-test for equality of population variance, Chi-Square Test for Goodness of fit, contingency table, Chi-Square Test for Independence of Attributes.

Total Periods : 45

TEXT BOOKS:

1. T.K.V. Iyengar, B. Krishna Gandhi ..etal., *Probability and Statistics*, 3/e., S. Chand & Company, (2011).
2. S.P.Gupta, *Statistical Methods,* 34th edition, Sultan and Chand, New Delhi, (2005).

REFERENCE BOOKS:

1. Shahnaz Bathul, *A text book of Probability and Statistics,* 2 ed, Ridge Publications.
2. S.C.Gupta and V.K.Kapoor , *Fundamentals of Applied Statistics,* Sultan and Chand, New Delhi.(1998).

II B.Tech II semester:
14BT3HS01: ENVIRONMENTAL SCIENCES

(Common to CE, ME, CSSE, IT & CSE)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITES: Engineering Physics and Engineering Chemistry

COURSE DESCRIPTION:

Introduction to environment, Need for public awareness; Natural resources, conservation and management; Ecology and ecosystems; Biodiversity, conservation and management; Environment pollution and Control; Social issues and environment; Human population and environment; Field study and analysis.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Acquire knowledge in

a) diverse components of environment and natural resources
b) ecosystem and biodiversity & its conservation methods
c) population growth and human health
d) green technology

2. Identify and resolve the issues related to sources of different types of pollutions.
3. Provide solutions to individuals, industries and government for sustainable development of natural resources.
4. Create awareness on environmental degradation and to bring best management practices to protect environment.
5. Develop skills in analyzing reports on environment for sustainable development.
6. Apply environmental ethics in protection of diversified ecosystems.

DETAILED SYLLABUS:

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT AND NATURAL RESOURCES (11 periods)

Multidisciplinary nature of environment: Definition, scope and importance of multidisciplinary nature of environment, segments of environment-lithosphere, hydrosphere, atmosphere and biosphere, need for public awareness.

Natural Resources: Renewable and Non-renewable resources and associated problems- (a) forest resources: use and over exploitation, deforestation-causes, effects and remedies, case studies, (b) water resources-use and over utilization of surface & ground water, conflicts over water-benefits and problems of large dams, case studies, (c) mineral resources- mining, adverse effects, case studies,

(d) food resources-world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problem, water logging and salinity, case studies, (e) energy resources-growing needs, renewable energy resources–solar, wind, hydropower, hydrogen fuel and non-renewable energy resources-coal, natural gas, nuclear energy, role of an individual in conservation of natural resource and equitable use of resources for sustainable lifestyles.

UNIT-II: ECOSYSTEMS AND BIODIVERSITY (10 periods)

Ecosystems: Definition and concept of an ecosystem, structure and function of an ecosystem-producers, consumers and decomposers, food chains, food webs and ecological pyramids-introduction, types, characteristic features, structure and functions of forest ecosystem, desert ecosystem, aquatic ecosystem-ponds, lakes & oceans, energy flow in the ecosystem, ecological succession. **Biodiversity:** Definition, concept and value of biodiversity, role of biodiversity in addressing new millennium challenges, hot spots of biodiversity, threats to biodiversity–habitat loss, poaching of wildlife, man-wild life conflicts, endemic, endangered and extinct species of India, conservation of biodiversity–in-situ and ex-situ.

UNIT-III: ENVIRONMETAL POLLUTION AND CONTROL (8 periods)

Definition, causes, adverse effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) noise pollution (e) thermal pollution (f) nuclear pollution, solid waste management–causes, effects and control measures of urban and industrial wastes, hazards and disaster management–floods, earthquakes, tsunamis, case studies.

UNIT-IV: SOCIAL ISSUES AND THE ENVIRONMENT (8 periods)

From unsustainable to sustainable development, urban problems related to energy, environmental ethics-issues and possible solutions, global warming, acid rain, ozone layer depletion, nuclear accidents and 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 environmental awareness.

UNIT-V: HUMAN POPULATION AND THE ENVIRONMENT (8 periods)

Population growth, population characteristics and variation among nations, population explosion, family welfare programme, 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-pond/forest/grassland/hill/mountain/ Environment Impact Assessment procedures for local environmental issues or assignment/seminar.

Total periods: 45

TEXT BOOKS:

1. A.Kaushik and C.P. Kaushik, *"Environmental Studies"*, 4th Edition, New Age International (P) Ltd Publications, 2014.

2. Erach Barucha, "*Environmental Studies*", 2nd Edition, Orient Blackswan, 2013.

REFERENCE BOOKS:

1. R. Rajagopalan, "*Environmental Studies"*, 2nd Edition, Oxford University Press, 2011.
2. Benny Joseph, "*Environmental Studies*", Tata Mc.Graw Hill, 2009.
3. Dr. B S Chauhan, "*Environmental Studies"*, 1st Edition, University Science Press, 2008.
4. M. Anji Reddy, "*Textbook of Environmental Sciences and Technology"*, BS Publications, 2007.
5. Larry W Canter, *"Environmental Impact Assessment"*,2nd edition, Mc.Graw Hill Education, 1996.

II B. Tech. II Semester
14BT4HS01: BUSINESS COMMUNICATION AND PRESENTATION SKILLS

(Common to CSE, IT, CSSE, CE and ME)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE REQUISITES: Basic grammar and fundamentals of Listening, Speaking, Reading and Writing skills.

COURSE DESCRIPTION:
Nature and Scope of Communication; Non-Verbal Communication; Writing Business Documents; Business Presentations and Public Speaking; Careers and Resume.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to

1: Acquire knowledge in
a) Managerial Communication
b) Corporate Communication
c) Business Writing
d) Presentation Skills
e) Career Building

2: Analyze and judge the situation through non-verbal communication for effective organizational communication.
3: Achieve personal excellence and ability to work in groups.
4: Develop effective communication to meet professional needs.

DETAILED SYLLABUS:

UNIT – I: NATURE AND SCOPE OF COMMUNICATION(09 periods)
Introduction - Functions of Communication - Roles of a Manager - Communication Basics - Communication Networks - Informal Communication - Tips for Effective Internal Communications - Interpersonal Communication - Communication Barriers - Effective Managerial Communication - Strategies for Improving Organizational Communication.

UNIT – II: NON-VERBAL COMMUNICATION (09 periods)

Introduction - Significance of Non-verbal Communication in Organizations - Forms of Non-verbal Communication - Types of Non-verbal Communication - Cross Cultural Communication: Introduction - Concept of Cross cultural Communication - Different Communication Styles - Cross-cultural Communication Strategies - Corporate Communication: Introduction - Crisis Management / Communication - Case Study.

UNIT – III: WRITING BUSINESS DOCUMENTS (10 periods)

Business Writing: Introduction - Importance of Written Business Communication - Five Main Stages of Writing Business Messages; Business Letter Writing: Common Components of Business Letters - Strategies for Writing the Body of a Letter - Kinds of Business Letters; Business Reports - Kinds of Reports - Characteristics of Business Reports - Steps in Writing a Routine Business Report - Corporate Reports.

UNIT – IV: BUSINESS PRESENTATIONS AND PUBLIC SPEAKING (10 periods)

Introduction - Business Presentations Speeches - Introduction to a presentation - Main Body - Conclusion - Effective Sales Presentations - Case Study; Group Discussions: Introduction - Work Place GD Guidelines - Functional and Non-functional Roles in Group Discussions; Team Presentations: Benefits of Team Presentations - Purpose of Team Presentations - Case Studies.

UNIT – V: CAREERS AND RESUME (07 periods)

Introduction - Career Building: Understanding Yourself - Setting a Career Goal - Résumé Writing: Résumé Formats; Interviews: Introduction - Fundamental Principles of Interviewing - General Preparation for an Interview - Success in an Interview - Types of Interviewing Questions - Important Non-verbal Aspects - Types of Interviews - Styles of Interviewing - Case Interviews.

Total periods: 45

TEXT BOOK:

1. Meenakshi Raman and Prakash Singh, *Business Communication,* Second Edition, Oxford University Press, New Delhi, 2012.

REFERENCE BOOKS:

1. M K Sehgal and Vandana Khetarpal*, Business Communication,* Excel Books, New Delhi, 2011.
2. M Ashraf Rizvi, *Effective Technical Communication,* Tata Mc.Graw Hill, 2009.

II B.Tech II Semester
14BT40101: **STRUCTURAL ANALYSIS – I**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Mechanics of solids

COURSE DESCRIPTION: Principal Stresses and Strains – Deflection of Beams; Macaulay's Method and Double Integration Method – Columns and Struts – Intermediate Beams – Theories of Failure; Unsymmetrical Bending and Shear Centre.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Explain stresses and strains due to axial loading and fundamentals of columns and struts
2. Calculate stresses, moments and deflection of beams and columns using different methods

DETAILED SYLLABUS:

UNIT I **(08 Periods)**
PRINCIPAL STRESSES AND STRAINS: Stresses on an inclined plane under axial loading – Compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses –Triaxial state of stresses– Principal stresses and strains.

UNIT II **(11 Periods)**
DEFLECTION OF BEAMS: Bending into a circular arc – Slope, deflection and radius of curvature – Differential equation for the elastic curve of a beam – Double integration and Macaulay's methods –Mohr's theorems. Moment area method– Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L. and uniformly varying loads.

UNIT III **(09 Periods)**
COLUMNS AND STRUTS : Types of columns – Short, medium and long columns – Axially loaded compression members – Euler's theorem for long columns – Euler's critical load – Equivalent length of a column – Slenderness ratio – Limitations of Euler's theory – Rankine–Gordon formula – Long columns subjected to eccentric loading – Secant formula.

UNIT IV **(09 Periods)**

INDETERMINATE BEAMS: Introduction to statically indeterminate beams – Fixed end moment due to uniformly distributed load, point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams – Effect of sinking of support – Effect of rotation of a support – Shear force and Bending moment diagrams of propped cantilever. Continuous beams **–** Clapeyron's theorem of three moments – Analysis of continuous beams with one or both ends fixed – Continuous beams with overhang.

UNIT V **(08 Periods)**

THEORIES OF FAILURE: Maximum principal stress theory – Maximum principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNSYMMETRICAL BENDING AND SHEAR CENTRE: Centroidal principal axes of section– Stress in beams due to unsymmetrical bending– Principal axes– Location of neutral axis– Shear centre of channel section and unequal section.

Total Periods: 45

TEXT BOOKS

1. V.N. Vazirani, M.M.Ratwani and S.K.Duggal, *Analysis of Structures– Vol. I,* and *Vol. II*, 17th Edition, Khanna Publications, 2013.
2. Ramamrutham, S. and Narayanan, R., *Theory of Structures*, 9th Edition, Dhanpat Rai Publishing Co. Ltd., 2014.

REFERENCE BOOKS

1. R.S.Khurmi, *Theory of Structures*, 22nd Edition, S. Chand & Company Ltd., 2013.
2. S.S. Bhavikatti, *Structural Analysis– Vol–I*, 3rd Edition, I.K. International Publishing House Pvt. Limited, 2008.
3. H.J. Shah and S.B. Junnarkar, *Mechanics of Structures – Vol. II*, 21st Edition, Charotar Publishing House, 2010.
4. Pandit, G., Gupta, S. and Gupta, R., *Theory of Structures – Vol. I*, 2nd Edition, Tata Mc–Graw Hill Publishing Co. Ltd., 1999.

II B. Tech II Semester

14BT40102: CONSTRUCTION, PLANNING AND PROJECT MANAGEMENT

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Building Materials and Concrete Technology

COURSE DESCRIPTION: Masonry and Foundations, Building Components – Finishing's – Shoring Scaffolding and Formwork – Organization – Resource Management (Manpower, Materials, Machinery) – Project Management, Bar Charts and Milestone Charts, Network – PERT and CPM.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Demonstrate the knowledge of building components, resource and project management in the construction
2. Identify Critical Activities and Critical Paths in a Construction Project and prepare network for analysis.
3. Monitor and Control the activities in the Civil Engineering Projects in the view of Safety and Cost of the Project
4. Use engineering and project management skills for better construction management

DETAILED SYLLABUS:

UNIT I (08 Periods)

MASONRY AND FOUNDATIONS: Types of masonry – English and Flemish bonds – Rubble and Ashlar masonry – Cavity walls – Partition walls – Foundations – Shallow foundations – Spread, combined, strap and mat footings.

BUILDING COMPONENTS: Lintels, arches, vaults, stair cases – Different types of floors – Concrete, mosaic, terrazzo floors – Pitched, flat and curved roofs – Lean–to–Roof, coupled roofs, trussed roofs – King and Queen post trusses – RCC Roofs – Madras Terrace/Shell Roofs.

UNIT II (09 Periods)

FINISHINGS: Damp Proofing , water proofing, Termite proofing, Fire proof materials used – Plastering – Pointing – White washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish.

SHORING, SCAFFOLDING AND FORM WORK: Types, Erection methodology, Latest equipment, Safety precautions.

UNIT III (11 Periods)

ORGANIZATION: Types of organization – Merits and demerits of different types of organization – Labour legislation in India – Workmen's Compensation Act of 1923 and Minimum Wages Act of 1948, and subsequent amendments– Safety in construction.

RESOURCE MANAGEMENT :Manpower: Resource smoothing – Resource leveling – Establishing workers productivity. **Materials:** Objectives of material management – Costs – Functions of material management departments – ABC classification of materials – Inventory of materials – Material procurement – Stores management. **Machinery: (**Basics only) Classification of construction equipment – Earth moving equipment – Excavation equipment – Hauling equipment – Earth compaction equipment – Hoisting equipment – Concreting plant and equipment – Selection of equipment –Task consideration – Cost consideration – Factors affecting the selection – Factors affecting cost owning and operating the equipment – Equipment maintenance.

UNIT IV (07 Periods)

PROJECT MANAGEMENT, BAR CHARTS AND MILESTONE CHARTS:

Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives – Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT network problems.

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK:

Introduction – Event – Activity – Dummy – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network– Work breakdown structure – Hierarchies – Illustrative examples.

UNIT V (10 Periods)

PERT AND CPM : Network analyses – PERT – Slack – Critical path – Illustrative examples – Probability of meeting scheduled date problems – CPM Process – CPM Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L – Start and finish times of activity – Float – Critical activities and critical path – Resource allocation – Leveling – Crashing Illustrative examples.

Total Periods: 45

TEXT BOOKS

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Building Construction,* 10th Edition, Laxmi Publications (P) Ltd., 2010**.**

2. B.C.Punmia, K.K. Khandelwal, *Project Planning and Control with PERT and CPM,* 4th Edition, Lakshmi Publications (P). Ltd., 2010.

REFERENCE BOOKS

1. Jha, *Construction Project Management,* 1st Edition, Pearson Pubilications, 2011.
2. KK Chitkara, *Construction Project Management: Planning, Scheduling and Controlling*, 3rdEdition,Tata McGraw Hill Education Pvt. Ltd., 2014
3. S. Seetharaman, *Construction Engineering and Management,* 3rd Edition, Umesh Publications, 2010.
4. R. Chudly, Roger Greno, Mike Hurst and Simon Topliss, *Construction Technology – Vol. I and Vol. II,* 5th Edition, Longman, 2011.

NOTE: Booklet containing relevant extracts from Standards and Codes, prepared by the Department, should be made available to Students during examinations

II B.Tech II Semester
14BT40103: **SURVEYING**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

COURSE DESCRIPTION: Linear Measurements and Chain Surveying – Computation of Areas and Volumes – Compass Surveying– Leveling and Contouring – Theodolite – Tacheometric Surveying & Curves – Electronic Distance Measurement – Total Station.

COURSE OUTCOMES:

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

1. Apply the principles of mathematics, sciences in the field for evaluating heights, areas and volumes in surveying engineering
2. Analyze and interpret the survey techniques in calculating areas and volumes
3. Perform a survey and preparea a plot using appropriate methods

DETAILED SYLLABUS:

UNIT I (08 Periods)

LINEAR MEASUREMENTS AND CHAIN SURVEYING: Principle – Classification – Accuracy and errors – Linear measurements – Direct measurements – Instruments for chaining – Ranging out survey lines – Errors in chaining – Field book – Instruments for setting right angles.

COMPUTATION OF AREAS AND VOLUMES: Areas: Areas dividing into number of triangles – By offsets to a base line – By latitudes and departures (D.M.D. and D.P.D) – By coordinates – Areas from maps – Determination of the capacity of reservoir.

UNIT II (10 Periods)

COMPASS SURVEYING: Types of compass – Bearings – Included angles– Errors and Adjustments.

LEVELLING AND CONTOURING: Types of levels – Auto Level – Temporary and permanent adjustments – Height of instrument and rise and fall methods – Effect of curvature and refraction – Characteristics of contours – Uses of contour maps.

UNIT III (09 Periods)

THEODOLITE : Description and uses of vernier micrometer – Micro–optic theodolites – Temporary and permanent adjustments of vernier transit – Measurement of horizontal and vertical angles – Heights and distances – Traversing – Closing error and distribution – Gale's traverse table – Omitted measurements.

UNIT IV **(10 Periods)**

TACHEOMETRIC SURVEYING: Principle of stadia method – Distance and elevation formulae for staff held vertical and normal –Instrumental constants – Anallactic lens – Tangential method.

CURVES: Basic definitions – Different types and their characteristics – Geometry – Setting out – Filed problem of Circular curve, Transition curve, Combined curve and Vertical curve by using Tacheometry.

UNIT V **(08 Periods)**

ELECTRONIC DISTANCE MEASUREMENT: Modern surveying electronic equipments: digital levels, digital theodolites, EDMs.

TOTAL STATION: Principles – Working and applications: Measurement of Distance, Area, Height, Angles, Gradients, Traversing, Contouring, Stake out – Data Analysis.

Total Periods: 45

TEXT BOOKS

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Surveying – Vol. I, II and III*, 15th Edition, Laxmi Publications (P) Ltd., 2010.
2. R. Subramanian, *Surveying and Leveling*, 1st Edition, Oxford University Press, 2010.

REFERENCE BOOKS

1. S. K. Duggal, *Surveying – Vol. I and II*, 3rd Edition, Tata McGraw–Hill Publishing Co. Ltd., 2010.
2. Arthur R. Benton and Philip J. Taety, *Elements of Plane Surveying*, 3rd Edition, McGraw Hill, 2010.
3. Arora, K. R., *Surveying – Vol. I and II,* 14th and 11th Edition, Standard Book House, 2011.
4. T P Kanetkar,S V Kulakarni , *Surveying and leveling by*, 24th Edition, Vidyathi grisha prakasham, 2013.

II B.Tech II Semester
14BT40104: FLUID MECHANICS – II

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Fluid Mechanics–I

COURSE DESCRIPTION: Boundary Layer Theory – Open Channel Flow – Impact of Jets – Hydraulic Turbines – Centrifugal Pumps – Hydropower Engineering.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Explain open channel flows, turbines and pumps and apply the fundamentals of mathematics in solving boundary layer problems
2. Analyze the forces on a body, formation of a jump in a channel and efficiency of pumps and turbines.
3. Design a channel for a given condition and a turbine for a specified site

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

BOUNDARY LAYER THEORY : Boundary layer concepts – Thickness of boundary layer – Characteristics of boundary layer along a thin flat plate – Vonkarmen momentum integral equation – Laminar and turbulent boundary layers (no derivation) – Laminar sub–layer– Separation of boundary layer – Control of boundary layer– Flow around submerged bodies – Drag and lift – Magnus effect.

UNIT II **(09 Periods)**

OPEN CHANNEL FLOW: Types of flows – Types of channels – Velocity distribution – Chezy's, Manning's and Bazin's formulae for uniform flow – Most Economical sections – Critical flow – Specific Energy – Critical depth – Computation of critical depth – Critical, subcritical and supercritical flows – Non uniform flow – Dynamic equation for gradually varied flow – Types of slopes – Surface profiles – Direct step method – Rapidly varied flow – Hydraulic jump and its applications – Energy dissipation.

UNIT III **(8 Periods)**

IMPACT OF JETS : Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes – Series of vanes – Jet striking centrally and at tip – Velocity triangles at inlet and outlet – Expressions for work done and efficiency – Applications to radial flow turbines.

UNIT IV **(10 Periods)**

HYDRAULIC TURBINES : Layout of a typical hydropower installation – Heads and efficiencies –classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine – Working, working proportions – Velocity diagrams **–** Work done and efficiency – Hydraulic design – Runaway speed – Draft tube theory, function and efficiency – Governing of turbines – Surge tanks – Unit quantities and specific speed – Performance characteristics – Geometric similarity – Cavitation, causes, effects – Classification of hydropower plants – Load factor – Utilization factor – Capacity factor – Estimation of hydropower potential.

UNIT V **(09 Periods)**

PUMPS : Pump installation details – Classification of centrifugal pumps – Heads – Losses and efficiencies – Limitation of suction lift – Work done – Minimum starting speed – Specific speed – Multistage pumps –Pumps in parallel and series – Performance of pumps – Characteristic curves – Net positive suction head – Priming devices – Cavitation – Working procedure of Special pumps – Self priming pump – Gear pump – Jet pump – Airlift pump.

Total Periods: 45

TEXT BOOKS

1. P.N. Modi and S.M. Seth, *Hydraulics a*nd *Fluid Mechanics,* 18th Edition, Standard Book House, 2011.

2. K. Subramanya, *Flow in Open Channels*, 3rd Edition, Tata McGraw Hill Publishers, 2010.

REFERENCE BOOKS

1. R.K. Bansal, *Fluid Mechanics a*nd *Hydraulic Machines,* 9th Edition, Laxmi Publishers, 2011.
2. R.K. Rajput, *A Textbook of Fluid Mechanics*, 5th Edition, S. Chand Publishers, 2013.
3. V.T .Chow, *Open Channel Flow,* 3rd Edition, McGraw–Hill Publishers, 2009.
4. Domkundwar and Domkundwar, *A Textbook of Fluid Mechanics a*nd *Hydraulic Machines*, 6th Edition, Dhanpat Rai and Co, 2014.

II B.Tech II Semester

14BT40121: **SURVEYING LAB**

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: Engineering Mathematics and Engineering Physics

COURSE DESCRIPTION: Exercises on chain survey; compass survey; plane table survey; leveling, heights, distances and areas.

COURSE OUTCOMES:

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

1. Implement the procedure for an accurate and through note taking in the field work to serve as a legal note
2. Identify the differences in elevation, draw and utilize contour plots and calculate volume for earth work using different instruments
3. Design simple curves
4. Function effectively as a team member in multi–disciplinary teams
5. Effectively communicate information in written, oral and graphical formats

LIST OF EXPERIMENTS:

CYCLE –I

1. **CHAIN SURVEY:**
   1. Cross staff survey and plotting
   2. Chain traversing and plotting
2. **COMPASS SURVEY:**
   3. Determination of area by radiation method and plotting
   4. Compass traversing and plotting
3. **PLANE TABLE SURVEY**
   5. Resection – Two point and three point problems
4. **LEVELLING:**
   6. Longitudinal and cross–sectioning of a road profile and plotting.
   7. Contouring exercise

CYCLE –II

5. **THEODOLITE SURVEY:**
   8. Measurement of horizontal angles by method of repetition and reiteration.

9. Trigonometric leveling – Measurement of heights and distances
10. Setting out a simple curve by Rankine's method

6. **TOTAL STATION SURVEY:**
    11. Determination of area using total station
    12. Determination of remote height using total station.
    13. Distance between two inaccessible points.
    14. Traversing using total station

II B.Tech II Semester

14BT40122: **FLUID MECHANICS AND HYDRAULIC MACHINERY LAB**

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: Fluid Mechanics – I & II

COURSE DESCRIPTION: Calibration of Flow Meters – Bernoulli's Apparatus – Performance of Turbines and Pumps – Losses Through Pipes.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Understand the working procedure of various flow measuring devices and hydraulic machines
2. Perform the test on flow measuring devices and hydraulic machines
3. Perform individually and in groups to find the flow rate and efficiency of pumps and turbines
4. Check the efficiency of hydraulic machines and write reports on the suitability of the machine

LIST OF EXPERIMENTS:

1. Calibration of Venturimeter
2. Calibration of Orificemeter
3. Determination of coefficient of discharge for a small orifice by a constant head method.
4. Calibration of rectangular notch
5. Determination of loss of head due to sudden contraction
6. Determination of friction factor for pipes
7. Verification of Bernoulli's equation.
8. Impact of jet on vanes
9. Study of hydraulic jump.
10. Performance test on Pelton wheel turbine
11. Performance test on Francis turbine
12. Performance test on Kaplan turbine.
13. Performance test on single stage centrifugal pump
14. Performance test on multi stage centrifugal pump
15. Performance test on reciprocating pump

III B.Tech I Semester

14BT5HS02: **MANAGEMENT SCIENCE**

(Common to CSE, IT, CSSE, CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PRE-REQUISITES: -

COURSE DESCRIPTION:

Concepts of Management, Evolution of thought of Management, Functions of Management, Environmental Scanning, SWOT analysis, Social Responsibility of Management, Operations Management, Forecasting Methods, Work study, Method Study, Work measurement, Statistical Quality Control, Inventory Management, Marketing, Marketing functions, Human Resource Management, Job evaluation, merit rating, Theories of motivation, Project Management, CPM, PERT, Project cost analysis, Project crashing, Entrepreneurship, Entrepreneur vs Manager, Contemporary Management practices, Just-in-time, Enterprise Resource Planning, Business Process Outsourcing, Intellectual property rights and Supply chain management.

COURSE OUTCOMES:

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

1. Employ fundamental knowledge on 'Management Thought' and 'Management of a business organization'.
2. Apply various Managerial concepts & contexts to attain 'Optimum Utilization of available organizational resources'.
3. Contribute to the group, as an individual, in accomplishing the stated objective of the business organization.
4. Apply gained knowledge on Management to establish and run his/her own organization, if he/she deserve to be an 'Entrepreneur'.
5. Imbibe contemporary practices in applying Management and exercise discernment in implementing managerial decisions for ethical, safe, and sustainable operations of the business

DETAILED SYLLABUS:

UNIT – I: INTRODUCTION TO MANAGEMENT AND ORGANIZATION (9 Periods)

Concepts of management and organization - Nature and Importance of management - Evolution of management thought - Functions of management - Contributions of F.W. Taylor and Henri Fayol to the management - Systems approach to management - Managerial skills - Elements of corporate planning process - Environmental scanning - SWOT Analysis - Social responsibilities of management. Basic concepts related to organization- Objectives, Procedure and Principles; Types of organizations – Merits, demerits and adoptability to modern firms.

UNIT – II: OPERATIONS MANAGEMENT (12 Periods)

Principles and types of plant layout - Methods of production - Forecasting - Forecasting methods - Work study - Basic procedure involved in method study and work measurement - Statistical quality control: Factors affecting quality - Quality control using control charts (simple problems) - Acceptance sampling. Materials management objectives; Inventory - Types of inventory – Classical EOQ model - - ABC analysis - Purchase procedure - Stores management. **Marketing:** Functions of marketing - Marketing mix - Channels of distribution.

UNIT – III: HUMAN RESOURCES MANAGEMENT (HRM) (6 Periods)

Nature and scope of HRM - Functions of HRM - Role of HR Manager in an organization, Job evaluation and merit rating - Maslow's theory of human needs - McGregor's theory X and theory Y - Herzberg's two-factor theory.

UNIT–IV: PROJECT MANAGEMENT (PERT/CPM) AND ENTREPRENEURSHIP (9 Periods)

Network analysis - Program evaluation and review technique (PERT) - Critical path method (CPM) - Probability of completing the project within given time - Project cost analysis - Project crashing.

Introduction to entrepreneurship - Entrepreneurial traits - Entrepreneur vs. manager - Role of entrepreneurship in economic development - Women as an entrepreneur.

UNIT – V: CONTEMPORARY MANAGEMENT PRACTICES (9 Periods)

Basic concepts of Just-In-Time (JIT) system - Total quality management (TQM) - Value chain analysis - Enterprise resource planning (ERP) - Business process outsourcing (BPO) – Globalization-Management challenges - Intellectual property rights - Supply chain management - Role of information technology in managerial decision making.

Total Periods:45

TEXT BOOKS:

1. O.P. Khanna, *Industrial Engineering and Management,* Dhanpat Rai and Sons, 2010.
2. Stoner, Freeman and Gilbert, *Management,* 6th Edition, Pearson Education, New Delhi, 2005.

REFERENCE BOOKS:

1. Kotler Philip and Keller Kevin Lane, *Marketing Management,* 12th Edition, PHI, New Delhi, 2007.
2. Koontz and Weihrich, *Essentials of Management,* 6th Edition, TMH, New Delhi, 2007.
3. N.D. Vohra, *Quantitative Techniques in Management,* 2nd Edition, TMH, New Delhi.
4. Heinz Weihrich and Harold Koontz*, Management- A Global Perspective,* 10th Edition, Mc.Graw Hill International Ltd.

III B. Tech I Semester
14BT4HS02: **PROFESSIONAL ETHICS**
(Common to CSE, IT, CSSE, CE & ME)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

COURSE DESCRPTION: Engineering Ethics, Moral autonomy and Moral dilemmas – Professional and Ideal Virtues, Professional Responsibility and Moral Leadership – Engineering as Social Experimentation, Conscientiousness and Law of Engineering - Responsibilities and Rights, Whistle Blowing – Global Issues, Managerial Ethics.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Apply the principles of ethics to solve engineering problems
2. Analyze the problems in the implementation of moral autonomy and resolve through consensus
3. Responsible to follow the codes of ethics
4. Practice professionalism in Engineering and assess the issues pertaining to moral dilemmas
5. Function as a member, consultant, Manager, Advisor and Leader in multi–disciplinary teams
6. Write reports without bias and give instructions to follow ethics

DETAILED SYLLABUS:

UNIT I **(8 Periods)**

ENGINEERING ETHICS

Scope and Aim of Engineering Ethics–Senses of Engineering Ethics– Variety of Moral Issues–Types of Inquiry– Moral Dilemmas– Moral Autonomy– Kohlberg's Theory, Gilligan's theory, Consensus and Controversy,

UNIT II **(10 Periods)**

PROFESSIONAL IDEALS AND VIRTUES

Theories about Virtues, Professions, Professionalism – characteristics, expectations, Professional Responsibility, Integrity, Self–respect, Sense of "Responsibility". Self–interest, Customs and Religion– Self–interest and Ethical Egoism, Customs and Ethical Relativism, Religion and Divine Command Ethics. Use of ethical theories– resolving moral dilemmas and moral leadership.

UNIT III **(9 Periods)**

ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering as experimentation– Similarities to standard experiments, learning from the past and knowledge gained. Engineers as Responsible Experimenters–Conscientiousness, moral autonomy and accountability. The challenger case, codes of ethics and limitations. Industrial standards, problems with the law of Engineering.

UNIT IV **(9 Periods)**

RESPONSIBILITIES AND RIGHTS

Collegiality and Loyalty, Respect for authority, collective bargaining, confidentiality, conflict of interests, occupational crime. Rights of Engineers– Professional rights, whistle–blowing, the bart case, employee rights and discrimination.

UNIT V **(9 Periods)**

GLOBAL ISSUES

Multinational corporations–Professional ethics, environmental ethics, computer ethics, Engineers as Consultants, Witnesses, Advisors and Leaders. Engineers as Managers – Managerial ethics applied to Engineering Profession, moral leadership.

Total Periods: 45

TEXT BOOKS

1. Mike W. Martin, Roland Schinzinger, *Ethics in Engineering*, 3rd Edition, Tata McGraw–Hill, 2007.
2. Govindarajan M, Nata Govindarajan. M, Natarajan. S, Senthilkumar. V.S, *Engineering Ethics*, Prentice Hall of India, 2004.

REFERENCE BOOKS

1. Dr. S. Kannan, K. Srilakshmi, *Human Values and Professional Ethics*, Taxmann Allied Services Pvt Ltd., 2009.
2. Edmund G. Seebauer and Robert L. Barry, *Fundamental of Ethics for Scientists and Engineers*, 1st Edition, Oxford University Press, 2001.
3. Charles F. Fledderman, *Engineering Ethics*, Pearson Education, 2004.
4. R. Subramanaian, *Professional Ethics*, Oxford Higher Education, 2013

III B.Tech I Semester
14BT50101:**STRUCTURAL ANALYSIS – II**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Structural analysis – I

COURSE DESCRIPTION: Shear Force and Bending Moment**,** Concentrated Load and Moving Load, Influence Lines – Moment Distribution Method – Slope–Deflection Method – Kani's Method – Energy Method – Redundant Pin–Jointed Frames – Multi Storey Frames.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Understand the concepts of Moving loads, influence lines, slope deflection, moment distribution method, Kani's method, energy methods

2. Analyse the beams and frames using different methods

DETAILED SYLLABUS:

UNIT I **(10 Periods)**

MOVING LOADS : Maximum SF and BM at a given section and absolute maximum SF and BM due to single concentrated load, UDL longer than the span, UDL shorter than the span, two point loads and several point loads – Equivalent uniformly distributed load – Focal length.

INFLUENCE LINES: Influence line for support reaction, shear force and bending moment – Load position for maximum SF and for maximum BM at a section – Point loads, UDL longer than the span, UDL shorter than the span – Influence lines for forces in members of Pratt and Warren trusses.

UNIT II **(10 Periods)**

SLOPE–DEFLECTION METHOD: Basic concepts – Slope deflection equation – Application to continuous beams with and without settlement of supports.

MOMENT DISTRIBUTION METHOD: Basic concepts – Stiffness factor – Carry over factor – Application to continuous beams with and without settlement of supports.

UNIT III **(10 Periods)**

KANI'S METHOD: Analysis of continuous beams including settlement of supports – Single bay, single storey portal frames without side sway.

ENERGY METHOD: Strain in linear elastic system – Expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem – Deflections of simple beams and pin jointed plane trusses.

UNIT IV **(08 Periods)**

MULTI STOREY FRAMES (Approximate Methods): Substitute frame method (Two cycle method) for gravity loads – Portal method and cantilever method for lateral loads.

UNIT V **(07 Periods)**

REDUNDANT PIN–JOINTED FRAMES: Introduction to indeterminate frames – Static and kinematic indeterminacies – Castigliano's theorem – Analysis of pin–jointed frames with upto two degrees of internal and external indeterminacies.

Total Periods:45

TEXT BOOKS

1. Ramamrutham, S. and Narayanan, R., *Theory of Structures*,9th Edition, DhanpatRai Publishing Co. Ltd., 2014.
2. V.N. Vazirani, M.M. Ratwani and S.K.Duggal, *Analysis of Structures – Vol.II*, 16th Edition, Khanna Publications, 2013.

REFERENCE BOOKS

1. H.J.Shah and S.B.Junnarkar, *Mechanics of Structures – Vol.II*, 21st Edition, Charotar Publishing House, 2010.
2. Pandit, G., Gupta.S. and Gupta.R., *Theory of Structures – Vol. II*, 1st Edition, Mc.Graw Hill Publishing Co. Ltd., 1999.
3. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *SMTS–II –Theory of Structures*, 12th Edition, Laxmi Publications (P) Ltd., 2004.
4. R.S.Khurmi, *Theory of Structures*, 22nd Edition, S. Chand & Company Ltd., 2010.

III B.Tech I Semester

14BT50102: REINFORCED CEMENT CONCRETE STRUCTURES – I

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Building Materials and Concrete Technology, Structural Analysis

COURSE DESCRIPTION: Introduction to IS 456 recommendations, Working Stress Method, Limit State Method – Design of Beams – Design of Columns – Design of Footings – Design of Slabs.

COURSE OUTCOMES:

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

1. Demonstrate the knowledge concepts, techniques of design of reinforced cement concrete structural elements
2. Analyze reinforced cement concrete structural elements
3. Design beams, columns and footings using IS Code .

DETAILED SYLLABUS:

UNIT I **(08 Periods)**

INTRODUCTION TO IS CODAL PROVISIONS: IS 456 recommendations– Reinforced cement concrete, Concrete (constituents, grades, setting time and its behavior under tension and compression), Steel (types, grades and its behavior under tension and compression), Characteristic loads – Characteristic strength – Partial safety factors, Bonding between concrete and steel, Design methods of various RCC elements of a structure(Working stress method and Limit state method).Design of beam using working stress method.

UNIT II **(09 Periods)**

BEAMS: Limit state design of singly reinforced and doubly reinforced beam in detail.

UNIT III **(08 Periods)**

COLUMNS: Short and long columns under axial loads – Slender columns.

UNIT IV **(10 Periods)**

FOOTINGS: Different types of footings – Design of isolated square, rectangular and circular footings– Design of combined footing.

UNIT V **(10 Periods)**

SLABS: Design of one way slab – Two–way slab – Continuous slab using IS Coefficients.

Total Periods:45

TEXT BOOKS

1. S. UnnikrishnaPillai and DevdasMenon, *Reinforced Concrete Design*, 3rd Edition, Tata Mc.Graw Hill, 2010.
2. S.K. Ray and N.C. Sinha, *Fundamentals of Reinforced Concrete*, 5thEdition, S. Chand & Company & Ltd., 2010.

REFERENCE BOOKS

1. P.C. Varghese, Limit State Designed of Reinforced Concrete, 2nd Edition, Prentice Hall of India, 2010.
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete Structures – Vol. I*, 19th Edition, Laxmi Publications Pvt. Ltd., 2010.
3. N. Krishna Raju and R.N. Pranesh,*Reinforced Concrete Design*, 3rdEdition, CBS Publishers Distributors, 2010.
4. M.L. Gambhir, *Fundamentals of Reinforced Concrete Design*, 1st Edition, Printice Hall of India Pvt. Ltd., 2010.

Codes: IS 456–2000 code book is to be permitted into the examination hall.

III B.Tech I Semester
14BT50103:WATER SUPPLY ENGINEERING

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Environmental Sciences, Fluid Mechanics–I

COURSE DESCRIPTION: Water quality and introduction to water supply – water collection, conveyance and distribution – water treatment – advanced treatment methods – water supply arrangements in buildings.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Explain the concepts of water quality, water quantity and water distribution
2. Analyze the water samples for finding different impurities present in water .
3. Design a pipe network for supplying water from a main source .
4. Assess the reasons for ill health due to disinfected water consumption and provide necessary solutions to treatment for the benefit of the society .

DETAILED SYLLABUS:

UNIT I (08 Periods)

WATER QUALITY AND INTRODUCTION TO WATER SUPPLY: Importance of water supply engineering – Need for protected water supply – Objective of water supply systems – Flow diagram of water supply systems. Different sources of water **–** Quantity and quality of different sources – Physical, chemical and biological impurities and their testing– Types and variation in water demand – Factors affecting water demand – Design period – Forecasting of population, different methods and their suitability, Water quality standards.

UNIT II (10 Periods)

WATER COLLECTION, CONVEYANCE AND DISTRIBUTION : Intake works for collection of surface water – Conveyance of water – Gravity and pumping methods – Different materials used for conveying conduits and their suitability – Systems of distribution – Distribution reservoirs – Distribution networks – Design of simple networks – Pipe accessories – Valves and their location and suitability.

UNIT III **(09 Periods)**

WATER TREATMENT: Conventional water treatment processes, units and their functions – Theory and design of aeration, coagulation, flocculation, and clarification – Determination of optimum dose of alum for coagulation of water. Theory of filtration – Different types of filters and their design – Disinfection – Disinfectants – Mechanism of disinfection – Different methods of disinfection – Break point chlorination – Types chlorination – Dose of disinfectant.

UNIT IV **(09 Periods)**

ADVANCED TREATMENT METHODS: Removal of fluorides, arsenic, hardness, iron and manganese, salinity, colour, organic chemical and biological residues – Adsorption with activated carbon, ion–exchange resins, membrane processes, chemical oxidation.

UNIT V **(09 Periods)**

WATER SUPPLY ARRANGEMENTS IN BUILDINGS: Definition of technical terms used in water supply arrangements – Identification of different water supply of pipes – General layout of water supply in single storey and multi– storied buildings – Principles and precautions in laying pipe lines in the premises of buildings – Connection from water main to building – Water supply fittings – Detection and prevention of leakage.

Total Periods:45

TEXT BOOKS

1. G.S. Birdie and J. S. Birdie, *Water Supply and Sanitary Engineering*, 9th Edition , Dhanpat Rai and Sons Publishers, 2011.
2. S.K. Garg, *Environmental Engineering,Vol. I: Water Supply Engineering*, 20th Edition Khanna Publishers, 2011.

REFERENCE BOOKS

1. K.N. Duggal, *Elements of Environmental Engineering*, 1st Edition S.Chand Publishers, 2010.
2. H.S. Peavy and D.R.Rowe, *Environmental Engineering*, 2nd Edition, Mc.Graw Hill Publishing Company, , 1984.
3. P.N.Modi, *Water Supply Engineering*, 3rd edition, Standard book house, 2010.
4. S.K.Duggal, *Elements of water Supply Engineering,* 1st Edition, S. Chand & Co, 2010.

III B.Tech I Semester

14BT50104: **SOIL MECHANICS**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Engineering Mechanics, Engineering Geology

COURSE DESCRIPTION: Basic principles of soil mechanics and their application in engineering practice; Index properties; Engineering properties: Permeability; Seepage – Stress distribution; Compaction; Consolidation; Shear strength.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to

1. Understand the behaviour of soil as an engineering material
2. Provide the description and classification of soil and analyze stresses in soils under different loading conditions.
3. Address problems associated with flow through soils and suggest suitable methods.

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

INDEX PROPERTIES OF SOILS: Soil formation – Types of soils – Soil structure and clay mineralogy – Adsorbed water – Volume–weight relationships – Three–phase diagram – Moisture content – Specific gravity – In–situ density – Relative density– Grain size analysis – Sieve and hydrometer methods – Plasticity of soils – Consistency limits and indices – I.S. Classification of soils – Sensitivity – Thixotropy – Activity of soil.

UNIT II **(09 Periods)**

PERMEABILITY: Soil water – Capillary rise – Flow of water through soils – Darcy's law – Permeability – Factors affecting permeability – Laboratory determination of coefficient of permeability – Permeability of layered systems.

SEEPAGE THROUGH SOILS: Effective stress principle – Effective stress under different loading conditions – Seepage pressure **–** Quicksand condition – Seepage through soils – Flownets: Characteristics and uses – Seepage through earth dams with horizontal filter – Critical hydraulic gradient.

UNIT III **(09 Periods)**

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for point loads, circular and rectangular loaded areas – Newmark's influence chart – Approximate methods – Contact pressure distribution.

COMPACTION: Mechanism of compaction – Optimum moisture content and maximum dry density – Factors affecting compaction – Effects of compaction on soil properties – Laboratory determination of OMC and MDD – Field compaction methods – Compaction control.

UNIT IV (09Periods)

CONSOLIDATION OF SOILS : Initial, primary and secondary consolidation – Spring analogy for primary consolidation – Consolidation test – e–p and e–log p curves – Terzaghi's theory of one dimensional consolidation – Coefficient of consolidation – Preconsolidation pressure – Secondary consolidation.

UNIT V (09Periods)

SHEAR STRENGTH OF SOILS: Mohr–Coulomb failure theories – Types of laboratory shear strength tests – Strength tests based on drainage conditions and their field applicability – Shear strength of cohesionless soils – Critical void ratio – Liquefaction – Shear strength of cohesive soils – Skempton's pore pressure coefficients.

Total Periods:45

TEXT BOOKS

1. Gopal Ranjan and A. S. R. Rao, *Basic and Applied Soil Mechanics,* 2nd Revised Edition, New age International Pvt. Ltd., 2014.

2. K. R. Arora, *Soil Mechanics and Foundation Engineering,* 7thEdition, Standard Publishers and Distributors, 2014.

REFERENCE BOOKS

1. Braja. M. Das, *Principles of Geotechnical Engineering,* 7th Edition, Cengage Learning India, 2009.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation,* 16th Edition, Laxmi Publications Pvt. Ltd., 2014.
3. C. Venkatramaiah, *Geotechnical Engineering,* 3rd Edition, New Age International Publishers, 2010.
4. Lambe, T. W. and Whitman, R. V., *Soil Mechanics,* John Wiley and Sons, Singapore, 2000.

III B.Tech I Semester
14BT50105: ENGINEERING HYDROLOGY

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Fluid Mechanics I and II

COURSE DESCRIPTION: Hydrologic cycle, applications and history – Weather and seasons in India – Precipitation – Evaporation and evapotranspiration – Runoff – Hydrograph analysis – Design flood – Erosion and reservoir sedimentation.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Explain hydrological cycle, characteristics of runoff and principles of sedimentation .
2. Analyze and interpret the rainfall data and measure precipitation & runoff .
3. Develop solutions in estimating runoff and the flood routing for the safety of public .

DETAILED SYLLABUS:

UNIT I (09Periods)

INTRODUCTION TO HYDROLOGY AND PRECIPITATION: Definition and scope of hydrology – Hydrologic cycle – Practical applications and historical development – Precipitation – Types and forms of precipitation – Weather and seasons in India – Measurement of rainfall – Recording and non–recording type of rain gauges – Errors in measurement – Analysis and interpretation of rain fall data – Methods of calculation of mean precipitation over an area

UNIT II (09Periods)

EVAPORATION AND INFILTRATION: Process – Factors affecting evaporation – Estimation – Methods of reduction – Infiltration **–** Definition – Factors affecting infiltration – Infiltration equation and indices – Interception – Evapotranspiration – Factors affecting – Measurement

UNIT III (09Periods)

RUNOFF : Components – Factors affecting runoff – Rainfall–Runoff relationships – Flow mass curve – Flow duration curves – Mass curve of rainfall – Hyetograph – Double mass curve – Measurement – Stream flow – Measurement of discharge – Area velocity method – Moving boat method – Current meter – Float methods.

UNIT IV **(09Periods)**

HYDROGRAPH ANALYSIS AND FLOOD: Components of Hydrograph – Unit Hydrograph – Derivation – Use and limitation of unit hydrograph – Flood – Methods – Envelope curves – Empirical formulae – Rational method – Unit hydrograph method – Frequency analysis – Flood routing.

UNIT V **(09Periods)**

EROSION AND RESERVOIR SEDIMENTATION

Introduction – Erosion process – Estimation of sheet erosion – Channel erosion – Movement of sediment from Watersheds – Sediment yield from Watersheds – Trap efficiency – Density of sediment deposits – Distribution of sediment in the reservoir – Life of a reservoir – Reservoir sedimentation control – Erosion and reservoir sedimentation problems in India.

Total Periods:45

TEXT BOOKS

1. K. Subramanya, *Engineering Hydrology*, 4th Edition, Tata McGraw–Hill Education Pvt. Ltd., 2013.
2. P. Jaya Rami Reddy, *A Text book of Hydrology,* 3rd Edition, University Press, Laxmi Publications, 2011.

REFERENCE BOOKS

1. H.M. Raghunath, *Grou*nd *Water,* 3rd Edition, Wiley Eastern Ltd., 2009.
2. David Keith Todd, *Grou*nd *Water Hydrology,* 2nd Edition, Wiley India Pvt. Ltd., 2010.
3. V.T. Chow., *Ha*nd *Book of Applied Hydrology,* 2nd Edition, Mc Graw–Hill Education Pvt. Ltd., 2000.
4. C.S.P. Ojah, R. Berndtsson, P. Bhunya, *Engineering Hydrology*, 5th Edition, Oxford Higher Education, 2008.

III B.Tech I Semester

14BT50121 : COMPUTER AIDED BUILDING PLANNING & DRAWING LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: Building materials and Concrete Technology

COURSE DESCRIPTION: Loading bearing walls; RCC framed structures; Industrial buildings; views on one and two storey buildings.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Explain knowledge on building planning and drawing; and AutoCAD drafting
2. Analyse the given data to draw plan, elevation and cross sectional views of a structure
3. Draft the civil engineering drawing using Auto CAD
4. Prepare drawings and provide report on the building plan, section and elevation .

SOFTWARE: AUTOCAD

LIST OF EXPERIMENTS:

1. Buildings with load bearing walls (Flat and pitched roof) – Including details of doors and windows
2. RCC framed structures
3. Industrial buildings – North light roof trusses
4. Perspective view of one and two storey buildings

TEXT BOOKS

1. Varma B.P., *Civil Engineering Drawing and House Planning,* 10th Edition, Khanna Publishers, 2008.
2. Balagopal and T.S. Prabhu, *Building Drawing and Detailing,* Spades Publishers, 1987.

REFERENCE BOOKS

1. Shah, M.G., *Building Drawing,* Mc.Graw Hill, New Delhi, 2007.
2. Kumaraswamy N. and KameswaraRao A., *Building Planning and Drawing,* 4th Edition, Charotar Publishing, 2010.
3. Kale and Patki, Shah, *Building Drawing with Integrated Approach To Built Environment,* Mc.Graw Hill, New Delhi, 2002.
4. K.V.Natarajan, *A Text Book of Engineering Graphics,* N.Dhanalakshmi Publishers, 2015.

III B.Tech I Semester
14BT50122: GEOTECHNICAL ENGINEERING LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: Soil Mechanics

COURSE DESCRIPTION: Determination of water content and specific gravity, Grain size analysis, Tests for Atterberg's limits, Determination of field density, Relative density, Compaction test, CBR test, Permeability tests, Consolidation test, Direct shear test, Unconfined compression test, Triaxial test, Vane shear test.

COURSE OUTCOMES

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

1. Demonstrate knowledge on laboratory testing of soils
2. Analyze and interpret engineering behavior of soils.
3. Find suitability of soil for a civil engineering construction.
4. Recommend suitable ground improvement method based on soil type and application.
5. Give solutions to the problems of soil which are environmental friendly and economically viable.
6. Work effectively as an individual or in a group to determine soil properties
7. Prepare a report on the properties of soil for a given site

LIST OF EXPERIMENTS:

1. Determination of water content
2. Determination of specific gravity
3. Grain size analysis
4. Tests for Atterberg's limits
5. Determination of field density – core cutter and sand replacement method
6. Relative density test
7. Standard Proctor's Compaction test
8. CBR test
9. Permeability of soil – constant head test and variable head test
10. Consolidation test
11. Direct shear test
12. Unconfined compression test
13. Tri–axial compression test
14. Vane shear test

III B. Tech II semester

14BT5HS01: MANAGERIAL ECONOMICS AND PRINCIPLES OF ACCOUNTANCY

(Common to CSE, IT, CSSE, CE & ME)

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PRE-REQUISITE: Nil

COURSE DESCRIPTION: Managerial Economics; Demand and Elasticity of Demand; Supply and supply function; Production Functions; Markets and Pricing Policies; Formation of different types of Business Organizations; Basic concepts of Journal, Ledger and Trial balance; Trading Account, Profit and Loss Account and Balance sheet with simple adjustments; Computerized Accounting.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1 : Acquire Knowledge in

a) Tools and concepts of Micro Economics.
b) Basic Principles and concepts of Accountancy.
c) Provides life skills for effective utilization of scarce resources.
d) Financial Accounting.
e) Using advanced tools like tally and SAP.
f) Significance of Economics and Accountancy

2:Develop skills in analyzing problems for

a) Managerial decisions of an organization.
b) Demand & Supply, Production & Cost and Markets & Price through Economic theories.

3: Develop effective communication in Business and Accounting transactions.

DETAILED SYLLABUS:

UNIT – I (09 Periods)

INTRODUCTION TO MANAGERIAL ECONOMICS, DEMAND & SUPPLY ANALYSIS:

Definition, Nature and Scope of Managerial Economics. **Demand:** Determinants of demand – Demand function - Law of demand, assumptions and exceptions - Elasticity of demand –Types of elasticity of demand -Demand forecasting and methods of demand forecasting, **Supply-** Determinants of Supply and Supply function.

UNIT – II **(09 Periods)**

THEORY OF PRODUCTION AND COST ANALYSIS:

Production Function: Isoquants and Isocosts – Input-output relationship - Law of returns. **Cost Concepts:** Total, Average and Marginal Cost **-** Fixed vs. Variable costs –Opportunity Costs Vs Outlay Costs– Separable Costs Vs Joint Costs, Urgent Costs Vs Postponable Costs- Avoidable Costs Vs Unavoidable Costs - **Break Even Analysis (BEA)**–Assumptions, Merits and demerits - Determination of Break Even Point (Simple problems).

UNIT – III **(09 Periods)**

INTRODUCTION TO MARKETS AND PRICING

Market Structure: Types of Markets - Features of perfect competition - Monopoly and monopolistic competition - Price and Output determination in perfect competition and monopoly.

Pricing : Objectives and policies of pricing – Sealed bid pricing - Marginal cost pricing - Cost plus pricing - Going rate pricing - Market penetration – Market skimming - Block pricing – Peak load pricing - Cross subsidization.

Capital: Significance - Types of capital – Sources of Capital.

UNIT – IV **(09 Periods)**

INTRODUCTION AND PRINCIPLES OF ACCOUNTING:

Accountancy: Introduction – Concepts – Conventions – Accounting Principles - Double Entry Book Keeping – Journal – Ledger - Trial Balance (Simple problems).

UNIT – V **(09 Periods)**

FINAL ACCOUNTS:

Introduction to Final Accounts - Trading account - Profit and Loss account and Balance Sheet with simple adjustments (Simple problems).**Computerization of Accounting System :** Manual Accounting *Vs* Computerized Accounting – Advantages and Disadvantages of Computerized Accounting.

Total periods: 45

TEXT BOOKS:

1. A.R. Aryasri, *Managerial Economics and Financial Analysis,* 3rd Edition, Mc. Graw Hill, New Delhi, 2007.ISBN 13: 9780070078031
2. R.Cauvery, U.K. Sudhanayak, M. Girija and R. Meenakshi, *Managerial Economics,* 2nd Edition, S. Chand and Company, New Delhi, 2010.ISBN13:

REFERENCE BOOKS:

1. Vershaney and Maheswari, *Managerial Economics,* 19th Edition, Sultan Chand and Sons, New Delhi, 2005.
2. H. Craig Petersen and W. Cris Levis, *Managerial Economics,* 4th Edition, Pearson Education, 2009 ISBN-13: 978-0139762833

3. Lipsy and Chrystel, *Economics,* 12th Edition, Oxford University Press, New Delhi, 2011.ISBN 978-0-19-956338-8
4. S.P. Jain and K.L. Narang, *Financial Accounting,* 6th Edition, Kalyani Publishers, Ludhiana, 2002. ISBN 8127204242, 9788127204242.

III B.Tech II Semester

14BT60101: REINFORCED CEMENT CONCRETE STRUCTURES – II

Internal Marks	External Marks	Total Marks	L	T	P	C
30	70	100	3	1	-	3

PREREQUISITES: RCCS I

COURSE DESCRIPTION: Structures– Foundations: strap, raft and piles– Retaining walls– Domes and water tanks– Silos and Chimneys.

COURSE OUTCOMES:

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

1. Explain the types of stair cases, foundations and water tanks
2. Design stair case, foundation, retaining walls, water tanks, silos and chimney using IS code .
3. Suggest suitable type of foundation based on loading and soil conditions .

DETAILED SYLLABUS:

UNIT I **(08 Periods)**

STAIRCASES: Types of staircases – Stairs spanning longitudinally and transversally

UNIT II **(10 Periods)**

FOUNDATIONS: Strap footing – Raft foundations–Design of piles and pile caps

UNIT III **(09 Periods)**

RETAINING WALLS: Lateral earth pressure – Design of cantilever and counter fort retaining walls.

UNIT IV **(10 Periods)**

DOMES AND WATER TANKS: Stresses in domes–membrane theory–design of dome–types of water tanks–IS Code provisions–Design of water tanks with flexible base and rigid base.

UNIT V **(08 Periods)**

MISELLANEOUS STRUCTURES: Design of Silos – design of chimneys

Total Periods:45

TEXT BOOKS

1. S. Unnikrishna Pillai and Devdas Menon, *Reinforced Concrete Design*, 3rd Edition, Tata Mc.Graw Hill, 2010.
2. P.C. Varghese, *Limit State Design of Reinforced Concrete*, 2nd Edition Prentice Hall of India, 2010.

REFERENCE BOOKS

1. N.C. Sinha and S.K. Roy, *Fundamentals of Reinforced Concrete*, 5th Edition, S. Chand & Company Ltd, 2010.
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Limit state design of Reinforced Concrete,* Laxmi Publications Pvt. Ltd., 2007.
3. N. Krishna Raju and R.N. Pranesh, *Reinforced Concrete Design*, 3rd Edition, CBS Publishers Distributors, 2010.
4. M.L. Gambhir, *Fundamentals of Reinforced Concrete Design*, Prentice Hall of India Pvt. Ltd., 2010.

III B.Tech II Semester
14BT60102: **FOUNDATION ENGINEERING**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Soil Mechanics

COURSE DESCRIPTION:
Subsurface sampling and characterization methods; Lateral earth pressure; Earth retaining structures; Stability of earth slopes; Bearing capacity of shallow foundations; Allowable bearing pressure; Pile foundations; Caissons and well foundations.

COURSE OUTCOMES:
After completion of this course, a successful student will be able to:

1. Explain the soil condition at a given location in order to suggea suitable foundation.
2. Estimate bearing capacity, settlement of footings and Analyze slopes using limit equilibrium methods
3. Design foundations and retaining walls

DETAILED SYLLABUS:

UNIT I (09 Periods)

SOIL EXPLORATION : Need – Planning – Methods of soil exploration: Geophysical methods, open excavation methods, boring and sampling methods – Types of soil samples – Field tests: SPT, CPT, plate load test, in–situ vane shear test – Borehole logging – Soil investigation report.

UNIT II (09 Periods)

LATERAL EARTH PRESSURE: Types of earth pressures – Plastic equilibrium in soils – Rankine's theory: Earth pressures in cohesionless and cohesive soils - Coloumb's wedge theory – Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - Types of earth retaining structures - Stability considerations of gravity and cantilever retaining walls.

UNIT III (8 Periods)

STABILITY OF EARTH SLOPES : Infinite and finite earth slopes – Types of failures – Factor of safety of infinite slopes – Stability analysis of finite slopes: Bishop's simplified method, Taylor's stability number – Stability of slopes of earth dams under different conditions – Improving stability of slopes.

UNIT IV **(10 Periods)**

BEARING CAPACITY OF SHALLOW FOUNDATIONS: Types and choice of foundation - Depth of foundation - Types of shear failure – Safe bearing capacity - Bearing capacity theories: Terzaghi, Meyerhof, Skempton and IS methods - Effect of groundwater table on bearing capacity - Bearing capacity from SPT and CPT - Allowable bearing pressure - Safe bearing capacity and settlement from plate load test – Allowable settlements of structures – Settlement analysis.

UNIT V **(09 Periods)**

PILE FOUNDATIONS: Types of pile foundation – Factors influencing the selection of pile – Load carrying capacity of piles in granular and cohesive soils – Static and dynamic pile formulae – Pile load test – Negative skin friction – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

CAISSONS AND WELL FOUNDATIONS : Types of caissons – Bearing capacity – Construction – Advantages and disadvantages – Well foundations – Shape – Components of wells – Sinking of wells – Tilts and shifts.

Total Periods:45

TEXT BOOKS

1. C. Venkatramaiah, *Geotechnical Engineering,* 3rd Edition, New Age International Publishers, 2010.
2. K. R. Arora, *Soil Mechanics and Foundation Engineering*, 7th Edition, Standard Publishers and Distributors, 2010.

REFERENCE BOOKS

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation*, 16th Edition, Laxmi Publications Pvt. Ltd., 2005.
2. Gopal Ranjan and A. S. R. Rao, *Basic and Applied Soil Mechanics,* 2nd Revised Edition, New Age International Pvt. Ltd., 2010.
3. Braja M. Das, *Principles of Foundation Engineering,* 6th Edition, Cengage Learning India, 2007.
4. Bowles J.E., *Foundation Analysis and Design,* 5th Edition, McGraw–Hill Publishing Company, 2001.

III B.Tech II Semester

14BT60103: TRANSPORTATION ENGINEERING – I

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Surveying, Soil Mechanics

COURSE DESCRIPTION: Highway development and planning – Highway geometric design– Highway alignment and Highway drainage – Pavement types and Design – Highway construction and equipment – Railway Engineering, Tracks, Curves, Alignment – Airport Engineering, Runway & Lighting systems

COURSE OUTCOMES:

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

1. Understand the methodology of various tests on Highway materials and their significance
2. Assemble, analyze, and appropriately apply transportation engineering data from existing graphics, reports, and other documents
3. Design Highway Geometrics, Flexible and Rigid Pavements, Transportations systems and components

DETAILED SYLLABUS:

UNIT I **(08 Periods)**

HIGHWAY DEVELOPMENT AND PLANNING : Highway development in India – Necessity for highway planning – Different road development plans – Classification of roads – Road network patterns – Highway alignment – Factors affecting alignment – Engineering surveys – Drawings and reports.

HIGHWAY GEOMETRIC DESIGN : Importance of geometric design – Design controls and criteria– Highway cross section elements– sight distance elements – Stopping sight distance, overtaking sight distance and intermediate sight distance – Design of horizontal alignment – Design of super elevation and extra widening – Design of transition curves – Design of vertical alignment – Gradients – Vertical curves.—Numerical problems on all the above topics

UNIT II **(07 Periods)**

HIGHWAY MATERIALS : Aggregates and bitumen – Desirable properties – Laboratory tests on aggregate and bitumen, CBR test – Specifications – Aggregate bitumen mixes – Desirable properties – Mix design by Marshal method – Cement and cement concrete —Numerical Problems on all these methods of Testing

HIGHWAY DRAINAGE : Importance of highway drainage – Requirements – Surface drainage – Subsurface drainage – Drainage of slopes and erosion control – Road construction in water logged areas and black cotton soils –Numerical problems

UNIT III **(12 Periods)**

PAVEMENT DESIGN : Types of pavements Difference between flexible and rigid pavements – Pavement components – Sub grade, sub base, base and wearing course – Functions of pavement components – Design factors – Flexible pavement design methods – G.I method, CBR method, Triaxial method – Numerical examples – Design of rigid pavements – Critical load positions – Westergaard's stress equations – Computing radius of relative stiffness and equivalent radius of resisting section – Stresses in rigid pavements – Design of expansion and contraction joints in CC pavements. Design of dowel bars and tie bars – Numerical Problems in all above methods using Formulae and Charts.

UNIT IV **(09 Periods)**

HIGHWAY CONSTRUCTION: Earth work – Construction of WBM Roads – Bituminous Pavements – Cement Concrete Pavements – Joints in Cement Concrete Pavements – RCC and PCC Pavements

HIGHWAY CONSTRUCTION AND CONSTRUCTION EQUIPMENT: Excavators – Drilling Rock and Earth – Aggregate Production – Trucks and Haulage Equipment – Dozers – Scrappers – Finishing Equipment – Asphalt Mix Production and Placement – Concrete and Concrete Equipment – Piles and Pile Driving Equipment – Air Compressors and Pumps – Numerical Problems on output calculations

UNIT V **(09 Periods)**

RAILWAY ENGINEERING: Permanent way components – Cross section of permanent way – Functions of various components like rails, sleepers and ballast –Rail fastenings – Creep of rails – Theories related to creep – Adzing of sleepers – Sleeper density.

GEOMETRIC DESIGN OF RAILWAY TRACK: Gradients – Grade compensation – Cant and negative super elevation – Cant deficiency – Degree of curve – Crossings and turn out.

AIRPORT ENGINEERING: Factors affecting selection of site for airport – Aircraft characteristics – Geometric design of runway – Computation of runway length – Correction for runway length – Orientation of runway – Wind rose diagram – Runway lighting system.

Total Periods:45

TEXT BOOKS

1. S.K. Khanna and C.E.G.Justo, *Highway Engineering,* 10th Edition, Nemchand and Brothers, 2014.
2. S.P. Saxena, S.P. Arora, *Railway Engineering – A Text Book of Transportation Engineering,* 7th Edition, S.Chand and Co. Ltd., 2010.

REFERENCE BOOKS

1. S.K. Khanna and Arora, *Airport Planning and Design,* 6th Edition, Nemchand and Brothers, 2012.
2. KK Chitkara, *Construction Project Management: Planning, Scheduling and Controlling*, Tata McGraw Hill Education Pvt. Ltd., 2010
3. L.R.Kadyali, *Traffic Engineering and Transportation Planning,* 7th Edition, Khanna Publications, 2012.
4. SP Chandola, *A Text book of Transportation Engineering*, S Chand & Co Ltd, 2011

III B.Tech II Semester
14BT60104:**WASTEWATER TECHNOLOGY**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Water Supply Engineering

COURSE DESCRIPTION: Introduction to sewerage systems – Quantity and characterization of sewage – Preliminary and primary sewage treatment – Secondary treatment of sewage – Sludge management and effluent disposal.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Explain the characteristics of wastewater and its treatment processes
2. Analyze characteristics, treatment and disposal methods of wastewater
3. Design waste water treatment plant
4. Understand the impact on the environment due to onsite disposal of waste
5. Follow ethical standards for wastewater treatment and disposal using relevant IS codes

DETAILED SYLLABUS:

UNIT I **(06 Periods)**

INTRODUCTION TO SEWERAGE SYSTEMS Definition of terms – Sewage, sullage, refuse, garbage – Objectives of sewerage works systems– Sewage collection and disposal – Conservancy systems – Water carriage systems – Merits and demerits – Sewerage systems – Combined, separate, partially separate and combined systems – Merits and demerits**.**

UNIT II **(11 Periods)**

QUANTITY AND CHARACTERISTICS OF SEWAGE

Estimation of quantity of municipal wastewater – Estimation of quantity of storm water – Different types of sewers, design flows through sanitary sewers, storm sewers and combined sewers – Hydraulic design of sewers – Sewer appurtenances – House drainage and plumbing systems. Sampling of sewage – Characteristics and composition of sewage – Physical, chemical and biological properties – Total solids – C.O.D – B.O.D – Equation and factors affecting the BOD and rate of reaction.

UNIT III **(08 Periods)**

PRELIMINARY AND PRIMARY SEWAGE TREATMENT

Concept of waste water treatment, primary, secondary and tertiary treatment – Conventional treatment process flow diagrams of municipal wastewater treatment plants – Functions of each unit– Principles and design of screens, grit chamber, and primary settling tanks.

UNIT IV **(08 Periods)**

SECONDARY TREATMENT OF SEWAGE

Principles of biological treatment, nutritional requirement of biological treatment systems, factors affecting biological treatment systems – Design, construction, operation and maintenance of trickling filter– Activated sludge process – Oxidation ditch – Stabilization ponds.

UNIT V **(12 Periods)**

SLUDGE MANAGEMENT AND EFFLUENT DISPOSAL

Quantity and characteristics and types of sludge – Sludge conditioning and dewatering – Handling, treatment, sludge utilization and disposal – Tertiary treatment – Removal of nitrogen, phosphorus, refractory organic, heavy metals, suspended solids and pathogenic bacteria. Standards for disposal – Disposal into surface water bodies – Self purification, zones of pollution – Dissolved oxygen sag curve – Streeter Phelps equation– marine disposal – On land disposal and treatment systems – Overflow, flooding and irrigation – Onsite disposal systems – Septic tank and effluent disposal system.

Total Periods:45

TEXT BOOKS

1. G.S. Birdie and J. S. Birdie, *Water Supply and Sanitary Engineering*, 8th Edition, Dhanpat Rai and Sons Publishers, 2010.
2. P.N. Modi, *Sewage Treatment Disposal and Wastewater Engineering*, 3rd Edition, Standard Publishers Distributors, 2011.

REFERENCE BOOKS

1. S.K. Garg., *Environmental Engineering (Vol. II): Sewage Disposal and Air Pollution Engineering*, 22nd Edition, Khanna Publishers, 2010.
2. Met Calf and Eddy, *Wastewater Engineering*, 4th Edition, TMH Education Pvt. Ltd., 2010.
3. K.N. Duggal, *Elements of Environmental Engineering*, 1st Edition, S. Chand Publishers, 2010.
4. B.C. Punmia and Ashok Jain, *Waste water Engineering*, 2nd Edition, Laxmi Publications, 2014.

III B.Tech II Semester

14BT60105: ADVANCED STRUCTURAL ANALYSIS

(PROFESSIONAL ELECTIVE - I)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Structural Analysis

COURSE DESCRIPTION: Arches: two and three hinged arches– Portal frames– Flexibility method– Stiffness method– Curved beams.

COURSE OUTCOMES:

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

1. Analyze and interpret the data using different methods for arches, frames and curved beams .
2. Apply modern techniques in analyzing arches, frames and curved beams .

DETAILED SYLLABUS:

UNIT I **(10 Periods)**

ARCHES:

THREE HIGED ARCHES Types of arches–Elastic theory of arches – Eddy's theorem– Determination of horizontal thrust, bending moment, normal thrust and radial shear – Effect of temperature

TWO HINGED ARCHES: Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses – Tied arches – Fixed arches.

UNIT II **(09 Periods)**

PORTAL FRAMES: Analysis of single bay, single storey, portal frame including side sway – Shear force and bending moment diagrams by slope deflection and moment distribution methods.

UNIT III **(09 Periods)**

FLEXIBILITY METHOD: Flexibility coefficients – Flexibility matrices – Sign convention – Application to continuous beams – Temperature stresses – Lack of fit – Support settlements.

UNIT IV **(09 Periods)**

STIFFNESS METHOD: Stiffness coefficients – Stiffness matrices – Application to continuous beams – Effect of support displacements– Temperature stresses.

UNIT V **(08 Periods)**

CURVEDBEAMS: Circular beams loaded uniformly and supported on symmetrically placed columns – Semi–circular beams simply supported on three equally spaced supports.

Total Periods:45

TEXT BOOKS

1. V.N. Vazirani, M.M.Ratwani and S.K.Duggal, *Analysis of Structures – Vol. I*, 17th Edition and *Vol. II*, 16th Edition, Khanna Publications, 2013.
2. Ramamrutham, S. and Narayanan, R., *Theory of Structures*, 9th Edition, Dhanpat Rai Publishing Co. Ltd., 2014.

REFERENCE BOOKS

1. H.J.Shah and S.B. Junnarkar, *Mechanics of Structures – Vol. II*, 21st Edition, Charotar Publishing House, 2010.
2. Pandit, G., Gupta, S. and Gupta, R., *Theory of Structures – Vol. II*, 1st Edition, Tata Mc–Graw Hill Publishing Co. Ltd., 1999.
3. Punmia, B. C., Ashok Kumar Jain and Arun Kumar Jain, *SMTS–II – Theory of Structures*, 12thEdition, Laxmi Publications (P) Ltd**,** 2004.
4. R.S.Khurmi, *Theory of Structures*, 22nd Edition, S. Chand & Company Ltd., 2010.

III B.Tech II Semester

14BT60106: GEOENVIRONMENTAL ENGINEERING

(PROFESSIONAL ELECTIVE – I)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Soil Mechanics, Environmental Engineering

COURSE DESCRIPTION: Fundamentals of Geoenvironmental Engineering; Multiphase behavior of soil – Soil–Water–Contaminant Interaction – Waste Containment System; Contaminant Site Remediation; Advanced Soil Characterization.

COURSE OUTCOMES:

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

1. Explain the fundamental principles of science in Geo-environmental engineering
2. Analyse and identify the mechanical and hydraulic properties of soil, solid waste, and geosynthetics.
3. Quantify the mechanical and hydraulic properties needed to satisfy design criteria of projects involving clay barriers, unsaturated soil barriers, and geosynthetics barriers.
4. Apply stability, water balance, and contaminant transport concepts needed in the design of waste containment facilities.

DETAILED SYLLABUS:

UNIT I **(9 Periods)**

Fundamentals of Geoenviromental Engineering: Scope of geoenvironmental engineering – multiphase behavior of soil – role of soil in geoenvironmental applications – importance of soil physics, soil chemistry, hydrogeology, biological process – sources and type of ground contamination – impact of ground contamination on geoenvironment – case histories on geoenvironmental problems..

UNIT II **(9 Periods)**

Soil–Water–Contaminant Interaction: Soil mineralogy characterization and its significance in determining soil behavior – soil–water interaction and concepts of double layer – forces of interaction between soil particles – concepts of unsaturated soil – importance of unsaturated soil in geoenvironmental problems – measurement of soil suction – water retention curves – water flow in saturated and unsaturated zone – soil–water–contaminant interactions and its implications – factors affecting retention and transport of contaminants.

UNIT III **(9 Periods)**

Waste Containment System: Evolution of waste containment facilities and disposal practices – site selection based on environmental impact assessment – different roles of soil in waste containment – different components of waste containment system and its stability issues – property evaluation for checking soil suitability for waste containment – design of waste containment facilities.

UNIT IV **(9 Periods)**

Contaminant Site Remediation: Site characterization – risk assessment of contaminated site – soil remediation technologies: soil vapor extraction, soil washing, stabilization/solidifcation, electrokinetic remediation, thermal desorption, vitrification, bioremediation, phytoremediation – groundwater remediation technologies: pump–and–treat; in–situ flushing; permeable reactive barriers, in–situ air sparging, monitored natural attenuation, bioremediation – selection and planning of remediation technologies – some examples of in–situ remediation.

UNIT V **(9 Periods)**

Advanced Soil Characterization: Contaminant analysis – water content and permeability measurements – electrical and thermal property evaluation – use of GPR for site evaluation – introduction to geotechnical centrifuge modeling.

Total Periods:45

TEXT BOOKS

1. Reddi, L. N. and Inyang, H. I. *Geoenvironmental Engineering Principles and Applications*, Marcel. Dekker, Inc., 2000.
2. Sharma H.D. and Reddy K.R., "Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies" John Wiley & Sons, Inc., USA, 2004.

REFERENCE BOOKS

1. Rowe, R. K. *Geotechnical & Geoenvironmental Engineering Handbook*, Kluwer Academic, 2001
2. Yong, R. N., "Geoenvironmental Engineering, Contaminated Soils, Pollutant Fate, and Mitigation" CRC Press, New York, 2001.
3. Phillip B. Bedient, Refai, H. S. & Newell, C. J. *Ground Water Contamination*, 4th Edition, Prentice Hall Publications, 2008
4. LaGrega, M. D., Buckingham, P. L. and Evans, J. C. *Hazardous Waste Management*, McGraw–Hill, 2001.

III B.Tech II Semester

14BT60107: GROUND WATER DEVELOPMENT AND MANAGEMENT

(PROFESSIONAL ELECTIVE I)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Engineering Hydrology, Engineering Geology, Water Resources Engineering

COURSE DESCRIPTION: Groundwater occurrence and movement – Analysis of pumping test data – Saline water intrusion into an aquifer – Artificial recharge of ground water – Surface and subsurface investigation – Groundwater basin management.

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Describe about ground water occurrence, exploration, movement and pollution .
2. Analyze the capacity of a well using Theis, Jacob and Chow's solution .
3. Use modern methods for recharging groundwater and reducing the ground water pollution .

DETAILED SYLLABUS:

UNIT I **(10 Periods)**

GROUNDWATER OCCURRENCE AND MOVEMENT : Groundwater hydrologic cycle – Origin of groundwater – Vertical distribution of groundwater – Geologic formations – aquifers – Types of aquifers – Aquifer Parameters – Permeability – Darcy's law – Differential equation governing groundwater flow – Groundwater flow equation – Groundwater flow contours and their applications.

UNIT II **(09 Periods)**

ANALYSIS OF PUMPING TEST DATA : Steady groundwater flow towards a well in confined and unconfined aquifers – Unsteady radial flow towards a well – Non equilibrium equations – Thies solution – Jacob and Chow's solutions – Leaky aquifers – Yield of an open well.

UNIT III **(08 Periods)**

SALINE WATER INTRUSION IN AN AQUIFER: Saline water intrusion – Ghyben – Herzberg relation – Shape of interface – Control of seawater intrusion – Recognition of seawater in groundwater.

UNIT IV **(09 Periods)**

ARTIFICIAL RECHARGE OF GROUND WATER AND BASIN MANAGEMENT: Concept of artificial recharge – Recharge methods – Relative merits – Applications of GIS and Remote Sensing in artificial recharge of groundwater along with case studies – Concepts of conjunction use – Case studies.

UNIT V **(09 Periods)**

SURFACE AND SUBSURFACE INVESTIGATION: Surface methods of exploration – Electrical resistivity and seismic refraction methods – Radiometric logging – Subsurface methods – Geophysical logging and resistivity logging – Field Survey using Electrical resistivity method.

Total Periods:45

TEXT BOOKS

1. H.M. Raghunath, *Grou*nd *Water,* 3rd Edition, Wiley Eastern Ltd., 2009.
2. David Keith Todd, *Grou*nd *Water Hydrology,* 2nd Edition, Wiley India Pvt. Ltd., 2010.

REFERENCE BOOKS

1. K.R. Karanth, *Grou*nd *Water Assessment, Development a*nd *Management*, 1st Edition, TMH, 2003.
2. R.Willis and W.W.G. Yeh, *Grou*nd *Water System Planning a*nd *Management,* PHI, 1987.
3. C.W. Fetter, *Applied Hydrogeology,* 4th Edition, PHI, 2010.
   Bhagu R. Chahar, *Grou*nd *Water Hydrology,* Mc. Graw Hill Education Pvt. Ltd., 2014.

III B.TECH II SEMESTER

14BT60108: **SOLID WASTE MANAGEMENT**

(PROFESSIONAL ELECTIVE I)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Waste Water Technology

COURSE DESCRIPTION: Sources and types of municipal solid wastes – Onsite handling, storage and processing – collection and transfer – Off sites processing – Disposal

COURSE OUTCOMES:

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

1. Demonstrate knowledge on the sources, types of solid wastes, storage and disposal .
2. Idenrify and develop onsite and offsite processing techniques of solid waste .
3. Use modern techniques for collection and land filling of solid waste .
4. Address the public health problems due to waste disposal and collection .

DETAILED SYLLABUS:

UNIT I **(11 Periods)**

SOURCES AND TYPES OF MUNICIPAL SOLID WASTES

Sources and types of solid wastes, quantity – Factors affecting generation of solid wastes–Characteristics – methods of sampling and characterization – Effects of improper disposal of solid wastes – public health effects. Principles of solid waste management – Social & economic aspects – Public awareness – Role of NGOs – Legislation.

UNIT II **(08 Periods)**

ON–SITE STORAGE & PROCESSING

On–site storage methods – materials used for containers – On–site segregation of solid wastes – Public health & economic aspects of storage – Options under Indian conditions – Critical Evaluation of Options.

UNIT III **(09 Periods)**

COLLECTION AND TRANSFER

Methods of Collection – types of vehicles – Manpower requirement – Collection routes; transfer Stations – Selection of location, operation & maintenance– Collection options under Indian conditions.

UNIT IV **(09 Periods)**

OFF–SITE PROCESSING

Processing techniques and Equipment; Resource recovery from solid wastes – Composting,
Incineration, Pyrolysis.

UNIT V **(08 Periods)**

DISPOSAL

Dumping of solid waste– sanitary landfills – Site selection, design and operation of sanitary
Landfills – Leachate collection & treatment

Total Periods:45

TEXT BOOKS

1. T.V.Rama Chandra, *Management of Municipal Solid Waste*, 2011.
2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, *Waste Management*, Springer, 1994.

REFERENCE BOOKS

1. George Tchobanoglous et.al., *Integrated Solid Waste Management*, Mc.Graw Hill Publishers, 2002.
2. *Manual on Municipal Solid Waste Management*, CPHEEO, Ministry of Urban Development, Government of India, 2000.
3. Bhide A.D. and Sundaresan, B.B. *Solid Waste Management in Developing Countries*, INSDOC, 2010.
4. G. Burke, B. R. Singh and L. Theodore, *Handbook of Environmental Management and Technology*, 2nd Edition, John Wiley & Sons, 2000.

III B.Tech II Semester

14BT60121: CONCRETE AND HIGHWAY MATERIALS LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: Transportation Engineering – I

COURSE DESCRIPTION: Testing of Aggregates, Cement and Bituminous material; Testing of Concrete and Bituminous mixes

COURSE OUTCOMES:

After completion of this course, a successful student will be able to:

1. Perform standard tests on Aggregates and Cements used in Buildings and Highway construction
2. Evaluate the quality and performance of Aggregates, Cement and Bituminous material and select suitable materials used in Buildings and Highway construction
3. Test and design Concrete and Bituminous mixes
4. Function effectively as an member or leader in teams to solve highway engineering problems
5. Communicate the properties of building and highway materials through a report after testing

LIST OF EXPERIMENTS:

I. AGGREGATES

1. Aggregate crushing value
2. Aggregate impact test
3. Specific gravity and water absorption
4. Attrition test
5. Abrasion test
6. Shape tests
7. Bulking of Sand

II. BITUMINOUS MATERIALS

1. Penetration test
2. Ductility test
3. Softening point test
4. Flash and fire point tests
5. Bituminous Mix Design and testing using Marshall Stability Testing Machine

III. CEMENT AND CONCRETE

1. Normal consistency and fineness of cement
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement
4. Compressive strength of cement
5. Workability test on concrete by Compaction factor, Slump and Vee–bee
6. Young's modulus and compressive strength of concrete
7. Concrete Mix Design and Testing

III B.Tech II Semester
14BT60122: ENVIRONMENTAL ENGINEERING LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: Water Supply Engineering

COURSE DESCRIPTION: Physical and chemical analysis for water and waste water

COURSE OUTCOMES:
After completion of the course, a successful student will able to:

1. Demonstrate the knowledge on experimental analysis of water and wastewater
2. Test water quality and asses waste water characteristics using different treatment methods
3. Function effectively as a member or leader in teams to solve water and wastewater problems
4. Write a report after testing the water samples

LIST OF EXPERIMENTS:

1. Determination of pH and turbidity
2. Determination of conductivity and total dissolved solids.
3. Determination of alkalinity/acidity.
4. Determination of chlorides.
5. Determination and estimation of total solids, organic solids and inorganic solids.
6. Determination of optimum coagulant dose
7. Determination of chlorine demand
8. Determination of dissolved oxygen
9. Determination of B.O.D
10. Determination of C.O.D
11. Determination of iron
12. Determination of nitrogen.
13. Determination of total phosphorous
14. Determination of sulphates

IV B. Tech I Semester
14BT70101: **STEEL STRUCTURES**

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: SA & RCCS

COURSE DESCRIPTION: Design concepts– connections: Bolts , rivets, welds– Tension and compression members – Beams and built–up compression members– Design of column foundations

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Attain the knowledge on various structural steel elements .
2. Analyze the steel structures and their elements
3. Design elements of Steel Structures.

DETAILED SYLLABUS:

UNIT I **(06 Periods)**

DESIGN CONCEPTS: Types of rolled steel sections – Stress–strain relationship for mild steel – Loads – Design concepts of steel structures – Working stress design – Limit state design – Design requirements – Design strength – Serviceability limit state.

UNIT II **(11 Periods)**

RIVETED, BOLTED AND WELDED CONNECTIONS: Failure of a joint – Strength and efficiency of a joint – Lap Joint – Butt joint – Eccentric connections. Strength of welds – Butt and fillet welds – Design of fillet welds subjected to axial load – Design of fillet welds subjected to moment acting in the plane and at right angles to the plane of the joints – Beam to beam and beam to column connections.

UNIT III **(10 Periods)**

TENSION AND COMPRESSION MEMBERS: Net effective sectional area for angle and tee sections – Design of tension members – Lug angles. Effective length, radius of gyration and slenderness of compression members – Design strength – Design of axially loaded compression members.

UNIT IV **(11 Periods)**

BEAMS AND BUILT–UP COMPRESSION MEMBERS: bending, shear and bearing strength – Design of simple beams – Design of plated beams – Design of connection of cover plates with the flanges of beams. Design of built–up compression members – Design of lacings and battens – Design principles of eccentrically loaded columns – Splicing of columns.

UNIT V **(07 Periods)**

DESIGN OF COLUMN FOUNDATIONS: Design of slab base and gusseted bases – Column bases subjected moment

Total Periods:45

TEXT BOOKS

1. S.K. Duggal, *Limit State Design of Steel Structures*, 2nd Edition, Mc.Graw Hill, 2014.
2. N. Subramanian, *Design of Steel Structures*, 1st Edition, Oxford University Press, 2010

REFERENCE BOOKS

1. S.S. Bhavikatti, *Design of Steel Structures*, 2nd Edition, I.K. International Publishing House Pvt. Ltd., 2010.
2. N. Krishna Raju, *Structural Design and Drawing*, 3rd Edition, Universities Press, Hyderabad, 2009.
3. Ramachandra and VirendraGehlot, *Design of Steel Structures*, 11th Edition, Scientific Publishers, 2005.
4. B.C. Punmia, Ashok Kumar Jain and ArunKumar Jain, *Design of Steel Structures,* 2nd Edition, Laxmi Publications, 2013.

IS Codes:IS 800–2007, IS–875– Part III and Steel Tables are to be permitted into the examination hall.

IV B.Tech I Semester

14BT70102: WATER RESOURCES ENGINEERING

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Fluid Mechanics – I and II, Engineering Hydrology

COURSE DESCRIPTION: Irrigation and soil moisture – Diversion head works – Reservoirs – Gravity and earth dams – Canal structures – Cross drainage works.

COURSE OUTCOMES:

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

1. Demonstrate the knowledge of irrigation systems, water resources and storage works and apply the principle of mathematics in finding the irrigation water requirement.
2. Analyze the forces acting on a hydraulic structure .
3. Design hydraulic structures and regulation works using different methods .
4. Estimate the reservoir capacity using modern tools .
5. Give reasons for the failure of a dam and reservoir for the safety of the society .
6. Demonstrate the importance of canals and canal lining for reducing the seepage losses for sustainable use of water .
7. Responsible as a civil engineer for the construction of canal outlets and canal escapes in reducing the floods .

DETAILED SYLLABUS:

UNIT I (10 Periods)

IRRIGATION AND SOIL MOISTURE: Necessity and importance– Advantages and Disadvantages – Types of Irrigation – Application of irrigation water – Indian agricultural soils – Methods of increasing soil fertility – Standards for irrigation water – Soil–Water–Plant relationship – Vertical distribution of soil moisture – Soil moisture constants – Consumptive use – Duty–Delta relationship **–** Factors affecting duty – Irrigation efficiency.

UNIT II (09 Periods)

DIVERSION HEAD WORKS : Types of diversion head works – Weirs – Barrages – Layout of diversion works – Causes and failure of hydraulic structures on permeable foundations – Bligh's creep theory – Khosla's theory – Determination of uplift pressure – Impervious floors – Exit gradient – Functions of upstream and downstream sheet piles.

UNIT III **(10 Periods)**

DAMS : Types of dams – Merits and demerits – Factors affecting selection of site – Zones of storage of reservoir – Estimation of reservoir capacity – Mass curve– Gravity dams – Forces acting on gravity dam – Causes of failure of gravity dams – Elementary profile and practical profile of gravity dam – Limiting height of a low gravity dam – Stability analysis – Drainage galleries – Joints – Grouting – IS design of gravity dams.

UNIT IV **(10 Periods)**

EARTH DAMS AND CANAL STRUCTURES: Types – Causes of failure – Criteria for safe design – Seepage through earth dam – Measures of seepage control – Types of canals – Lining of Canals – Design of canals – Kennedy's and Lacey's theory – falls – Canal regulation works – Canal outlets

UNIT V **(6 Periods)**

CROSS DRAINAGE WORKS: Types – Selection of site for aqueducts – Super passages – Level crossing – River training works.

Total Periods:45

TEXT BOOKS

1. S.K.Garg, *Irrigation Engineering and Hydraulic Structures,* 24th Edition, Khanna Publishers, 2012.
2. P.N. MODI, *Irrigation Water Resources and Water Power Engineering,* 7th Edition, Standard Book House, 2008.

REFERENCE BOOKS

1. K.R. Arora, *Irrigation, Water Power a*nd *Water Resources Engineering*, 4th Edition, Standard Publishers Distributers, 2013.
2. G.L. Asawa*, Irrigation a*nd *Water Resources Engineering,* New Age International Limited, 2012
3. R.K. Sharma and T.K. Sharma, *Irrigation Engineering,* 3rd Edition, S. Chand Publishers, 2007.
4. B.C. Punmia and P.B.B. Lal*, Irrigation a*nd *Water Power Engineering,* 16th Edition, Laxmi Publications, 2011.

IV B.Tech I Semester

14BT70103: GEOSPATIAL TECHNOLOGIES

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Surveying

COURSE DESCRIPTION: Aerial Photogrammetry – Remote Sensing, Electromagnetic Spectrum, Sensors – Geographic Information System, Data Representation – GIS Spatial Analysis – Remote Sensing and GIS Applications.

COURSE OUTCOMES:

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

1. Apply the knowledge of aerial photographs, satellite imagery to civil engineering Applications .
2. Analyze the availability of natural resources using RS and GIS .
3. Use modern tools to estimate the land use and land cover .
4. Demonstrate the knowledge of GIS and RS to predict and assess damages due to natural disasters for sustainable development .

DETAILED SYLLABUS:

UNIT I (9 Periods)

INTRODUCTION TO PHOTOGRAMMETRY : Fundamental concepts of photogrammetry – Principle and types of aerial photographs – Geometry of Aerial photographs – Scale of aerial photographs and its determination – Planning & Execution of Photographic Flights – Stereoscopy –Mosaics – Parallax measurements for height determinations

UNIT II (10 Periods)

REMOTE SENSING: Basic concepts and foundation of remote sensing – Elements of remote sensing, electromagnetic spectrum – Spectral reflectance and spectral regions – Energy resources – Energy interactions with earth surface features and atmosphere – Resolution – Spectral properties of water bodies, soil and vegetation – Sensors and platforms – Visual interpretation techniques – Converging evidence

UNIT III (10 Periods)

GEOGRAPHIC INFORMATION SYSTEM: GIS categories – Components of GIS, fundamental operations of GIS – Raster GIS – Vector GIS – File management, spatial and non spatial data – Layer based GIS – Feature based GIS, map projections.

UNIT IV **(7 Periods)**

GIS SPATIAL ANALYSIS: Data storage – Vector data storage – Attribute data storage – Overview of the data manipulation and analysis – Integrated analysis of the spatial and attribute data– Basics of Global positioning system.

UNIT V **(9 Periods)**

REMOTE SENSING AND GIS APPLICATIONS : Land use/Land cover classification – Rainfall – Runoff studies – Flood and drought impact assessment and monitoring – Drainage Morphometry – Watershed management for sustainable development – Inland water quality survey and management. Regional and Urban planning and management, GIS based Highway alignment, GIS based traffic congestion analysis, Soil Mapping.

Total Periods:45

TEXT BOOKS

1. B. Bhatta, *Remote Sensing and GIS*, 2nd Edition, Oxford University Press, 2011.
2. M. Anji Reddi, *A Text Book of Remote Sensing and Geographical Information Systems*, 2nd Edition, B. S. Publications, 2012.

REFERENCE BOOKS

1. Lillesand, T.M., Kiefer, R.W. and J.W.Chipman, *Remote Sensing and Image Interpretation*, 7th Edition, John Willey and Sons (Asia) Pvt. Ltd. 2014.
2. C.P. Lo Albert and K.W. Yong, *Concepts and Techniques of GIS*, 2nd Edition, Prentice Hall (India) Publications, 2010.
3. Narayana Panigrahi, *Geographical Information Science*, 2nd Edition, University Press, 2013.
   Peter A. Burragh and Rachael Mc Donnell, *Principles of Geographical Information Systems*, 2nd Edition, Oxford University Press, 2014.

IV B.Tech I Semester

14BT70104: TRANSPORTATION ENGINEERING – II

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Surveying, Soil Mechanics

COURSE DESCRIPTION: Introduction to Traffic engineering, Traffic characteristics, Highway safety – Traffic measurement, Highway capacity – Traffic regulation and control, Parking studies, Traffic signs and Road markings – Statistical methods in Traffic Engineering – Road Safety Audit, Traffic and Environment, Environmental Impact Assessment, Traffic management.

COURSE OUTCOMES:

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

1. Demonstrate knowledge on the principles of mathematics and science to understand the problems related to transportation engineering projects
2. Assemble, analyze, and appropriately apply transportation engineering data from existing graphics, reports, and other documents .
3. Conduct Traffic studies and arrive at the parameters for design of Highway and design of Traffic Control systems .
4. Use modern technology to support the planning, design, operation and management of transportation facilities and projects .

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

INTRODUCTION TO TRAFFIC ENGINEERING: Significance and scope – Characteristics of vehicles and road users – Skid resistance and braking efficiency (Problems) – Components of traffic engineering – Road, traffic and land use characteristics.

TRAFFIC CHARACTERISTICS: Basic characteristics of traffic – Volume, speed and density – Relationship among traffic parameters.

HIGHWAY SAFETY: Problem of highway safety – Types of road accidents – Causes – Numerical Problems – Engineering measures to reduce accidents – Enforcement measures – Educational measures.

UNIT II **(09 Periods)**

TRAFFIC MEASUREMENT : Traffic volume studies – Objectives – Types of volume studies – Concept of PCU– Data collection and presentation – Speed studies – Types of speeds – Objectives of speed studies – Methods

of conducting Pedestrian studies – Basic principles of traffic flow speed studies – Data collection and presentation – Origin and Destination studies, Numerical Problems

HIGHWAY CAPACITY: Definition of capacity – Importance of capacity – Factors affecting capacity – Concept of level of service – Different levels of service – Concept of service volume – Peak hour factor– Numerical Problems.

UNIT III **(09 Periods)**

TRAFFIC CONTROL AND REGULATION : Traffic problems in urban areas – Importance of traffic control and regulation – Traffic regulatory measures – Channelization – Principle and design of intersections, grade separations and interchanges – Traffic signals – Saturation flow – Design of traffic signals and signal co–ordination (Problems) – Signal phasing and timing diagrams – Traffic control aids and street furniture, street lighting, computer applications in signal design.

PARKING STUDIES: Types of Parking facilities – On street and off street parking facilities – Parking studies – Parking inventory study – Parking survey by patrolling method – Analysis of parking data and parking characteristics – Multi–storey car parking facility – Design standards. **–** Numerical Problems

TRAFFIC SIGNS AND ROAD MARKINGS : Types of traffic signs – Cautionary, regulatory and informative signs – Specifications – Pavement markings – Types of markings – Lane markings and object markings – Standards and specifications for road markings.

UNIT IV **(09 Periods)**

STATISTICAL METHODS IN TRAFFIC ENGINEERING: Numerical Problems using Poisson Distribution, Normal Distribution, Hypothesis Testing, Chi–Squared Test, Linear Regression and Correlation, Numerical Problems.

UNIT V **(09 Periods)**

ROAD SAFETY AUDIT:. Road safety audit – Principles, Elements and Methodology of Road Safety Audit.

TRAFFIC AND ENVIRONMENT: Detrimental effect of traffic on environment – Air pollution – Pollutants due to traffic – Measures to reduce air pollution due to traffic – Noise pollution – Measures to reduce Noise pollution.

ENVIRONMENTAL IMPACT ASSESSMENT (EIA): Importance – Aspects to be considered – Preparation of EIA for a Highway Project before construction, during construction, after construction.

TRAFFIC MANAGEMENT: Traffic management – Transportation system management (TSM) – Travel demand management (TDM) – Traffic forecasting techniques, restrictions on turning movements – Oneway Streets – Traffic segregation – Traffic calming – Tidal flow operations –

Exclusive bus lanes – Introduction to Intelligent transportation system (ITS).

Total Periods:45

TEXT BOOKS

1. Kadiyali L R, *Traffic Engineering and Transport Planning,* 7th Edition, Khanna Publishers, 2012.
2. Khanna K and Justo C E G, *Highway Engineering,* 10th Edition, Nem Chand & Bros, 2014.

REFERENCE BOOKS

1. *Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management.*
2. *Guidelines of Ministry of Road Transport and Highways,* Government of India.
3. C. Jotin Khisty and B.Kent Lall, *Transportation Engineering – An Introduction,* Prentice Hall of India Pvt. Ltd., 2006.
4. C.S. Papacostas and P.D. Prevedouros, *Transportation Engineering and Planning,* Prentice Hall of India Pvt. Ltd., 2006.

NOTE: Booklet containing relevant extracts from Standards and Codes, should be made available to students during examinations.

IV B.Tech I Sem

14BT6HS01: BANKING AND INSURANCE

(OPEN ELECTIVE)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

Pre Requisite: Managerial Economics and Principles of Accountancy

COURSE DESCRIPTION: Origin and growth of Banking, functions and importance, RBI; Debtor and Creditor relationship, Types of Accounts, Loans and Advances; e-payment, e-cash ,NEFT, RTGS, Credit and Debit cards; Insurance elements and risk; LIC, GIC, IRDA.

COURSE OUTCOMES: After completion of the course a successful student is able to

1 Acquire Knowledge in

a) Tools and concepts of Banking and Insurance.
b) Basic Principles and concepts of Insurance and Banking.
c) Provides life skills for effective utilization of Banking and Insurance facilities.
d) e-fund transfers, e-payments and e-business models.

2 Develop analytical skills in understanding problems pertaining to
a) Online banking and e – payments..
b) Risk Management through insurance benefits the society at large.
c) money management by leveraging on technology, banking and insurance services.

DETAILED SYLLABUS:

UNIT – I (09 Periods)

INTRODUCTION TO BANKING: Origin and growth of banking, meaning and functions of banking, importance of banking, Reserve Bank of India; functions, monetary policy, open market operations.

UNIT – II (09 Periods)

BANK-CUSTOMER RELATIONSHIP: Debtor-creditor relationship, anti money laundering, products or services, payment and collection of cheques and other negotiable instruments. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances-principles of lending, types of loans,

UNIT – III **(09 Periods)**

BUSINESS MODELS AND ELECTRONIC PAYMENT SYSTEM: Features, types of e-payment system, e-cash ,NEFT,RTGS, Electronic purses, Credit and Debit cards. Business models- B2B, B2C, C2C, and B2G.

UNIT – IV **(09 Periods)**

INTRODUCTION TO INSURANCE: Introduction - Insurance definition, elements of insurance concept of risk, risk Vs uncertainty.

UNIT – V **(09 Periods)**

INSURANCE OVERVIEW: Principles of insurance, insurance types, LIC & GIC insurance contract- nature, elements, functions, IRDA, Insurance Players in India.

Total periods : 45

TEXT BOOKS:

1. A.V. Ranganadha Chary, R.R. Paul- *Banking and Financial system,* 2nd Edition, Kalyani Publisher, New Delhi.
2. P.K.Gupta- *Insurance and Risk Management*, Himalaya Publishing House, New Delhi, ISBN: 9789350516676

REFERENCE BOOKS:

1. Diwan, Praq and Sunil Sharma: '*Electronic Commerce- A Manager's Guide to E-Business*', Vanity Books International, Delhi,2002. ISBN-13: 978- 8174462039
2. Kalakota Ravi and Whinston Andrew B: '*Frontiers of Electronic Commerce'*, Pearson Education India, 1996 New Delhi. ISBN: 978-81-7758-392-2
3. Schneider, Grey P: '*Electronic Commerce, Course Technology',* 8th Edition, Cengage Learning, 2008, New Delhi ISBN-13:978-1-4239-0305-5.

IV. B.Tech I Semester
14BT6HS02: COST ACCOUNTING AND FINANCIAL MANAGEMENT

(OPEN ELETIVE)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

Pre-Requisites : Nil

COURSE DESCRIPTION: Scope, Objectives and Elements of cost Accounting; Cost Sheet and Tender quotations; Variance Analysis: Material variances, Labor variances; Meaning and Scope, Liquidity, Profitability Ratios: concept of Risk and Returns on Investment..

COURSE OUTCOMES: After completion of the course a successful student is able to

1. Acquire Knowledge in
   a) Elements of Costing.
   b) Basic concepts of Financial Management.
   c) Risk and Return
   d) Financial Accounting.
   e) Using advanced tools like tally and SAP.
   f) Significance of Economics and Accountancy
2. Do cost, risk and return of investment analysis.
3. Develop skills in providing solutions for
   a) Material, Labor, Overheads control.
   b) Excellence and ability to minimize the cost of the organization
   c) Effective investment decisions
4. Prepare cost sheets pertaining to manufacturing of products.

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

INTRODUCTION TO COST ACCOUNTING: Cost and Cost Accounting, Scope, Objectives, Advantages and disadvantages –Cost Accounting Vs Management Accounting – Elements of Costing –Installation of costing system – Material Control, Labor Control, Overhead Control, Fixed and Variable, Direct and Indirect Costs.

UNIT II **(09 Periods)**

COST ANALYSIS: Analysis of Cost – Preparation of cost sheet, estimate, tender and quotation (Simple problems) –Importance of Costing while pricing the products.

UNIT III **(09 Periods)**

STANDARD COSTING: Introduction to Standard Costing & Variances – Variance Analysis: Material variances, Labor variances (Simple Problems).

UNIT IV **(09 Periods)**

FINANCIAL MANAGEMENT: Financial Management-Meaning and Scope, Liquidity, Profitability, Financial Statement Analysis through ratios (Simple Problems).

UNIT V **(09 Periods)**

RISK AND RETURNS ON INVESTMENT: Investment-Meaning and Definition- concept of risk and returns-Investment Alternatives-Introduction to Behavioral Finance – Anomalies –Key Concepts – Anchoring – Mental Anchoring-Confirmation and Hindsight Bias-Gambler's Fallacy-Herd Behavior-Over Confidence-Overreaction and Availability Bias-Prospect Theory.

Total periods: 45

TEXT BOOKS:

1. S.P. Jain and K.L. Narang: *Cost Accounting,* 6th Edition, Kalyani Publishers, Ludhiana, 2002
2. James C Van Horne, *Financial Management and Policy,* 12th Edition, Prentice-Hall of India/Pearson, 2001 ISBN-10: 0130326577

REFERENCE BOOKS:

1. The Institute of Company Secretaries of India, *Cost and Management Study Material*, New Delhi.
2. I.M. Pandey, *Financial Management,* 10th Edition, Vikas Publishing House Pvt. Ltd., 2010, ISBN- 13 9788125937142

IV B.Tech I Semester
14BT7HS03: ENTREPRENEURSHIP FOR MICRO SMALL AND MEDIUM ENTERPRISES
(OPEN ELECTIVE)
(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

Pre requisites: Nil

COURSE DESCRIPTION: Introduction to Entrepreneur Development; Idea generation and formation of Business Plan; Micro and Small Enterprises; Institutional Finance and Support to Entrepreneur; Woman Entrepreneurship.

COURSE OUTCOMES: After completion of the course a successful student is able to

1. Acquire Knowledge in KNOWLEDGE
   a) Schemes and institutions encouraging entrepreneurship.
   b) Basic Principles and concepts of Accountancy.
   c) Significance of entrepreneurship.
2. (i) Develop analytical skills in understanding problems pertaining to
   a) Personal excellence through financial and professional freedom.
   b) Women entrepreneurship acts as contrivance in the societal development
   (ii) Develop Critical thinking and evaluation ability.
3. Generate ideas for formulating business plans.

DETAILED SYLLABUS

UNIT – I (09 Periods)

INTRODUCTION TO ENTREPRENEURSHIP DEVELOPMENT: Concept of Entrepreneurship – Growth of Entrepreneurship in India **-** Factors affecting entrepreneurship growth - Characteristics of an Entrepreneur – Functions of Entrepreneur – Need for an Entrepreneur – Entrepreneurial Decision Process – Types of Entrepreneurs – Distinction between an Entrepreneur and a manager – Intrapreneur - Entrepreneur Vs Intrapreneur.

UNIT – II (09 Periods)

IDEA GENERATION AND FORMULATION OF BUSINESS PLANS : Sources of Ideas – Methods of idea generation - – Product Identification – Opportunity Selection – Steps in Setting up of a Small Business Enterprise - Contents Of Business Plans – Significance – Formulation of Business Plan – Business Opportunities in Various Sectors – Common Errors in Business Plan Formulation – Project Report Preparation

UNIT – III **(09 Periods)**

MICRO AND SMALL ENTERPRISES: Meaning and Definition – Micro and Macro units – Essentials – Features – Characteristics – relationship between Micro and Macro Enterprises – Rationale behind Micro and Small Enterprises – Scope of Micro and Small Enterprises – Objectives of Micro Enterprises - Problems of Micro and Small Enterprises

UNIT – IV **(09 Periods)**

INSTITUTIONAL FINANCE AND SUPPORT TO ENTREPRENEUR: Need for Institutional Finance **-** Commercial Banks - Industrial Development Bank of India (IDBI) – Industrial Finance Corporation of India Ltd. (IFCI) – Industrial Credit Investment Corporation of India Ltd. (ICICI)– State Financial Corporations (SFCs) - State Industrial Development Corporations (SIDCs) – Small Industries Development of Bank of India (SIDBI) –– Need For Institutional Support – National Small Industries Corporation Ltd (NSIC) – Small Industries Development Organisation (SIDO) – Small Industries Service Institutes (SISIs) – District Industries Centres (DICs) – National Institute of Entrepreneurship and Small Business Development (NIESBUD) – Technical Consultancy Organizations (TCOS)(Origin, Mission, and credit facility/support).

UNIT –V **(09 Periods)**

WOMEN ENTREPRENEURSHIP: Concept of Women entrepreneur - Functions of Women entrepreneurs - Growth of women entrepreneurship in India - Challenges of Women entrepreneurs- Programmes supporting women entrepreneurship – Rural Entrepreneurship – Meaning, Need for Rural entrepreneurship, Problems of rural entrepreneurship, Role of NGOs.

Total periods : 45

TEXT BOOKS:

1. Dr.S.S.Khanka*, Entrepreneurial Development,* Revised Edition, S. Chand and Company Ltd, 2012. **ISBN**: 9788121918015
2. Madhurima Lall & Shikha Sahai, *Entrepreneurship,* 2nd Edition, Excel Books India, 2008. **ISBN** : 9789350620953

REFERENCE BOOKS:

1. Nandan, H., *Fundamentals of Entrepreneurship,* PHI Learning Pvt. Ltd., 2013, New Delhi, 3rd edition 2013. **ISBN**: 9788120347502
2. Vasanth Desai, *"The Dynamics of Entrepreneurial Development and Management"*, Himalaya Publishing House, 4th edition 2009. **ISBN**: 9788183184113
3. Bholanath Dutta, *Entrepreneurship Management – Text and Cases,* 1st edition, Excel Books, 2009. **ISBN**: 9789350621257

IV B.Tech I Semester
DISASTER MITIGATION AND MANAGEMENT
(OPEN ELECTIVE)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Environmental Sciences

COURSE DESCRIPTION: Natural disasters and hazards – Earthquakes – Floods and cyclones, droughts – Landslides – Disaster management

COURSE OUTCOMES:

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

1. Explain various types of disasters and mitigation strategies
2. Analyze and interpret the Guidelines for hazard assessment and vulnerability analysis
3. Use historical data of disaster losses and inform the people over preparedness
4. Address the issues due to disasters and provide conclusions over post disaster events for the benefit of the society
5. Function in multidisciplinary teams for the effective displacement of people during disasters

DETAILED SYLLABUS:

UNIT I (08 Periods)

INTRODUCTION: Types of disasters – Natural disasters – Impact of disasters on environment – Infrastructure and development – Concepts of hazards and vulnerability analysis– Hazard Assessment **–** Guidelines for hazard assessment and vulnerability analysis – Basic principles and elements of disaster mitigation

UNIT II (11 Periods)

EARTHQUAKES : Introduction to earthquakes – Intensity scale (MSK–64) – Seismic activity in India – Seismic zones of India – Earthquakes in A.P. – Action plan for earthquake disaster preparedness – Elements at risk, recovery and rehabilitation after earthquake – Earthquake resistant design and construction of buildings. Tsunami – Onset, types and causes

– Warning – Element at risk – Typical effects – Specific preparedness and mitigation strategies

UNIT III (11 Periods)

FLOODS AND CYCLONES: Onset, types, warnings – Elements at risk – Typical effects – Indian floods and cyclones – Hazard zones – Potential for reducing hazards – Mitigation strategies and community based mitigation.

DROUGHTS: Onset, types and warning – Kinds of droughts – Causes of droughts – Impact of droughts – Early warning and response mechanisms – Mitigation strategies – Droughts in India

UNIT IV (07 Periods)

LANDSLIDES: Onset, types and warning – Causes of landslides – Elements at risk – Indian land slides – Hazards zones – Typical effects – Mitigation strategies and community based mitigation

UNIT V (08 Periods)

DISASTER MANAGEMENT: Disaster management organization and methodology – Disaster management cycle – Disaster management in India – Typical cases – Cost–benefit analysis with respect to various disaster management programmes implemented by NGOs and Government of India.

Total Periods:45

TEXT BOOKS

1. V.K. Sharma, *Disaster Management,* National Centre for Disaster Management, IIPE, 1999.
2. A.S. Arya, Anup Karanth, and Ankush Agarwal, *Hazards, Disasters and Your Community: A Primer for Parliamentarians,* GOI–UNDP Disaster Risk Management Programme, 2005.

REFERENCE BOOKS

1. *Disaster Management in India*, A Status Report Publication of the Govt. of India, Ministry of Home Affairs, National Disaster Management Division, August 2004.
2. R. B. Singh *Natural Hazards And Disaster Management*, Rawat Publications, 2009.
3. Pardeep sahni, Alka Dhameja, Uma Medury *Disaster Mitigation*, 4th Edition, PHI Learning Pvt. Ltd., 2011.
4. Sanjay K. Sharma *Environment Engineering and Disaster Management,* 1st Edition, USP Publishers, 2011.

IV B.Tech I Semester
ENVIRONMENTAL POLLUTION AND CONTROL

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Environmental Sciences

COURSE DESCRIPTION: Introduction, Sources and Effects of Air Pollution – Dispersion of Pollutants and their control – Surface and Ground Water Pollution and control–Soil Pollution and remediation–Management of Municipal Solid Wastes.

COURSE OUTCOMES:

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

1. Explain various pollutants, characteristics and their dispersion
2. Analyze the major pollutants that causes environmental pollution.
3. Conduct research and select suitable techniques to control pollution.
4. Understand the effects of environmental pollutions on human beings and vegetation
5. Communicate the methods of management and control of environmental pollution

DETAILED SYLLABUS:

UNIT I (08 Periods)

INTRODUCTION TO AIR POLLUTION AND DISPERSION OF POLLUTANTS: Scope – Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, Point and Non– Point, Line and Area Sources of Air Pollution – Stationary and Mobile Sources – Dispersion of Pollutants – Dispersion Models – Applications.

UNIT II (09 eriods)

EFFECTS AND CONTROL OF PARTICULATES: Effects of Air Pollutants on Man, Material and Vegetation – Global Effects of Air Pollution – Green House Effect, Heat Island, Acid Rains, Ozone Holes – Control of Particulates – Control at Sources – Process Changes – Equipment Modifications – Design and Operation of Control Equipment – Settling Chambers – Centrifugal Separators – Bag Filters, Dry and Wet Scrubbers – Electrostatic Precipitators.

UNIT III **(10 Periods)**

WATER POLLUTION: Introduction–Water Quality in Surface Waters – Nutrients – Controlling Factors in Eutrophication–Effects of Eutrophication – Ground Water Pollution – Thermal Pollution – Marine Pollution – Sewage Disposal in Ocean – Types of Marine Oil Pollution – Cleanup of Marine Oil Pollution – Control of Water Pollution – Case Study on Tanneries – Drinking Water Quality Standards.

UNIT IV **(09 Periods)**

SOIL POLLUTION: Soil Pollutants – Sources of Soil Pollution – Causes of Soil Pollution and their Control – Effects of Soil Pollution–Diseases Caused by Soil Pollution – Methods to Minimize Soil Pollution – Effective Measures to Control Soil Pollution – Case Study on Fertilizer.

UNIT V **(09 Periods)**

MUNICIPAL SOLID WASTE MANAGEMENT: Introduction – Types of Solid Wastes – Principles of Excreta Disposal – Domestic Solid Waste Production – Collection of Solid Wastes – Transport of Solid Wastes – Management of Solid Wastes – Methods of Land Disposal – Sanitary Landfill – Composting – Incineration.

Total Periods:45

TEXT BOOKS

1. C.S.Rao, *Environmental Pollution Control Engineering*, 2nd Edition, New Age International Pvt Ltd., 2007.
2. Y.Anjaneyulu, *Introduction to Environmental Science,* 1st Edition, BS Publications*.,* 2009.

REFERENCE BOOKS

1. M.N. Rao and H.V.N. Rao, *Air Pollution,* 19th Edition, Tata McGraw–Hill Education Pvt. Ltd., 2010.
2. Daniel Vallero, *Fundamentals of Air Pollution,* 5th Edition, Academic Press (Elsevier)*,* 2014.
3. S.M.Khopkar , *Environmental Pollution Monitoring and Control,* 2nd Edition, New Age International Pvt Ltd., 2007.
4. S.Deswal and K.Deswal, *Environmental Science,* 2nd Edition, Dhanpat Rai & Co, 2011.

IV B.Tech I Semester
CONTRACT LAWS AND REGULATIONS
(OPEN ELECTIVE)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: —

COURSE DESCRIPTION: Construction Contracts – Tenders – Arbitration – Legal Requirements – Labour Regulations.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Explain contract documents and tendering processes .
2. Analyze the legal issues in arbitration and in contracts documents .
3. Address the legal issues in collecting taxes .
4. Follow ethics while bidding, sale and purchase of property .
5. Develop and Prepare tender documents as per the standards.

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

CONSTRUCTION CONTRACTS: Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document and laws – Standard Contract Document – Law of Torts.

UNIT II **(09 Periods)**

TENDERS: Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Financial Points of View – Two Cover System – Preparation of the Documentation – Contract Formation and Interpretation – Potential Contractual Problems – Price Variation Clause – Comparison of Actions and Laws – Subject Matter – Violations.

UNIT III **(09 Periods)**

ARBITRATION: Arbitration – Comparison of Actions and Laws – Agreements – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Arbitration Disputes – Dispute Review Board.

UNIT IV **(09 Periods)**

LEGAL REQUIREMENTS: Legal Requirements for Planning – Property Law – Agency Law – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties – Local Government Approval – Statutory Regulations – Insurance and Bonding – Laws Governing Purchase and Sale – Use of Urban and Rural Land – Land Revenue Codes – EMD – Security Deposits – Liquidated Damages.

UNIT V **(09 Periods)**

LABOUR REGULATIONS: Social Security – Welfare Legislation – Laws Relating to Wages, Bonus and Industrial Disputes – Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Maternity Benefit Act – Child Labour Act – Other Labour Laws.

Total Periods:45

TEXT BOOKS

1. G.C.V. Subba Rao *Law of Contracts I & II*, 11th Edition, S. Gogia & Co., 2011.
2. Jimmie Hinze, *Construction Contracts,* 2nd Edition, Mc Graw Hill, 2001.

REFERENCE BOOKS

1. Gajaria G.T, Kishore Gajaria, *Laws Relating to Building and Engineering Contracts in India*, 4th Edition, Lexis Nexis Butterworths India, 2000.
2. B. S. Patil, *Civil Engineering Contracts and Estimates*, 3rd Edition, University Press (India) Private Ltd., 2013.
3. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, 7th Edition, McGraw Hill Education, 2010.
4. Akhileshwar Pathak, *Contract Law*, 1st Edition, Oxford University Press, 2011.

IV B.Tech I Semester
PLANNING FOR SUSTAINABLE DEVELOPMENT
(OPEN ELECTIVE)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: —

COURSE DESCRIPTION: Introduction to Sustainable Development – Environment, Sciences and Sustainability – Sustainable Development Politics and Governance – Tools, Systems and Innovations for Sustainability – Communication and Learning for Sustainability.

COURSE OUTCOMES:

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

1. Demonstrate the knowledge of planning, environment, tools and systems for sustainable development
2. Analyze the current challenges to sustainability
3. Use theoretical frameworks and provide solutions to the real world sustainability issues
4. Conduct awareness of contemporary issues on globalization in terms of sustainability
5. Give recommendations for the sustainability issues and solutions using a holistic approach
6. Explain a sense of civic responsibility, including reflection on the student's own role in developing and nurturing sustainable communities
7. Participate in decision making as individual and responsible for collective decision

DETAILED SYLLABUS:

UNIT I **(08 Periods)**

INTRODUCTION TO SUSTAINABLE DEVELOPMENT: Definition and Concepts of Sustainable Development – Capitalization of Sustainability – National and Global Context – The Millennium Development Goals – Emergence and Evolution of Sustainability and Sustainable Development – Theories of Sustainability – Case Studies

UNIT II **(08 Periods)**

ENVIRONMENT, SCIENCES AND SUSTAINABILITY: Climate Change – Science, Knowledge and Sustainability – Unforeseen Environmental Impacts on Development – Challenges of Sustainable Development – Centrality of Resources in Sustainable Development – Case Studies

UNIT III **(10 Periods)**

SUSTAINABLE DEVELOPMENT POLITICS AND GOVERNANCE: Governance and Democracy and Eco–Welfare – Global Civil Society and World Civil Politics – Civic Environmentalism – Policy Responses to Sustainable Development – Economics of Sustainability – Social Responsibility in Sustainability – National Action

UNIT IV **(11 Periods)**

TOOLS, SYSTEMS AND INNOVATION FOR SUSTAINABILITY: Need for System Innovation – Transition and Co–Evolution – Theories and Methods for Sustainable Development – Strategies for Eco–Innovation – Ecological Foot Print Analysis – Socio Ecological Indicators – Eco Labels– Policy Programmes for System Innovation – Case Studies

UNIT V **(08 Periods)**

COMMUNICATION AND LEARNING FOR SUSTAINABILITY: Role of Emerging Media – Remarkable Design and Communication Art, Activism and the Public Interest – Education for Sustainability – Participation in Decision Making – Critical Thinking and Reflection – Case Studies

Total Periods:45

TEXT BOOKS

1. John Blewitt, *Understanding Sustainable Development*, Earth Scan Publications Ltd., 2nd Edition, 2008.

2. Jennifer A. Elliot, *An introduction to sustainable development*, Earth Scan Publications Ltd., 4th Edition, 2006.

REFERENCE BOOKS

1. Peter Rogers, Kazi F Jalal , John A Boyd, *An introduction to sustainable development*, Earth Scan Publications Ltd., 1st Edition, 2006.
2. Simon Dresner, *The Principles of Sustainability*, Earth Scan Publications Ltd., 2nd Edition, 2008.

3. Peter Bartelmus, *Environment growth and development: The concepts and strategies of sustainability*, Routledge, 3rd Edition, 2003.

4. Gabriel Moser, Enric Pol, Yvonne Bernard, Mirilia Bonnes, Jose Antonio Corraliza, Maria Vittoria Giuliani, *People places and sustainability*, Hogrefe & Huber Publishers, 2nd Edition, 2003.

IV B.Tech I Semester
RURAL TECHNOLOGY
(OPEN ELECTIVE)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES:

COURSE DESCRIPTION: Research & Development – Non Conventional Energy – Community Development – IT Management

COURSE OUTCOMES:

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

1. Acquire the knowledge of various nonconventional energy systems and technologies for rural development.
2. Apply the principles of IT for the rural development .
3. Responsible for the development of technologies in rural areas .
4. Understand the impact of technologies in societal and environmental aspects .

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

RESEARCH & DEVELOPMENT: India – Ancient Indian Technologies – Rural India Life – Indian Farmer – Role of Science and Technology in Rural Development – Rural Technology and Poverty Eradication – Rural Business Hubs – Technology in improving rural infrastructure – Various organizations related to innovation – Issues of technology transfer: CAPART, NABARD, CSIR, NIF.

UNIT II **(09 Periods)**

NON CONVENTIONAL ENERGY: Definition of Energy, Types of alternative sources of energy, Sources of non conventional energy – Solar energy – Solar Cooker – Solar Heater – Biogas – Recycling and Management and Wastes Conservation – Assessment & Production of biomass products & their utilization.

UNIT III **(09 Periods)**

TECHNOLOGIES FOR RURAL DEVELOPMENT: Food & Agro based technologies – Tissue culture – Building and Construction technologies – Cultivation and processing of economic plants – Cottage and social Industries.

UNIT IV **(09 Periods)**

COMMUNITY DEVELOPMENT: Water conservation – Rain water Harvesting – Drinking water – Environment and Sanitation – Bio fertilizers – Medical and Aromatic plants – Employment generating technologies – Apiculture – Piciculture – Aquaculture.

UNIT V **(09 Periods)**

IT IN RURAL DEVELOPMENT: The Role of Information Technology in Rural Areas – Impact of Information Technology in Rural development – Need and Necessity of Technology – Corporate Social Responsibilities – Private sector participation (Activities in different spheres: Employment, Education, Health, Agriculture and Service Sectors) and Saansad Adarsh Gram Yojana (SAGY) – village adoptions schemes.

Total Periods:45

TEXT BOOKS

1. M.S Virdi, *Sustainable Rural Technologies,* 1st Edition, Daya Publishing House, New Delhi, 2009.
2. S.V. Prabhath & P. Ch. Sita Devi, *Technology and Rural India*, 1st Edition, Serials Publications, New Delhi, 2012.

REFERENCE BOOKS

1. P. R. S. Murthy, R.C. Chackravarthy, *Information Technology & Rural Development,* 1st Edition, Pacific Books International, 2011.
2. Shivakanth Singh, *Rural Development Policies and Programmes,* 1st Edition, Northern book centre, New Delhi, 2002.
3. L.M.Prasad, *Principles and Practice of Management*, 8th Edition, Sultan Chand & Sons, New Delhi, 2014.
4. Venkata Reddy. K, *Agriculture and Rural Development Gandhian Perspective*, 1st Edition, Himalaya Publishing House, 2001.

IV B.Tech I Semester

14BT60305: **Artificial Intelligence and Robotics**

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

COURSE DESCRIPTION:

Artificial Intelligence; Problem solving strategies; Heuristic search, Production systems; Simple facts in logic, Forward and Backward Reasoning; Fuzzy logic and Neural Nets; Concept of learning; Classification and specification of robots; Different Sensing and Vision techniques; Direct and Inverse Kinematics; Dynamics; Programming Languages, VAL-II programming; Applications of Artificial Intelligence in Robotics, Task Planning;

COURSE OUTCOMES:

On completion of the program, a successful student will be able to:

1. Impart knowledge on forward, backward and plausible reasoning inherent in them for developing Artificial intelligence and expert systems.
2. Employ effective methods to analyze a robot motion control while executing a specific task.
3. Design and Implement appropriate solutions for search Problems such as playing two person games and for planning problems which involve defining a sequence of actions of a robot.
4. Apply various AI techniques to different robotic sub-problems involving task planning and obstacle avoidance.

UNIT-I **(10 periods)**

ARTIFICIAL INTELLIGENCE & PROBLEM SOLVING: The Underlying assumption of AI; AI Technique: simple Tic-Tac-Toe program; Problem solving: State space search; Production systems: control strategies, search space control: depth-first, breadth-first search; Heuristic search: Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis.

UNIT-II **(09 periods)**

KNOWLEDGE REPRESENTATION & LEARNING: Knowledge Representation; Predicate Logic: Simple facts in logic, resolution, Natural deduction; Procedural versus Declarative Knowledge; Forward reasoning versus Backward reasoning; Semantic Nets; Frames; slots; conceptual dependency; scripts; Non-Monotonic Reasoning, Probabilistic reasoning, use of certainty factors, fuzzy logic systems & Neural nets: Basic concepts; Concept of learning.

UNIT-III **(08 periods)**

ROBOTICS –VISION & SENSING: Robotics: Robot Classification, Robot Specification, notation; Sensing: Range sensing: Triangulation; proximity sensing: Inductive, Capacitive and Ultrasonic sensing; touch sensing: tactile sensing, artificial skins; Force and torque sensing: Wrist force sensors; Vision: low-level vision, high-level vision.

UNIT-IV **(10 periods)**

ROBOT PROGRAMMING & CONTROL: Direct and Inverse Kinematics: Co-ordinate reference Frames, Rotations, Homogeneous Coordinates; Introduction to arm dynamics; Control: Types of control schemes: Resolved motion control, Adoptive control; Programming: Robot level languages: characteristics, specifications; Task level languages; Language structure: VAL II.

UNIT-V **(08 periods)**

ROBOT INTELLIGENCE & TASK PLANNING: Artificial intelligence in Robotics: Goals of AI research; Applications of state space search in robotics; graph search technique; Problem solving and problem reduction; robot learning; Task planning: Modelling, task specification, obstacle avoidance, grasp planning; Expert system.

Total Periods: 45

Text Books:

1. E. Rich and K. Knight,"*Artificial intelligence"*, 2nd ed., Tata Mc Graw Hill, 1992.
2. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, *Robotics: Control, Sensing, Vision, and Intelligence,* International Edition, Mc Graw Hill, 1987.

Reference Books:

1. Mikell P. Groover, *"Industrial Robotics, Technology, Programming, and Applications"*, 9th reprint, Tata Mc Graw Hill, 2011.
2. D.W. Patterson, *"Introduction to AI and Expert Systems",* PHI, 1992.
3. N.J. Nilsson, *"Principles of AI"*, Narosa Publ. House, 2000.
4. George Luger, *.Al-Structures and Strategies for and Strategies for Complex Problem solving,* 4th edition, Pearson Educations, 2002.

IV B.Tech I Semester

14BT60306: Global Strategy and Technology (Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PRE-REQUISITES: -Nil-

COURSE DESCRIPTION:

Introduction to strategic management, strategic management process, principles of good strategy, globalisation, globalisation strategies, research & development strategies, technology management and transfer, significance, elements of transfer process, corporate governance: the Indian scenario.

COURSE OUTCOMES:

On completion of the program, a successful student will be able to:

1. Decide upon a macroscopic management strategy to optimize the impact of decisions with limited resources.
2. Identify the impact of globalization in a given engineering scenario. Participate in elementary discussions on corporate governance.
3. Analyse an industrial Engineering problem and layout research plan to meet the needs. Identify the crucial stages needed to ensure smooth transfer of technology from concept stage.

DETAILED SYLLABUS:

UNIT-I (09 periods)

INTRODUCTION TO STRATEGIC MANAGEMENT: Deefinitions; Classes of decisions; Levels of strategy; Core competence; Strategic intent and stretch; Approaches to strategy making; Roles of different strategists; strategic management process; Benefits and relevance of strategic management; limitations and misgivings; Principles of good strategy growing relevance of strategic management in India, TQM and strategic management.

UNIT II (09 periods)

GLOBALISATION: Meaning and dimensions; Stages of globalisation; Essential conditions for globalisation; Competitive advantage of Nations; Globalisation of Indian business; Factors favouring Globalisation; Globalisation strategies.

UNIT III **(09 periods)**

RESEARCH & DEVELOPMENT STRATEGIES: Introduction, Concept, Evolution of R & D Management, R & D as a business, R & D and competitive advantage, Integration of R & D, Elements of R & D strategies, Selection of R & D strategies, Implementation strategies, R & D trends, Responses to changes.

UNIT IV **(09 periods)**

Technology Management and Transfer

Technology Management: Introduction, Definition of Technology, Components, Features, Classification of technology, Concept of technology management, Nature of technology management, Drivers of MOT, Significance, Scope of MOT, Responding to technology challenge.

Technology Transfer: Introduction, Definition, Classification, Significance, Elements of transfer process, Types of technology transfer, package, Modes of transfer, Channels of technology flow, Routes of technology transfer, Effectiveness of technology transfer.

UNIT –V **(09 periods)**

Corporate Governance: The Indian Scenario: Emergence of corporate governance in India and the landmarks, corporate governance models, Codes and status in India, Indian corporate governance – Role and Responsibilities of Regulators and the Board of Directors, Corporate Governance: Specific issues in India, Corporate Governance issues in Family – owned business in India, Corporate Governance and the Indian ethos,

Total Periods: 45

Text Books:

1. Francis Cherunilam, *Stategic Management*, 3rd Edition, Himalaya Publishing House, 2002.
2. C.S.G.Krishnamacharyulu and Lalitha Ramakrishnan , *Management of Technology, Stategic Management*, 2nd Edition, Himalaya Publishing House, 2012.

Reference Books:

1. White and Bruton, *The management of Technology and innovation; a strategic approach*, 1st Edition, Cengage Learning, 2007.
2. S.K.Mandak, *Ethics in business and Corporate Governance,* 2nd Edition, TMH 2012.

IV B.Tech – I Semester

14BT60307: Intellectual Property Rights & Management

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES:-Nil

COURSE DESCRIPTION:

Protection of ideas, innovation and artistic endeavors ; Acts and procedure related to patents, trademarks, passing off, copy right, design registration, trade secrets and cyber laws, case studies in each.

COURSE OUTCOMES:

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

1. Prepare documents and fill applications needed for filing a patent, design, copy right and trade mark
2. Ensure smooth transition from concept to final product.
3. Exercise discretion in following ethical aspects in dealing with intellectual property rights.

UNIT I **(09 periods)**

OVERVIEW OF INTELLECTUALPROPERTY RIGHTS: Introduction and importance of intellectual property rights (IPRs), types of intellectual property, International scenario in IPR: WIPO, WTO, TRIPS, international and national patent acts: United States of America patent act, United Kingdom patent act, India patent act, recent amendments in India patent act 1972.

UNIT II **(09 periods)**

PATENTS: Introduction, Basic concepts, object and value of patent law, advantages of patent to inventor, patentable inventions, Not patentable inventions, overview of patent procedure, Bio technology patents, patents on computer program, patent rights on micro organism, plant breeding and breeders right, protection of bio diversity, protection of traditional knowledge, infringement of patents and remedy for infringement.

UNIT III **(09 periods)**

TRADEMARKS: Trade Marks: Basic concepts, definition, functions, kinds of trademarks: service trademarks, collective trademarks, certification trademarks, textile trade marks, registrable and non registrable trademarks, registration of trademarks, examination process,

establishing trade mark right, good will, infringement and action for trademarks, passing off, trade mark and eco label, comparison with patents industrial design and copy right.

UNIT IV **(09 periods)**

INDUSTRIAL DESIGN , TRADE SECRETS, CYBER LAWS:

Industrial Design: Basic concepts, scope and nature of rights, process of registration rights, rights after registration, transfer of interest or rights, reliefs and remedies and action for infringement of rights, appeals..

Trade Secrets: Definition, significance, tools to protect trade secrets in India

Cyber laws: Co relation to intellectual property

UNIT V **(09 periods)**

COPY RIGHTS:

Copy Rights: Introduction, nature and scope, subject matter, related or allied rights, works in which copy rights subsists, registration of copy rights, conferred by copy right, copy right protection in India, transfer of copy rights, right of broad casing organizations and of performer, computer software.

Total Periods: 45

TEXT BOOKS:

1. P.Narayan, "*Intellectual Property Law*", Eastern Law House, New Delhi and Kolkata, 2005,
2. Deborah E. Bouchoux, "*Intellectual Property Rights"*, India edition, Cengage Learning, 2011.

REFERENCE BOOKS:

1. Bainbridge David, "*Intellectual Property Rights: Key to New Wealth, National Research Development Corporation,* Pearson Education, New Delhi.
2. W.R.Cornesh, "*Intellectual Property Rights: Patent, Copy Right, Trade Mark, Allied Rights"*, Universal law publishing private limited, Delhi, 2001.
3. S.R. Myneni, "*Law of Intellectual Property",* Asia law house, Hyderabad 2001.
4. Prabuddha Ganguly, "*Intellectual Property Rights: Unleasing Knowledge Economy",* TMH New Delhi, 1 st edition, 2001.

IV B.Tech – I Semester
14BT60308: **Managing Innovation and Entrepreneurship**

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PRE-REQUISITES: Nil

Course Description:

Evolution of entrepreneurship from economic theory Managerial and entrepreneurial competencies; Concepts Shifting Composition of the Economy Purposeful Innovation & 7 Sources of Innovative Opportunity The Innovation Process; Innovative Strategies; Entrepreneurial Motivation; Entrepreneurs versus inventors; Ethics and International Entrepreneurship; Strategic Issues in International Entrepreneurship; Problem solving Innovation and Diversification.

Course Outcomes:

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

1. Define, explain and illustrate theories of business innovation and entrepreneurship, the evolution of industries and economies, and the roles of Entrepreneurs.
2. Develop a comprehensive and well structured business plan for a new venture.
3. Present a persuasive business plan to potential investors or to internal stakeholders and effectively answer probing questions on the substance of the plan; and,
4. Work effectively in multidisciplinary, cross-cultural teams, towards the development of a Team Project.

DETAILED SYLLABUS:

UNIT I **(07 Periods)**

Entrepreneurship: Introduction to Entrepreneurship: Evolution of entrepreneurship from economic theory; Managerial and entrepreneurial competencies, entrepreneurial growth and development.

UNIT II **(11Periods)**

Creativity and Innovation: Creativity and Innovation: Concepts Shifting Composition of the Economy; Purposeful Innovation & the 7 Sources of Innovative Opportunity; The Innovation Process; Innovative Strategies: Strategies that aim at introducing an innovation, innovation & entrepreneurship, planning -incompatible with Innovation & entrepreneurship.

UNIT III **(07 Periods)**

The Individual Entrepreneur: Entrepreneurial Motivation: Need for continuous learning & relearning; Acquiring Technological Innovation Entrepreneurial motivation (nAch story); Achievement Motivation in Real life- Case Study. Entrepreneurs versus inventors.

UNIT IV **(11 Periods)**

International Entrepreneurship Opportunities: International Entrepreneurship: Concepts and Nature of International Entrepreneurship. The changing International environment. Ethics and International Entrepreneurship. Entrepreneurial entry in to international business, strategic Issues in International Entrepreneurship.

UNIT V **(09 Periods)**

Creative Problem Solving: Problem Identification and Problem Solving: Problem Identification. Problem solving Innovation and Diversification.

Total Periods: 45

Text Books:

1. Martin, M.J. *"Managing Innovation and Entrepreneurship in Technology based Firm",* John Wiley Interscience, 1994.
2. Ettlie, J.E. *"Managing Technology Innovation"*, John Wiley & Sons, 2000.
3. Robert D Hisrich., Michael P Peters., Dean A Shepherd, *"Entrepreneurship" The McGraw-Hill Companies*, 6th Edition, 2011

Reference Books:

1. Christensen, C. M. and Raynor, M. E. *The Innovators Solution: Creating and Sustaining Successful Growth,* Boston, MA: Harvard Business School Press, (2003).
2. Drucker, P. F., *Innovation and Entrepreneurship*, New York: Harper, 1985.
3. Harvard Business Review on Innovation (Collection of articles), Harvard Business School Press (2001).
4. Harvard Business Review on Entrepreneurship (Collection of articles), Harvard Business School Press (1999)
5. Rogers, E.M., *"Diffusion of Innovations",* New York: Simon and Schuster, 5th Edition, 2003.
6. Drucker, P. F. *"The Discipline of Innovation,"* Harvard Business Review, May2000. (Originally published 1985, May-June)

IV B.Tech – I Semester

14BT60309: **Materials Science**

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PRE-REQUISITES:
Engineering Chemistry, Engineering Physics.

COURSE DESCRIPTION
Structure and Bonding in metals; Steels ,Cast Irons and Non Ferrous alloys; Material Selection for conductors, Insulators and semi conductors; Strengthening mechanisms of metals; Plastics and Ceramics as Insulators; AC and DC properties of Insulators; Semiconductors and Magnetic materials; Composite materials in Electrical and Electronics engineering, Material Selection and manufacturing of Optical fibers

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Understand how materials are formed and their classification based on atomic arrangement.
2. Illustrate how the design of the various types of steels, cast Irons and Non ferrous alloys influence various engineering applications.
3. Understand the basic difference in properties of various conductors, Insulators and Semiconductors and application of various advanced materials for different branches of Engineering.

UNIT I **(07 periods)**

INTRODUCTION TO MATERIALS SCIENCE: Structure of metals: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

Constitution of alloys: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

UNIT II **(12 periods)**

CAST IRONS , STEELS & NON-FERROUS METALS: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels. Structure and properties of Copper and its alloys, Aluminum and its alloys.

UNIT III **(12 periods)**

ELECTRIC CONDUCTORS & INSULATORS: Type of materials selected for conductors, Insulators and semi conductors. Introduction to ceramics-Bonding and microstructure-DC properties of ceramic materials–AC properties– mechanical properties - Ceramics as Conductors, Insulators and capacitors, introduction to Plastics-DC properties-AC properties-mechanical properties.

UNIT IV **(09 periods)**

SEMICONDUCTORS AND MAGNETIC MATERIALS: Fabrication of Semiconductors-Producing a silicon wafer-Lithography and Deposition-Packaging of semiconductors materials-Types of magnetic materials-Measuring magnetic properties-Application of soft magnetic materials in Electromagnets and relays, AC transformers, Generators and motors.

UNIT V **(05 periods)**

ADVANCED MATERIALS AND APPLICATIONS: Composites – Fiber reinforced, Metal Matrix, Ceramic Matrix – properties and applications; Ceramics – Alumina, Zirconia, Silicon Carbide, Sialons, Reaction Bonded Silicon Nitride(RBSN), Glasses– properties and applications, manufacturing of Optical fibers.

Total periods : 45 Periods

TEXT BOOKS:

1. Kodigre V D, *Material Science and Metallurgy*, 31st edition, Everest Publishing House, Pune, 2011.
2. Ian.P.Jones, *Material Science for Electrical and Electronic Engineers*, Oxford University Press, New Delhi,2000

REFERENCE BOOKS:

1. V. Raghavan, *Physical Metallurgy: Principles and Practices*, 2nd edition, PHI, New Delhi, 2006.
2. William. D. Callister, *Materials Science & Engineering-An Introduction,* 6th edition, John Wiley and sons, New Delhi, 2002.
3. A.J. Dekkar, *Electrical Engineering Materials*, PHI, New Delhi, 1970.

IV B. Tech. – I Semester

14BT60502: ENGINEERING SYSTEMS ANALYSIS AND DESIGN

(Open-Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PRE-REQUISITES: NIL

COURSE DESCRIPTION:

Overview of the Systems Process, Technologies for systems, System Development Life Cycle, system Analysis and Modeling, levels of management, Project Management, Systems Implementation and importance of UML Prototyping, Maintaining and Managing the Systems output Process.

COURSE OUTCOMES:

After successful completion of this course, a student will be able to:

1. Gain knowledge on:
   - Systems Process and System Design
   - Systems Analysis and Modeling
   - System Development Life Cycle
   - Design Management and Maintenance Tools.
2. Apply the CASE Tools for System Processand estimation the given models.
3. Design, Develop and implement new Techniques for modeling thesystems.
4. Work effectively as team member on projects
5. Manage and Maintain the System Process.

UNIT I **(09 periods)**

INTRODUCTION: Introduction- Systems, Types of systems,integrating technologies for systems, Need for system analysis and design, Roll of the systems analyst, the system development life cycle, CASE tools for analysis and design.

UNIT II **(09 periods)**

ANALYSIS AND MODELING ORGANIZATIONAL SYSTEMS:

Organization as system, System Analysis, Depicting systems graphically, Use case Modeling, levels of management, organizational culture.

UNIT III – PROJECT MANAGEMENT **(9 periods)**

Project initiation, Problem in organization, Determining feasibilities,ascertaining hardware and software needs,identifying, forecasting, comparing costs and benefits, activity planning and control, managing the project.

UNIT IV **(09 periods)**

OBJECT ORIENTED ANALYSIS AND DESIGN USING UML: Object oriented analysis and design- Introduction, Object modeling, Dynamic modeling, functional modeling, packages and other UML artifacts, the importance of using UML for modeling.

UNIT V **(09 periods)**

DESIGNING EFFECTIVE OUTPUT: Output design objectives, relating output content to output method, realizing how output bias affects users, designing output for display, Case studies- Designing a web site management, online exam management.

Total Periods: 45

TEXT BOOKS:

1. Kenneth E.Kendall and Julie E.Kendall, "*System analysis and Design*",8th Edition, Pearson Education , India,2011.

REFERENCE BOOKS:

1. Dennis, Wixom, and Roth "*Systems Analysis and Design"* 5th Edition, John Wiley. 2012.
2. Shelly and Rosenblatt, "Systems Analysis and Design" 9th Edition, Cengage Learning, 2012.

IV B. Tech. I Semester
14BT71005: MICROELECTROMECHANICAL SYSTEMS

(Open Elective)

(Common to ECE, EEE, EIE & CE)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

Pre-requisites: Basic knowledge in Physics.

Course Description: Overview of Micro Electro Mechanical Systems (MEMS), scaling laws, working principles of microsensors and microactuators, materials, microfabrication processes, packaging of Microsystems.

Course Outcomes:

After completion of the course the student is able to

1. Demonstrate knowledge on MEMS devices, scaling laws, microsensors and microactuators.
2. Identify the suitable materials, fabrication techniques, packaging methodologies to develop MEMS devices.

DETAILED SYLLABUS:

UNIT I (09 Periods)

Overview of MEMS and Scaling Laws: Introduction, MEMS and microelectronics, miniaturization, applications of MEMS in the automotive industry and in other industries.

Scaling laws of miniaturization: Introduction to scaling, scaling in: geometry, rigid- body dynamics, electrostatic forces, electromagnetic forces, Electricity, Fluid mechanics, Heat transfer.

UNIT II (09 Periods)

Working Principles of Microsystems: Microsensors, acoustic wave sensors, biomedical and biosensors, chemical sensors, pressure sensors, thermal sensors. Microactuation: actuation using thermal forces, shape-memory alloys, piezoelectric crystals, electrostatic forces. MEMS with microactuators, microgrippers, micromotors, microvalves, micropumps. Microaccelerometers, microfludics.

UNIT III (09 Periods)

Materials for MEMS and Microsystems: Substrate and wafers, silicon as a substrate material, silicon compounds, silicon piezoresistors, gallium arsenide, quartz, piezoelectric crystals, polymers, carbon nano tube (CNT), development of CNTs, application of CNTs.

UNIT IV (09 Periods)

MEMS Fabrication Process and Micromanufacturing: Photolithography, ion implantation, diffusion, oxidation, chemical vapor deposition, physical vapor deposition, deposition by epitaxy, etching, bulk micromanufacturing, surface micromanufacturing, LIGA process.

UNIT V **(09 Periods)**

MEMS Packaging: Introduction to microsystem packaging, objectives and general considerations in packaging design, three levels of microsystem packaging, interfaces in microsystem packaging, packaging technologies, three-dimensional packaging, selection of packaging materials, signal mapping and transduction, Design case: Pressure sensor packaging.

Total: 45 Periods

Text Books:

1. Tai-Ran Hsu, *MEMS & Microsystems, Design and Manufacture*, McGraw Hill Education (India) Pvt. Ltd., 2002.

References:

2. G.K.Ananthasuresh, K.J.Vinoy, *Micro and Smart Systems*, Wiley India, Ist edition, 2010
3. Nitaigour Premchand Mahalik, *MEMS*, McGraw Hill Education (India) Pvt. Ltd., eighth reprint, 2013.

IV B.Tech – I Semester

14BT61205: **BIO INFORMATICS**

(Open Elective)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Nil

COURSE DESCRIPTION: Introduction to Bioinformatics; Biology and Information; Sequence alignment and dynamic programming; Primary databases, Secondary databases and their use in Bioinformatics.

COURSE OUTCOMES:

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

1. Demonstrate knowledge on concepts of biological databases, Genome and proteome.
2. Analyze biological database management system.
3. Create, select and apply appropriate techniques and tools to manage the biological data.

DETAILED SYLLABUS:

UNIT I **(08 Periods)**

INTRODUCTION TO BIOINFORMATICS: Internet basics, Scope of bioinformatics, elementary commands and protocols, ftp, telnet, http, primer on information theory, introduction to perl and bioperl.

UNIT II **(07 Periods)**

BIOLOGY AND INFORMATION: Bioinformatics, Computers in Biology and Medicine, The Virtual Doctor, Biological Macromolecules as Information Carriers.

UNIT III **(10 Periods)**

SEQUENCE ALIGNMENT AND DYNAMIC PROGRAMMING: Heuristic alignment algorithms, global sequence alignments- Needleman-Wunsch algorithm, local sequence alignments- smith-waterman algorithm, amino acid substitution matrices- PAM and BLOSUM, Multiple sequence alignment and phylogenetic analysis.

UNIT IV **(11 Periods)**

PRIMARY DATABASES AND THEIR USE: Introduction to biological databases- organization and management, searching and retrieval of information from the World Wide Web, Structure databases - PDB (Protein Data Bank), Molecular Modeling Databases (MMDB), primary databases NCBI, EMBL, DDBJ.

UNIT V **(09Periods)**

SECONDARY DATABASES: Introduction to secondary databases-organization and management of databases Swiss-Prot, Uniprot and PIR, Introduction to biochemical databases-organization and Management of databases, KEGG, ExPASy, BRENDA.

(Total Periods: 45)

TEXT BOOKS:

1. David W. Mount "Bioinformatics: Sequence and Genome Analysis", CSHL Press, 2nd edition, 2005.

REFERENCE BOOKS:

1. Hooman H. Rashidi and Lukas K. Buehler, "Bioinformatics Basics, Applications in Biological Science and Medicine", CRC Press, Taylor & Francis Group, 2nd edition,2005.

2. Rastogi S. C., NamitaMendiratta, Parag Rastogi, "Bioinformatics: Methodsand Applications: Genomics, Proteomics and Drug Discovery", PHI Learning Pvt. Ltd.,3rd edition, 2011.

IV B.Tech - I Semester

14BT61206: CYBER SECURITY AND LAWS

(Open Elective)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Nil

COURSE DESCRIPTION: Cyber Crimes and Indian IT Act; Cyber Offenses; Tools and Methods used in Cyber Crime; Phishing ad Identity Theft; Indian and Global Perspective on Cyber Crimes and Cyber Security; Organizational Implications on Cyber Security; IPR Issues; Cyber Crime and Terrorism; Cyber Crime Illustrations.

COURSE OUTCOMES:

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

1. Demonstrate knowledge in Cyber security, Cyber crimes and its related laws in Indian and Global Act.
2. Analyze the legal perspectives and laws related to cyber crimes in Indian context.
3. Apply security and privacy methods in development of modern applications and in organizations to protect people and to prevent cyber crimes.

DETAILED SYLLABUS:

UNIT I (09 Periods)

INTRODUCTION TO CYBER CRIMES: Introduction, Definition, Origin, Cyber Crime and Information Security, Cyber Criminals, Classifications of Cyber Crimes, The Legal Perspectives and Indian Perspective, Cyber Crime and Indian ITA 2000, Global Perspective on Cyber Crimes.

Cyber Offenses: Introduction, Criminals Planning on Attacks, Social Engineering, Cyber Stalking, Cyber Café and Crimes, Botnets.

UNIT II (09 Periods)

TOOLS AND METHODS USED IN CYBER CRIME: Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan horses and Backdoors, Steganography, DoS and DDoS attacks.

Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft).

UNIT III **(08 Periods)**

CYBER CRIMES AND CYBER SECURITY-LEGAL PERSPECTIVES: Introduction, Cyber Crime and the legal landscape around the world. Cyber Laws in Indian Context, The Indian IT Act, Challenges to Indian Law and Cyber Crime Scenario in India, Consequences of not addressing the weakness in IT Act, Digital Signatures and the Indian IT Act, Cyber Crime and Punishment, Cyberlaw, Technology and Students in India Scenario.

UNIT IV **(10 Periods)**

CYBER SECURITY-ORGANIZATIONAL IMPLICATIONS: Introduction, Cost of Cyber Crimes and IPR issues, Web Threats for Organizations – Evils and Perils, Security and Privacy Implications from Cloud Computing, Social Media Marketing-Security Risks and Perils for Organizations, Social Computing and Associated Challenges for Organizations, Protecting People's Privacy in Organization, Organizational Guidelines for Internet Usage, Safe Computing and Usage Policy, Incident Handling and Best Practices, Media and Asset Protection.

UNIT V **(09 Periods)**

CYBER TERRORISM AND INFORMATION WARFARE: Introduction, Intellectual Property in the Cyber Space, the Ethical Dimension of Cyber Crimes, the Psychology, Mindset and Skills of Hackers and Cyber Criminals, Sociology of Cyber Criminals, Information Warfare.

Cyber Crime Illustrations: Indian Banks lose Millions of Rupees, Justice vs. Justice, Parliament Attack, The Indian case of online Gambling, Bank and Credit card related frauds, Purchasing goods and services scam, Nigerian 419 scam.

(Total Periods: 45)

TEXT BOOK:

1. Nina Gobole, Sunit Belapure, *"Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives,"* 1st edition, Wiley India, 2011.

REFERENCE BOOKS:

1. Ferrara et al., *"Cyber Law: Text and Cases,"* 3rd edition, Cengage Learning, 2012.
2. Vivek Sood, *"Cyber Law Simplified",* Tata McGraw-Hill, 1st edition, 2012.
3. Prashant Mali, *"Cyber Law and Cyber Crimes,"* 1st edition, Snow White Publications Pvt. Ltd., 2013.

IV B.Tech I Semester

14BT70110: STRUCTURAL DYNAMICS

(PROFESSIONAL ELECTIVE-II)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Engineering Mechanics, Structural Analysis–1 & Structural Analysis–2.

COURSE DESCRIPTION: Introduction to principle of vibration analysis, single degree of freedom Two degree of freedom and Multi–degree of freedom systems–Vibration Analysis– Dynamic analysis of continuous systems.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Evaluate the structural properties, mode shapes for the different structures under the different loading conditions .
2. Analyse the problems on the single degree of freedom and multi degrees of freedom .

DETAILED SYLLABUS:

UNIT I (10 Periods)

INTRODUCTION TO STRUCTURAL DYNAMICS AND SINGLE DEGREE OF FREEDOM (SDOF) SYSTEM : Single degree of freedom–introduction–Alembert's principle–Theory of vibrations – Lumped mass and continuous mass systems – Single degree of freedom (SDOF) systems – Formulation of equations of motion – Undamped and damped free vibration – Damping– Critical damping– Logarithmic decrement.

UNIT II (09 Periods)

TWO DEGREE OF FREEDOM SYSTEMS: Equations of motion of two degree of freedom systems–normal mode of vibrations–applications.

UNIT III (09 Periods)

MULTI–DEGREE OF FREEDOM (MDOF) SYSTEMS: Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response

UNIT IV (09 Periods)

VIBRATION ANALYSIS: Vibration analysis–Rayleigh's method–Approximate methods–Improved Rayleigh method.

UNIT V **(08 Periods)**

DYNAMIC ANALYSIS OF CONTINUOUS SYSTEMS: Differential equation of motion–Transverse vibration of linearly elastic beams–Analysis of undamped free vibration of simply supported and cantilever beams.

Total Periods:45

TEXT BOOKS

1. Anil.K.Chopra, *Dynamics of Structures*, 3rd Edition, Pearson Education, 2007.
2. Mario Paz, *Structural Dynamics: Theory and computation*, Kluwer Academic Publication, 2004.

REFERENCE BOOKS

1. Clough and Penzien*, Dynamics of Structures*, 3rd Edition, McGraw–Hill International Edition, 2008.
2. C.V.R. Murty, *Earthquake Tips*, NICEE, IIT, Kanpur.
3. R. Ayothiraman and HemanthHazarika, *Earthquake Hazard Mitigation*, I.K. International Publishing House Pvt. Ltd.,
4. PankajAgarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures*, 1st Edition, Prentice Hall of India, 2006.
5. S.K. Duggal, *Earthquake Resistant Design of Structures*, 1st Edition, Oxford University Press, 2010.

IV B.Tech I Semester

14BT70111: ADVANCED FOUNDATION ENGINEERING

[PROFESSIONAL ELECTIVE – II]

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Soil Mechanics, Foundation Engineering

COURSE DESCRIPTION:
Advanced bearing capacity theories; Analysis and design of shallow foundations; Pile foundations; Well foundations; Sheet pile walls; Foundations in problematic soils; Underreamed pile foundations; Marine substructures.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Demonstrate knowledge on advanced theories of bearing capacity and settlements of shallow and deep foundations
2. Analyze different types of foundations and sheet piles based on different ground conditions
3. Design foundations, sheet piles and breakwaters
4. Ensure stability and safety in the design of foundations, sheet piles and marine substructures

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

SHALLOW FOUNDATIONS : Theories of bearing capacity – Effects of size, depth and shape of footings, tilt and eccentricity of applied loads, water table, compressibility, non–homogeneity and anisotropy of soil – Bearing capacity of footings resting on stratified soils, on slope and on top of the slopes – Settlement of foundation – Bearing pressure using SPT, CPT, Dilatometer and Pressuremeter – Types of foundation – Design principles of isolated, combined footing and mat foundation (conventional rigid method only).

UNIT II **(10 Periods)**

PILE FOUNDATIONS: Bearing capacity of vertically loaded piles: Static capacity-á, â and ë Methods, IS Code - Dynamic formulae - Point Bearing Resistance with SPT and CPT Results; Bearing Resistance of Piles on Rock - Pile Load Test - Negative Skin Friction – Uplift Resistance - Laterally Loaded Piles - Ultimate Lateral Resistance - Batter Piles - Under Reamed Piles - Mini and Micro Piles - Ultimate Capacity of Pile Groups in Compression, Pullout & Lateral Load - Efficiency; Settlements of Pile Groups.

UNIT III **(09 Periods)**

SHEET PILE WALLS: Sheet pile structures – cantilever sheet pile walls in granular soils and cohesive soils – Anchored Bulk head – Free earth supported method – Fixed earth support method – Lateral earth pressure on Braced sheet pile walls.

UNIT IV **(08 Periods)**

FOUNDATIONS ON EXPANSIVE SOILS: Foundations in black cotton soils – basic foundation problems associated with black cotton soils – Lime column techniques – Use of Cohesive Non Swelling [CNS] layer below shallow foundations – Underreamed piles – principle of functioning of underreamed pile – Analysis and design of underreamed pile.

UNIT V **(09 Periods)**

MARINE SUBSTRUCTURES : Introduction – Type of marine structures – Breakwaters, wharves, piers, seawalls, docks, quay walls – Design loads – Wave action – Wave pressure on vertical wall – Ship impact on piled wharf structure – Design of rubble mount break water and wall type break water.

Total Periods:45

TEXT BOOKS

1. Donald P. Coduto, *Foundation Design Principles and Practices*, 2nd edition, PHI, 2008.
2. Swami Saran, *Analysis and Design of Substructures – Limit State Design,* 2nd Edition, Oxford & IBH Publishing Company Pvt. Ltd., 2010

REFERENCE BOOKS

1. V. N. S. Murthy, *Text Book of Soil Mechanics and Foundation Engineering,* 3rd Edition, CBS Publishers & Distributors [P] Ltd., 2010.
2. Braja M. Das, Principles *of Foundation Engineering,* 7th Edition, Cengage Learning India, 2010.
3. Bowles J.E., *Foundation Analysis and Design,* 5th Edition, McGraw–Hill Publishing Company, 2001.
4. Shamsher Prakash, Gopal Ranjan and Swami Saran, *Analysis and Design of Foundations and Retaining Structures,* 2nd Edition, Sarita Publishers, 1987.

IV B.Tech I Semester
14BT70112: WATER RESOURCES SYSTEMS PLANNING AND MANAGEMENT

(Professional Elective – II)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Surveying, Engineering Hydrology, Water Resources Engineering.

COURSE DESCRIPTION: Concepts of water resources system planning and management – Linear programming – Dynamic programming – Non–linear optimization techniques – Simulation – Water resources economics – Water resources management.

COURSE OUTCOMES:

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

1. Apply mathematics and optimization techniques for effective water resources planning .
2. Analyze availability of water resources for sustainable development .
3. Develop simulation techniques for water resources, planning and management .
4. Address the importance of water resources planning and management .
5. Carryout cost benefit analysis and give insights for the benefit of society .

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

WATER RESOURCE SYSTEMS: Concepts of systems analysis – Systems approach to water resources planning and management – Role of optimization models – Objective function and constraints – Types of optimization techniques.

UNIT – II **(09 Periods)**

LINEAR PROGRAMMING: Formulation of linear programming models – Graphical method – Simplex method – Application of linear programming in water resources – Revised simplex method – Duality in linear programming – Sensitivity and post optimality analysis.

UNIT – III **(09 Periods)**

DYNAMIC PROGRAMMING: Belman's principles of optimality – Forward and backward recursive dynamic programming – Case of dimensionality – Application of dynamic programming for resource allocation.

UNIT – IV **(09 Periods)**

NON–LINEAR OPTIMATIZATION TECHNIQUES AND SIMULATION: Classical method of optimization – Kun–Tucker – Gradient based techniques for simple unconstrained optimization – Application of simulation techniques in water resources planning.

UNIT – V **(09 Periods)**

WATER – RESOURCES ECONOMICS AND MANAGEMENT: Principles of economic analysis **–** Benefit cost analysis – Socio–economic institutional and pricing of water resources – Planning of reservoir system **–** Optimal operation of single reservoir system **–** Allocation of water resources **–** Optimal cropping pattern **–** Conjunctive use of surface and sub–surface water resources.

Total Periods:45

TEXT BOOKS

1. S. Vedula and P.P. Mujumdar, *Water Resources Systems*, 5th Edition, Mc.Graw Hill, 2010.
2. N. Ramanathan, *Operations research*, TMH Publications, 2005.

REFERENCE BOOKS

1. P.R. Bhave, *Optimal Design of Water Distribution Networks*, Narosa Publishing House, 2003.
2. P. Sankar Iyer, *Operations Research*, TMH Publications, 2008.
3. S.S. Rao, *Engineering Optimization,* 4th Edition, John Wiley and Sons Inc., 2009.
4. James and Lee, *Water Resources Economics,* Oxford Publishers, 2005.

IV B.Tech I Semester

14BT70113: TRANSPORTATION MANAGEMENT

(PROFESSIONAL ELECTIVE – II)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Transportation Engineering – I

COURSE DESCRIPTION: Transportation Planning and Management – Traffic Assessment, Land use transport models, Theory of Traffic flow – Transport economics, Public Transportation – Mass Transit System – Construction plant, Machinery, Tools and Vehicles used in Transportation Projects.

COURSE OUTCOMES:

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

1. Acquire the knowledge on the transportation planning and management .
2. Assemble, analyze, and appropriately apply transportation engineering data from existing graphs, reports, and other documents .
3. Use Statistical methods and Electronic technology to support the planning, design, operation and management of transportation facilities and projects .
4. Apply latest techniques in Planning and Controlling of Transportation Projects .

DETAILED SYLLABUS:

UNIT I (09 Periods)

TRANSPORTATION PLANNING AND MANAGEMENT: Introduction to the process of urban transport planning – Travel demand forecasting – Trip generation analysis – Trip classification – Multiple regression analysis – Category analysis – Modal split analysis: introduction, earlier modal split models, modal split models with behavioral basis – Trip distribution analysis: introduction, methods of trip distribution, uniform and average factor method, Fratar method,Furness method, The Gravity model, Intervening and competing, Linear programming approach to trip distribution.

UNIT II (09 Periods)

TRAFFIC ASSIGNMENT: Purpose of traffic assignment- Assignment techniques - All or nothing assignment - Multiple route assignment - Capacity restraint assignment - Diversion curves - Route building algorithms.

LANDUSE TRANSPORT MODELS: Introduction, selection of Land–use transport models, The Lowry model, Grain – Lowry model, Applications of Lowry model.

THEORY OF TRAFFIC FLOW: Scope, definitions and basic relationship, review of flow density speed studies, hydrodynamic analogies, Application of hydrodynamic analogy, Car following theory and its application to traffic engineering, probabilistic description of traffic flow, an introduction to queuing theory as applied to traffic flow problems for study state conditions, simulation studies.

UNIT III **(08 Periods)**

TRANSPORT ECONOMICS: Economic evaluation of highway schemes - need for economic evaluation - cost and benefits of transportation projects - basic principles of economic evaluation - Net present value method, benefit/cost ratio method - internal rate of return method - Vehicle operating costs - Value of travel time saving - Accident costs.

PUBLIC TRANSPORTATION–MASS TRANSIT SYSTEMS: Bus and rail transit, characteristic capacities – Introduction to advanced computational techniques for transportation planning.

UNIT IV **(08 Periods)**

CONSTRUCTION PLANT, MACHINERY, TOOLS AND VEHICLES USED IN TRANSPORTATION PROJECTS (HIGHWAY, RAILWAY, AIRPORT, NAVAL DOCKYARD) : Dewatering, Blasting, Excavation, Grading, Haulage; Dredging; Concreting – RMC Plant, Batching Plant, Concrete Pumps, Transit Mixers; Piling – Pile Driving in equipment; Air Compressors and Pneumatic tools; Equipment for Flexible Pavements – Hot Mix Plant, Paver; Railway Track–laying equipment; Time, Cost, Output and FOL calculation; Numerical Problems

SCHEDULING AND CONTROLLING OF PLANT, MACHINERY, TOOLS AND VEHICLES: Grouping of Plant and Machinery; Incorporating in Project Planning; Preparation of Plant Schedule, Numerical Problems.

UNIT V **(11 Periods)**

PLANNING AND CONTROLLING OF TRANSPORTATION PROJECTS: WBS, Network Development, Resource allocation, Planning and Controlling

INTRODUCTION TO SOFTWARE PACKAGES LIKE PRIMAVERA AND MS PROJECT

Total Periods:45

TEXT BOOKS

1. L.R.Kadyali, *Traffic Engineering and Transportation Planning,* 7th Edition, Khanna Publications, 2012.
2. KK Chitkara, *Construction Project Management: Planning, Scheduling and Controlling,* Mc.Graw Hill Education Pvt. Ltd., 2010

REFERENCE BOOKS

1. S.P. Saxena, S.P. Arora, *Railway Engineering – A Text Book of Transportation Engineering,* 7th Edition, S.Chand and Co. Ltd., 2010
2. SP Chandola, *A Text book of Transportation Engineering*, S Chand & Co Ltd, 2011

IV B.Tech I Semester

14BT70114: ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

(PROFESSIONAL ELECTIVE – II)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Environmental Science

COURSE DESCRIPTION: Introduction to environmental impact assessment – EIA methodologies – Environmental impact on soils, ground water and surface water – Environmental impact assessment of air, vegetation and wild life – Environmental audit and acts.

COURSE OUTCOMES:

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

1. Explain the parameters of EIA and its methods and Environmental audit .
2. Analyze and interpret the parameters that affect the study area .
3. Address the issue related to the impact of parameters on the environment and society .
4. Conduct audit and write EIA report without bias and give recommendations .

DETAILED SYLLABUS:

UNIT I (08 Periods)

INTRODUCTION TO ENVIRONMENTAL IMPACT ASSESSMENT

Basic concept of EIA – Initial environmental examination – Elements of EIA – Factors affecting EIA – Impact evaluation and analysis – Preparation of environmental base map – Classification of environmental parameters.

UNIT II (08 Periods)

EIA METHODOLOGIES

Criteria for the selection of EIA Methodology – EIA methods – Adhoc methods, matrix methods, network method – Environmental medium quality index method, overlay methods and cost/benefit analysis.

UNIT III (10 Periods)

ENVIRONMENTAL IMPACT ON SOIL, GROUND WATER AND SURFACE WATER Prediction and assessment – Soil quality – Methodology for the assessment of soil and groundwater – Delineation of study area – Identification of activities. Impact prediction – Assessment of impact significance – Identification and incorporation of mitigation measures – EIA in surface water: Methodology for the assessment of impacts on surface water environment.

UNIT IV (08 Periods)

ENVIRONMENTAL IMPACT ASSESSMENT OF AIR, VEGETATION AND WILDLIFE

Air pollution sources – Generalized approach for assessment of air pollution Impact. Assessment of impact of developmental activities on vegetation and wildlife – Environmental impact of deforestation – Causes and effects of deforestation.

UNIT V (11 Periods)

ENVIRONMENTAL AUDIT AND ACTS

Environmental audit and environmental legislation – Objectives of environmental audit – Types of environmental audit – Audit protocol – Stages of environmental audit – Onsite activities – Evaluation of audit data and preparation of audit report. Post audit activities – The Environmental Protection Act – The water act – The Air act – Wild life Act – Case studies– Preparation of Environmental Impact Assessment(EIA) statement for various projects.

Total Periods:45

TEXT BOOKS

1. Y. Anjaneyulu, *Environmental Impact Assessment Methodologies,* 2nd Edition B.S. Publications, 2010.
2. J. Glynn and Gary W. Heinke, *Environmental Science and Engineering,* 2nd Edition , Prentice Hall, 1996.

REFERENCE BOOKS

1. Suresh K. Dhameja, *Environmental Engineering and Management,* S.K. Kataria and Sons, 2010.
2. H.S. Bhatia, *A Text Book of Environmental Pollution and Control,* Galgotia Publications (P) Ltd., 2003.
3. Charless H.Eccleston, *Environmental Impact Assessment*, CRC Press, Taylor and Francis Group, 2011.
4. Balakrishna Moorthy, *Environmental Management*, 2nd Edition, PHI Publications, 2008.

IV B.Tech I Semester

14BT70121: REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

PREREQUISITES: –

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Apply the knowledge of aerial photographs, satellite imagery to civil engineering applications .
2. Analyze the Remote sensing and GIS data to generate the geographical information for natural resources .
3. Prepare thematic maps using Remote Sensing and GIS data for different applications
4. Interpret the feature classes in RS and GIS applications using appropriate methods
5. Use RS & GIS tools for various applications of civil engineering
6. Communicate effectively on the geospatial data to the engineering community and society in written, oral and graphical forms.

LIST OF EXPERIMENTS:

1. Creation of geo–database
2. Digitization of Toposheet/Map
3. Drainage analysis
4. Developing digital elevation model
5. Preparation of thematic maps
6. Landuse and Landcover analysis
7. Study of feature estimation
8. Rainfall –Runoff analysis
9. Road network analysis
10. Watershed analysis
11. Site suitability analysis
12. Natural hazard zones map

IV B.Tech I Semester

14BT70122: COMPUTER AIDED DESIGN AND DETAILING LAB

Internal Marks	External Marks	Total	L	T	P	C
25	50	75	–	–	3	2

Prerequisites: Engineering Graphics, RCCS–I & II

Course Description: Simple Beams and 2–D, 3D Frame Analysis.

Course Outcomes:

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

1. Acquire knowledge on the theoretical concepts of analysis, design and use of software .
2. Analyze structure under different loading conditions .
3. Estimate the reinforcement required and sizes of different members using Stadd–Pro .
4. Use Stadd-Pro for the analysis and design of structures
5. Prepare drawings with detailed report of a building for the necessary approvals .

LIST OF EXPERIMENTS:

1. Analysis of simple beams
2. 2–D Frame Analysis and design
3. Steel tabular truss analysis and design
4. 3–D Frame Analysis and design
5. Retaining wall analysis and design
6. Simple tower analysis and design
7. Analysis and design of INTZ type water tank, circular and rectangular water tanks
8. Analysis and design plate girder bridge

REFERENCE

1. IS 456 – 2000
2. IS 800 – 2007
3. IS 875 Part – I, II & III – 2000

IV B. Tech I Semester
14BT70123: **SEMINAR**

Internal Marks	External Marks	Total	L	T	P	C
0	50	50	-	-	-	2

PREREQUISITES: All the courses of the program up to III B. Tech. – I Semester.

COURSE DESCRIPTION:
Identification of topic for the seminar; Literature survey; Performing critical study and analysis of the topic identified; Preparation of report and presentation.

COURSE OUTCOMES:
After completion of the course, a successful student will be able to:

1. Demonstrate in-depth knowledge on the seminar topic.
2. Analyze critically, chosen seminar topic for substantiated conclusions.
3. Undertake investigation of issues related to seminar topic providing valid conclusions.
4. Function effectively as individual on the chosen seminar topic.
5. Develop communication skills, both oral and written for preparing and presenting seminar report.
6. Engage in lifelong learning to improve knowledge and competence in the chosen field of seminar.

IV B.Tech II Semester

14BT80101: PRESTRESSED CONCRETE

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Structural Analysis, Reinforced Concrete constructions

COURSE DESCRIPTION: Introduction to prestressing, methods and materials– Analysis of sections for flexure– Design of section for flexure and shear– Analysis of end blocks– Deflection of prestressed concrete sections

COURSE OUTCOMES:

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

1. Demonstrate knowledge on the preparation of prestressed concrete and members
2. Analyze prestressed members under flexure and shear .
3. Design the prestressed members using elastic design method .

DETAILED SYLLABUS:

UNIT I **(08 Periods)**

INTRODUCTION: Introduction to prestressing – Materials – Types of prestressing – Loss of prestress – Methods of Pretensioning and post tensioning

UNIT II **(10 Periods)**

ANALYSIS OF SECTIONS FOR FLEXURE: Analysis of sections for flexure – Prestressed with straight, concentric, eccentric tendons, bent and parabolic tendons.

UNIT III **(09 Periods)**

DESIGN OF SECTIONS FOR FLEXURE AND SHEAR: Kern Zone, cable zone– Allowable stresses – Design criteria as per I.S.Code – Design of section for flexure and shear.

UNIT IV **(10 Periods)**

ANALYSIS OF END BLOCKS : Anchorage zone stresses: Guyon's method and Mugnel method– Anchorage zone reinforcement – Transfer of prestress pre–tensioned members.

UNIT V **(08 Periods)**

DEFLECTION OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections – Factors influencing deflections – Short term deflections of uncracked members–prediction of long term deflections.

Total Periods:45

TEXT BOOKS

1. N. Krishna Raju, *Prestressed Concrete,* 4th Edition, Tata McGraw–Hill Publications, New Delhi, 2011.
2. N. Rajagopalan, *Prestressed Concrete,* 2nd Edition, Narosa Publications, New Delhi, 2014.

REFERENCE BOOKS

1. Ramamrutham, *Prestressed Concrete,* 5thEdition, Dhanpat Rai Publications, New Delhi, , 2003.
2. T.Y. Lin and Ned H. Burns, *Design of Prestressed Concrete Structures,* 3rdEdition, John Wiley and Sons, 2010.
3. Praveen Nagaraju, *Prestressed Concrete Design,* Dorling Kindersley Publication, 2013.
4. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Reinforced Concrete Structures – Vol. I,* 19thEdition, Laxmi Publications Pvt. Ltd., New Delhi, 2010.

IS Codes

IS 1343– is to be permitted into the examination hall.

IV B.Tech II Semester

14BT80102: ESTIMATION, COSTING & VALUATION

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Building Materials, Surveying

COURSE OUTCOMES:

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

1. Explain estimation, specifications of materials and valuation
2. Calculate various quantities required for a structure .
3. Prepare agreements, tenders and valuation of buildings .

DETAILED SYLLABUS:

UNIT I

ESTIMATE OF BUILDINGS (10 Periods)

Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.

UNIT II

ESTIMATE OF OTHER STRUCTURES (13 Periods)

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – estimation of reinforcement for different structures

UNIT III

SPECIFICATION AND RATE ANALYSIS (08 Periods)

Purpose and method of writing specifications – General and Detailed specification for different items of building construction – Lead statement – Data – Schedule of rates – Analysis of rates for concrete, RCC works, Brick work, Plastering, Flooring and Painting.

UNIT IV

CONTRACTS AND TENDERS (08 Periods)

Purpose of contract – Types of contract – Agreement – Tenders – Tender notice and form – Arbitration and Legal requirements

UNIT V

VALUATION **(06 Periods)**

Necessity – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortgage – Lease

Total Periods:45

TEXT BOOKS

1. Dutta, B.N., *Estimating and Costing in Civil Engineering*, 27th Edition, UBS Publishers & Distributors Pvt. Ltd., 2003
2. Kohli, D.D and Kohli, R.C., A Text Book of Estimating and Costing (Civil), 12th Edition, S. Chand & Company Ltd. 2004.

REFERENCE BOOKS

1. M. Chakraborthi, *Estimating Costing Specification and Valuation in Civil Engineering*, 23rd Edition, Laxmi Publications, New Delhi, 2010.
2. Standard Schedule of Rates and Standard Data Book, Public works Department.
3. IS 1200(Parts I to XXV – 1974/ Method of Measurement of Building and Civil Engineering Works – B.I.S)
4. National Building Code of India – 2005, BIS, Govt. of India, New Delhi.

IV B.Tech II Semester

14BT80103: ADVANCED STEEL STRUCTURES

(PROFESSIONAL ELECTIVE III)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Steel Structures

COURSE DESCRIPTION: Riveted plate girders and welded plate girders–Roof and Tubular trusses– Gantry Girder– steel water tanks– plastic analysis and composite construction

COURSE OUTCOMES:

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

1. Explain plate girders, roof trusses and water tanks due to various loading conditions .
2. Design roof trusses, plate girders and composite construction.

DETAILED SYLLABUS:

UNIT I (10 Periods)

RIVETED PLATE GIRDERS AND WELDED PLATE GIRDERS:

RIVETED PLATE GIRDERS Design of cross section– Curtailment of flange plates – connection of flange angles to web and flange angles to flange plates.

WELDED PLATE GIRDERS: Design of cross section of plate girders – Design of vertical, horizontal and bearing stiffeners.

UNIT II (09 Periods)

ROOF AND TUBULAR TRUSSES: ROOF TRUSSES: Different types of trusses – Design loads – Load combinations – IS Code recommendations – Structural details – Design of simple roof trusses involving the design of purlins, members and joints.

TUBULAR TRUSSES: Design of tension members, compression members and – Tubular trusses – Connections.

UNIT III (09 Periods)

GANTRY GIRDER: Gantry girder impact factors – Longitudinal forces – Design of gantry girders.

UNIT IV (09 Periods)

STEEL WATER TANKS: Specifications – Design of rectangular steel tank.

UNIT V (08 Periods)

PLASTIC ANALYSIS AND COMPOSITE CONSTRUCTION: Introduction to plastic analysis –Shape factor, plastic hinge, collapse loads for simply supported beams, propped cantilevers, and two span continuous beams – Design simple beams.

Total Periods:45

TEXT BOOKS

1. S.K. Duggal, *Design of Steel Structures,* 2nd Edition, Tata McGraw Hill, New Delhi, 2014.
2. B.C.Punmia, *Design of Steel Structures,*1st Edition, Laxmi publication (P) LTD, New Delhi, 2013.

REFERENCE BOOKS

1. S.S. Bhavikatti, *Design of Steel Structures,* 2nd Edition, I.K. International Publishing House Pvt. Ltd, 2010.
2. N. Krishna Raju, *Structural Design and Drawing,* 3rd Edition, Universities Press, Hyderabad, 2009.
3. Ramachandra and Virendra Gehlot, *Design of Steel Structures,* 11th Edition, Scientific Publishers, Jodhpur, 2005.
4. N. Subramanian, *Design of Steel Structures,* 1st Edition, Oxford University Press, 2010

IS Codes: IS 800–2007, IS 875– Part III, IS 1161–1979 and Steel Tables are to be permitted into the examination hall.

IV B.Tech II Semester

14BT80104: SOIL DYNAMICS AND MACHINE FOUNDATIONS

(PROFESSIONAL ELECTIVE – III)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Soil Mechanics

COURSE DESCRIPTION: Knowledge of vibration; wave propagation through soil deposits; vibration isolation; Determination of dynamic soil properties; Analysis and design of machine foundations.

COURSE OUTCOMES:

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

1. Understand causes and characteristics of vibration
2. Analyse soil properties due to dynamic loading
3. Design machine foundations.

DETAILED SYLLABUS:

UNIT I **(9 Periods)**

FUNDAMENTALS OF VIBRATION : Definitions – Simple harmonic motion – Free and forced vibrations with and without viscous damping – Frequency dependent excitation – Systems under transient loads – Rayleigh's method of fundamental frequency – Logarithmic decrement.

FREQUENCY OF SOIL SYSTEMS: Determination of viscous damping – Transmissibility – Systems with two and multiple degrees of freedom – Vibration measuring instruments.

UNIT II **(9 Periods)**

WAVE PROPAGATION: Propagation of seismic waves in soil deposits – Attenuation of stress waves – Stress–strain behavior of cyclically loaded soils – Strength of cyclically loaded soils.

DYNAMIC SOIL PROPERTIES : Dynamic soil properties – Laboratory and field testing techniques – Elastic constants of soils – Correlations for shear modulus and damping ratio in sands, gravels, clays and lightly cemented sand – Liquefaction of soils.

UNIT III **(9 Periods)**

VIBRATION ANALYSES : Types – General requirements – Permissible amplitude – Allowable soil pressure – Modes of vibration of a rigid foundation block – Methods of analysis – Lumped mass models – Elastic half space method – Elastodynamics – Effect of footing shape on vibratory response – Dynamic response of embedded block foundation – Vibration isolation.

UNIT IV **(9 Periods)**

DESIGN OF MACHINE FOUNDATIONS: Analysis and design of block foundations for reciprocating engines – Dynamic analysis and design procedure for a hammer foundation – IS code of practice – Design procedure for foundations of reciprocating and impact type machines.

UNIT V **(9 Periods)**

MACHINE FOUNDATIONS ON PILES: Introduction – Analysis of piles under vertical vibrations – Analysis of piles under translation and rocking– Analysis of piles under torsion – Design procedure for a pile supported machine foundation.

VIBRATION ISOLATION: Types and methods of isolation – Active isolation and passive isolation – Dynamic properties of isolation materials.

Total Periods:45

TEXT BOOKS

1. Braja M. Das and G. V. Ramana, *Principles of Soil Dynamics,* 2nd Edition, Cengage Learning Inc., 2011.
2. P. Srinivasulu, and C. Vaidyanathan, *Hand book of Machine Foundations,* 1st Edition, Tata McGraw–Hill, 2007.

REFERENCE BOOKS

1. Arya, S. D, O'Neil, M. and Pincus, *Design of Structures and Foundations for Vibrating Machines,* G.Gulf Publishing Co., 1979.
2. Prakash S., *Soil Dynamics,* McGraw Hill, 1981.
3. Swami Saran, *Soil Dynamics and Machine Foundations,* 1st Edition, Galgotia Publications Pvt. Ltd, 2010.
4. Kameswara Rao, *Vibration Analysis and Foundation Dynamics,* Wheeler Publishing, 2000.

IV B.Tech II Semester

14BT80105: WATERSHED MANAGEMENT

(PROFESSIONAL ELECTIVE – II)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Surveying and Hydrology.

COURSE DESCRIPTION: Concept of watershed – Need and objectives – Characteristics of watershed – Principles of erosion – Measures to control erosion – Water harvesting – Land and ecosystem management – Planning and administration.

COURSE OUTCOMES:

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

1. Explain the principles of watershed and its management
2. Assess water availability and suggest different water harvesting techniques .
3. Develop and strengthen community based watershed management for sustainable growth .

DETAILED SYLLABUS:

UNIT I **(10 Periods)**

INTRODUCTION AND CHARACTERISITCS OF WATERSHED : Concept of watershed development – Objectives of watershed development – Need for watershed development in India – Integrated and multidisciplinary approach for watershed management – Size – Shape – Physiography– Slope – Climate – Drainage – Land use – Vegetation– Geology and soils – Hydrology and Hydrogeology – Socio–economic characteristics – Basic data on watersheds.

UNIT II **(08 Periods)**

PRINCIPLES OF EROSION : Types of erosion – Factors affecting erosion – Effects of erosion on land fertility – Estimation of soil loss due to erosion – Universal soil loss equation – Contour techniques – Ploughing – Furrowing – Trenching – Bunding – Terracing – Gully control – Rock fill dams – Brushwood dam – Gabion.

UNIT III **(10 Periods)**

WATER HARVESTING AND LAND MANAGEMENT: Rainwater harvesting – Catchment harvesting – Harvesting structures – Soil moisture conservation – Check dams – Artificial recharge – Farm ponds – Percolation tanks – Land use and land capability classification – Management of forest – Agricultural – Grassland and wild land – Reclamation of saline and alkaline soils.

UNIT IV **(09 Periods)**

ECOSYSTEM MANAGEMENT : Role of ecosystem – Crop husbandry– Soil enrichment – Inter, mixed and strip cropping – Cropping pattern– Sustainable agriculture – Bio–mass management – Dry land agriculture – Silvi pasture – Horticulture – Social forestry and afforestation.

UNIT V **(08 Periods)**

PLANNING AND ADMINISTRATION: Planning of watershed management activities – Stake holder's participation – Preparation of action plan – Administrative requirements – Trends in watershed management.

Total Periods:45

TEXT BOOKS

1. JVS Murthy, *Watershed Management,* 2nd Edition, New Age International Publishers, 2009.
2. R. A. Wurbs and W.P. James, *Water Resource Engineering*, 1st Edition, PHI Publications, 2001.

REFERENCE BOOKS

1. V.V.N. Murthy*, La*nd *a*nd *Water Management,* 4th Edition, Kalyani Publications, 2008.
2. D.K. Majumdar, *Irrigation a*nd *Water Management,* 1st Edition, PHI, 2010.
3. Vijay P. Singh, Ram Narayan yadava, *Watershed Management*, 1st Edition, Allied Publishers, 2003.
4. Timothy O. Randhir, *Watershed Management: Issues a*nd *Approaches*, IWA Publishing, 2007.

IV B.Tech II Semester

14BT80106: INDUSTRIAL WASTE WATER TREATMENT

(PROFESSIONAL ELECTIVE – III)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Wastewater Technology

COURSE DESCRIPTION: Introduction to waste water treatment – Principles of Biological treatment – Studies in Biological Waste treatment design – Industrial Waste treatment – Treatment of Liquid Wastes.

COURSE OUTCOMES:

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

1. Apply the principles of science in the treatment of water.
2. Analyses various pollutant present in industrial waste water.
3. Develop solutions for the treatment of industrial waste water and safe disposal of industrial waste.

DETAILED SYLLABUS:

UNIT I (10 Periods)

INTRODUCTION TO WASTE WATER TREATMENT: Characteristics of Waste Water – Characteristics of Treatment Plant Effluents – Self Purification – D O – p^H Values of wastes and recycling water – Toxic Substances – Primary Treatment of Waste water.

UNIT II (09 Periods)

PRINCIPLES OF BIOLOGICAL TREATMENT: Microbiological Metabolism – Basic Kinetic Equations – Continuous flow treatment models – Oxygen Requirement in Aerobic Process – Design of Conventional Biological Treatment Facilities.

UNIT III (09 Periods)

STUDIES IN BIOLOGICAL WASTE TREATMENT DESIGN : Introduction – Aerobic Treatment – Anaerobic Treatment – Nitrogen Removal by Biological Nitrification and Denitrification – Anaerobic Filters – U–Tube Aeration System.

UNIT IV (08 Periods)

INDUSTRIAL WASTE TREATMENT: Introduction – Characteristics – Treatment – Pulp and Paper mill Wastes – Manufacturing – Characteristics and Treatment.

UNIT V (09 Periods)

TREATMENT OF LIQUID WASTES : Breweries, Wineries and Distilleries Waste – Tannery waste – Textile Mill Waste – Sugar Mill Waste.

Total Periods:45

TEXT BOOKS

1. M.N. Rao and Dutta, *Waste Water Treatment,* , Oxford and IBH Publishers, 3rd Edition , 2009.
2. Met Calf and Eddy, *Waste water Engineering, Treatment and Re Use,* Mc.Graw Hill Education Private Limited, 4th Edition , 2010.

REFERENCE BOOKS

1. Newmerow, *Liquid Waste of Industry,* Pearson Education Publishing Co., 1971.
2. Mark J. Hammer and Mark J. Hammer Jr., *Water and Waste Water technology,* 6th Edition, 2008.
3. A.D.Patwardhan, Industrial Waste Water Treatment,PHI Publisher,2008.
4. Rakesh Kumar; R.N.Singh, Municipal Water and Waste Water Treatment, TERI, 2009.

IV B.Tech II Semester
14BT80107: INFRASTRUCTURE DEVELOPMENT AND MANAGEMENT

(PROFESSIONAL ELECTIVE – III)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Construction Planning and Project Management

COURSE DESCRIPTION: Introduction – Overview of Indian Infrastructure – Tenders, Contracts and Specifications – Policies on Infrastructure Development – Construction and Infrastructure – Infrastructure Management.

COURSE OUTCOMES:

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

1. Understand contract, tendering and infrastructure development scenario in India
2. Give suggestions as per the policies of Infrastructure development and issues
3. Prepare a tender document for an infrastructure project (PO 10)
4. Forecast future development in Infrastructure project development and management .

DETAILED SYLLABUS:

UNIT I (06 Periods)

INTRODUCTION: Impact of Infrastructure development on economic development, standard of living and environment – Reasons for rise of public sector and government in infrastructural activities – Changed socio – economic scenario and current problems and related issues.

UNIT II (09 Periods)

OVERVIEW OF INDIAN INFRASTRUCTURE: Energy – Power, Water resources –Dams – Bridges – canals, Rural Infrastructure – Urban Infrastructure, housing, Roads, Railways, Ports, Airports – social Infrastructure – education, health care– Infrastructure deficiencies.

TENDERS, CONTRACTS AND SPECIFICATIONS: Methods of tendering for projects – Contracts – Different types of contracts – Importance of specifications – Preparation of tender document, Build operate and transfer contracts – Turn key contracts. Legal problems. Arbitration. Payment schedule. FIDIC clauses.

UNIT III **(09 Periods)**

POLICIES ON INFRASTRUCTURE DEVELOPMENT: A historical review of the Government policies on infrastructure – Current public policies on transportations, power and telecom sectors – Plans for infrastructure development – Legal framework for regulating private participation in – roads and highways, Ports & Airports, Power and Telecom.

UNIT IV **(09 Periods)**

CONSTRUCTION AND INFRASTRUCTURE: Construction component of various infrastructure sectors – Highway – ports and aviation – oil and gas – power – telecom, railways – irrigation – Current scenario, future needs, investment needed, regulatory framework, government policies and future plans. – Technological and methodological demands on construction management in infrastructure development projects.

UNIT V **(09 Periods)**

INFRASTRUCTURE MANAGEMENT: Importance, scope and role in different sectors of construction.

- **Highway Sector:** Repayment of Funds – Toll Collection Strategy – Shadow tolling, and direct tolls – Maintenance strategy – Review of toll rates & structuring to suit the traffic demand,
- **Irrigation Projects:** Large / Small Dams – Instrumentation, monitoring of water levels – catchments area – rainfall data management – prediction – land irrigation planning & policies, processes Barrages, Canals.
- **Power Projects:** Power scenario in India – Estimated requirement – Generation of Power distribution strategies – national grid – load calculation & factors, Hydropower – day to day operations – management structures – maintenance – Thermal Power – Nuclear Power.
- **Airports:** Requisites of domestic & International airports & cargo & military airports, facilities available – Terminal management, ATC.
- **Railways:** Mass Rapid Transport System MRTS – LRT – Multi–modal Transport System.

Total Periods:42

TEXTBOOKS

1. K. Narindar Jetli and Vishal Sethi, "*Infrastructure Development In Indi: Post Liberalisation Initiatives and Challengesa*", New Century Publications, Ist Edition, 2007.
2. Raghuram, G. & Jain, R., *Infrastructure Development & Financing Towards a Public–Private Partnership*, Macmillan India Ltd., 2002.

REFERENCE BOOKS

1. RN Joshi, *Public Private Parnership in Infrasturcture Perspectives, Principles, Practice*, Vision Books, Ist Edition, 2000.
2. Prasanna Chandra, *Projects: Planning, Analysis, Selection, Financing, Implementation and Review*, Mc.Graw Hill Education, 8th Edition, 2014.
3. Murty G R K, *Infrastructure Projects: Current Financing Trends,* ICFAI University Press, 2006.
4. Anup Chatterjee, K. Narinder Jetli, Vishal Sethi*, Industry and Infrasture Development in India since 1947*, Newcentry Publications, Ist Edition, 2009.

IV B.Tech II Semester
14BT80108: EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
(PROFESSIONAL ELECTIVE–III)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Structural Dynamics, Engineering Geology.

COURSE DESCRIPTION: Introduction to Structural Dynamics and Multi–Degree of Freedom Systems–Earthquake Analysis and Earthquake Engineering–Codal Design Provisions–Codal Detailing Provisions– Shear Walls.

COURSE OUTCOMES:

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

1. Explain the principles of seismic resistant design of structures .
2. Analyze structure subjected to natural vibrations and estimate frequencies .
3. Design of an earthquake resistant building using IS codes .

DETAILED SYLLABUS:

UNIT I **(10 Periods)**

EARTHQUAKE ENGINEERING: Engineering seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate tectonics – Elastic rebound theory – Earthquake terminology – Source, focus, epicenter etc. – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic zoning map of India.

UNIT II **(09 Periods)**

THEORY OF VIBRATIONS: Theory of vibrations– Free vibrations of single degree–Two degree and multi degree freedom systems– Vibrations absorbers–Brief introduction to instruments–Accelerograms.

UNIT III **(08 Periods)**

CODAL DESIGN PROVISIONS : Review of the latest Indian seismic code IS:1893 – 2002 (Part–I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT IV **(08 Periods)**

CODAL DETAILING PROVISIONS: Review of the latest Indian seismic codes IS: 4326, IS: 13920 and SP – 34 provisions for ductile detailing of R.C buildings – Beam, column and joints.

UNIT V **(10 Periods)**

SHEAR WALLS: Types – Design of shear walls as per IS: 13920 – Detailing of reinforcements.

Total Periods:45

TEXT BOOKS

1. PankajAgarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures*, 1st Edition, Prentice Hall of India, 2006.
2. S.K. Duggal, *Earthquake Resistant Design of Structures*, 1st Edition, Oxford University Press, 2010.

REFERENCE BOOKS

1. Clough and Penzien, *Dynamics of Structures*, 3rd Edition, Mc.Graw Hill International Edition, 2008.
2. Anil.K. Chopra, *Dynamics of Structures*, 3rd Edition, Pearson Education, 2007.
3. C.V.R. Murty, *Earthquake Tips*, NICEE, IIT, Kanpur.
4. Mario Paz, Structural Dynamics: Theory and computation, Kluwer Academic Publication, 2004.

Codes/Tables

IS Codes: IS 1893–2002, IS 4326–1993 and IS13920–1993 to be permitted into the examinations hall.

IV B.Tech II Semester

14BT80109: **BRIDGE ENGINEERING**

(PROFESSIONAL ELECTIVE – IV)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Reinforced concrete structures, Foundation Engineering.

COURSE DESCRIPTION: Bridge loading standards– Box culvert and Deck slab bridge– Beam and Slab bridge– Bridge beams– Piers and Abutments.

COURSE OUTCOMES:

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

1. Understand the concept of loading and their pattern on the bridges
2. Carryout stability analysis of bridge piers and bridge slab.
3. Design box culvert and deck slabs for different classes of vehicles .

DETAILED SYLLABUS:

UNIT I **(06 Periods)**

BRIDGE LOADING STANDARDS: Highway Bridge loading standards – Impact factor – Railway bridge loading standards (BG ML Bridge) – Various loads in bridges – Importance of site investigation in bridge design.

UNIT II **(08 Periods)**

BOX CULVERT AND DECK SLAB BRIDGE: General aspects – Design loads – Design of box culvert subjected to class AA tracked vehicle only.

DECK SLAB BRIDGE:Effective width method of analysis and design of deck Slab Bridge (simply supported) subjected to class AA tracked vehicle only.

UNIT III **(10 Periods)**

BEAM AND SLAB BRIDGE (T–BEAM BRIDGE) : General features – Design of interior panel of slab – Pigeauds method –Design of a T–beam bridge subjected to class AA tracked vehicle only.

UNIT IV **(10 Periods)**

BRIDGE BEARINGS: General features – Types of bearings – Design principles of steel rocker and roller bearings – Design of a steel rocker bearing – Design of elastomeric pad bearing.

UNIT V **(11 Periods)**

PIERS AND ABUTMENTS : General features – Bed block – Materials piers and abutments – Types of piers – Forces acting on piers – Stability analysis of piers – General features of abutments – Forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of bridge foundations (excluding design).

Total Periods:45

TEXT BOOKS

1. N. Krishna Raju, *Design of Bridges,* 4th Edition, Oxford and IBH, Publishing Company Pvt. Ltd., New Delhi, 2010
2. T.R. Jagadish and M.A. Jayaram, *Design of Bridges Structure,* 2nd Edition Prentice Hall of India Pvt. Ltd., New Delhi, 2004.

REFERENCE BOOKS

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Design of Steel Structures,* 2nd Edition, Laxmi Publications, New Delhi, 2013.
2. Ramachandra, *Design of Steel Structures,* 11th Edition, Scientific Publishers (India), 2009.
3. PonnuSwamyS.,*Bridge Engineering,* 2nd Edition, Tata Mcgraw–Hill Company, New Delhi, 2010.
4. Swami Saran, *Analysis and Design of Substructures – Limit State Design,* 2nd Edition, Oxford and IBH Publishing Company Pvt. Ltd., New Delhi, 2010.
5. *Relevant IRC & Railway Bridge Codes*

IV B.Tech II Semester

14BT80110: GROUND IMPROVEMENT TECHNIQUES

[PROFESSIONAL ELECTIVE – IV]

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Soil Mechanics and Foundation Engineering

COURSE DESCRIPTION: Scope of ground improvement; Methods of ground improvement – Drainage and dewatering – In–situ treatment of cohesionless and cohesive soils – Stabilisation – Earth reinforcement

COURSE OUTCOMES:

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

1. Explain various methods available for ground improvement
2. Use both mechanical and chemical methods/geosynthetics for improvement of soils.

DETAILED SYLLABUS:

UNIT I **(08 Periods)**

GROUND IMPROVEMENT

Role of ground improvement in foundation engineering – methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils – Selection of suitable ground improvement techniques based on soil condition.

UNIT II **(09 Periods)**

DRAINAGE AND DEWATERING

Drainage techniques – Well points – Vaccum and electroosmotic methods – Seepage analysis for two dimensional flow–fully and partially penetrating slots in homogenous deposits [Simple cases only].

UNIT III **(10 Periods)**

INSITU DENSIFICATION

Granular soils: Principles of Insitu Densification– Insitu Densification Methods– Dynamic Compaction, Blasting, Vibrocompaction, Granular Pilees – Relative Merits and their Limitations

Cohesive soils: Principles of Insitu Densification– Insitu Densification Methods– vertical driains, sand wick, geodrains, stone and lime coloms and thermal methods – Relative Merits and Their Limitations.

UNIT IV **(09 Periods)**

STABILISATION

Types of grouts – Grouting equipment and machinery – Injection methods – Grout monitoring – Shotcreting and Gunting Technology – Stabilisation with mechanical bituminous cement, lime and chemicals – Stabilisation of expansive soils.

UNIT V **(09 Periods)**

GEOSYNTHETICS AND EARTH REINFORCEMENT

Concept of reinforcement – Types of reinforcement material – Applications of reinforced earth –Types of Geosynthetics – Functions and applications of Geosynthetics.

(Total 45 Periods)

TEXT BOOKS

1. Hausmann M.R., *Engineering Principles of Ground Modification,* International Edition, Mc.Graw Hill, 1990.
2. Purushotham Raj, P., *Ground Improvement Techniques,* 1st Edition, Laxmi Publications [P] Ltd., 2005.

REFERENCE BOOKS

1. Moseley, M.P. and Kirsch. K., *Ground Improvement,* 2nd Revised Edition, Taylor Francis Ltd, 2004.
2. Xanthakos P.P, Abramson, L.W and Bruce, D.A, *Ground Control and Improvement,* 1st Edition, John Wiley and Sons, 1994.
3. Koerner, R. M., *Designing with Geosynthetics,* 6th Edition, Prentice Hall Inc., 2012.
4. Jewell, R.A., *Soil Reinforcement with Geotextiles [Report],* CIRIA Special Publication, 1996.

IV B.Tech II Semester

14BT80111: REHABILITATION AND RETROFITTING OF STRUCTURES

(PROFESSIONAL ELECTIVE – IV)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: CPPM

COURSE DESCRIPTION: Maintenance and Repair strategies– Serviceability and Durability of concrete– Materials and Technology for repair– Repairs, Rehabilitation and Retrofitting of structures– Demolition techniques

COURSE OUTCOMES:

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

1. Describe various types of materials used for retrofitting .
2. Suggest proper materials for the repair of structure.
3. Understand the importance of safety of structure and provide solutions for the rehabilitation of structure.

DETAILED SYLLABUS:

UNIT I (8 Periods)

MAINTENANCE AND REPAIR STRATEGIES: Maintenance, repair and rehabilitation, Facets of Maintenance, importance ofMaintenance various aspects of Inspection, Assessment procedure for evaluatinga damaged structure, causes of deterioration.

UNIT II (10 Periods)

SERVICEABILITY AND DURABILITY OF CONCRETE: Quality assurance for concrete construction concrete properties – strength, permeability,Thermal properties and cracking. – Effects due to climate, temperature, chemicals, Corrosion – design and construction errors – Effects of cover thickness and cracking.

UNIT III (15 Periods)

MATERIALS AND TECHNIQUES FOR REPAIR: Special concretes and mortar, concrete chemicals, special elements for acceleratedstrength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferrocement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebarsduring repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite andShotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methodsof corrosion protection, corrosion inhibitors, corrosion resistant steels, coating andcathodic protection.

UNIT IV **(8 Periods)**

REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES: Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption,weathering corrosion, wear, fire, leakage and marine exposure.

UNIT V **(4 Periods)**

DEMOLITION TECHNIQUES: Engineered demolition techniques for Dilapidated structures – case studies

Total Periods:45

TEXT BOOKS

1. Vidivelli,B,*Rehabilitation of Concrete Structures*, Standard PublishersDistributors, New Delhi,2008
2. Santhakumar, A.R., *Training Course notes on Damage Assessment and repairs in Low Cost Housing*, "RHDC – NBO" Anna University, July 1992.

REFERENCE BOOKS

1. Shetty, M.S*, Concrete Technology – Theory and Practice*, S.Chand and Company, New Delhi, 2005.
2. Zongjin li, *Advanced concrete technology,* published by John Wiley & Sons 2011.
3. 3.M.G.Alexander, H.–D.Beushausen, F. Dehn and P. Moyo, *Concrete Repair, Rehabilitation and Retrofitting III,* CRC press/Balkama, 2012.
4. 4.P.K.Guha, *Maintenance and Repairs of Buildings*, New Central Book Agency (P)Ltd, Kolkata, 2006.

IV B.Tech II Semester

14BT80112: DESIGN AND DRAWING OF IRRIGATION STRUCTURES

(Professional Elective – III)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Water Resources Engineering

COURSE DESCRIPTION: Design and drawing of surplus weir – Tank sluice with tower head – Trapezoidal notch fall – Canal regulator – Type III siphon aqueduct –sloping glacis weir.

COURSE OUTCOMES:

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

1. Design and develop an irrigation structure as per the suitability of a site .

DETAILED SYLLABUS:

Design and drawing of the following irrigation structures:

1. Surplus weir
2. Tank sluice with tower head
3. Trapezoidal notch fall
4. Canal regulator
5. Type III Siphon aqueduct.
6. Direct Sluice

Final Examination pattern: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS

1. C. Satyanarayana Murthy, *Design of Minor Irrigation a*nd *Canal Structures,* Wiley Eastern Ltd, 1990.
2. B.C. Punmia, Pande B.B. Lal, Ashok Kumar Jain and Arun Kumar Jain, *Irrigation a*nd *Water Power Engineering*, 16th Edition, Laxmi Publications, 2011.

REFERENCE BOOKS

1. S.K. Garg, *Irrigation Engineering a*nd *Hydraulic Structures*, 23rd Edition, Standard Book House, 2010.

2. Adrian Laycock*, Irrigation Systems: Design, Planning a*nd *Construction*, 2nd Edition,
CABI, 2011.
3. R.S.Varshney, S.C.Gupta, R.L.Gupta, The*ory & Design of Irrigation Structures:*
*Canal a*nd *Storage Works*, 4th Edition, Nem chand and Bros publishers, 1988.
4. S.K. Sharma, *Design of Irrigation Structures*, RSM Press publishers, 1984.

IV B.Tech II Semester

14BT80113: ARCHITECTURE AND TOWN PLANNING

(PROFESSIONAL ELECTIVE – IV)

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: CPPM

COURSE DESCRIPTION: Architectural design and site planning – Building Architecture and Services – Town Planning and Structure – Land Use Planning – Regional Planning and Standards

COURSE OUTCOMES:

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

1. Apply the principles of light and sound for the best architectural design of a building
2. Assess the importance of land use pattern and design landscape
3. Plan, design and develop town using various models of urban structure
4. Use modern techniques and methods in the construction of the building for sustainable development.

DETAILED SYLLABUS:

UNIT I **(09 Periods)**

ARCHITECTURAL DESIGN AND SITE PLANNING: Architectural design – Analysis – Integration of function and aesthetics – Introduction to basic elements and principles of design – Surveys – Site analysis – Development control – Layout regulations – Layout design concepts – Integration of building services – Interior design.

UNIT II **(09 Periods)**

BUILDING ARCHITECTURE AND SERVICES : Residential, institutional, commercial and industrial – Application of anthropometry and space standards – Inter relationships of functions – Safety standards – Building rules and regulations, National Building Code – Integration of building services – Interior design – Man and environment interaction – Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept.

UNIT III **(09 Periods)**

TOWN PLANNING AND STRUCTURE : Planning – Definition, concepts and processes– Aims and objectives of planning – Levels of planning in India and their interrelationship – Planning administration – Models of

planning processes – Components of Settlement structures – Models of urban structure – Demand and supply of land for urban use – Means and mechanism – Impact on urban structure – Goals of land policy.

UNIT IV **(09 Periods)**

LAND USE PLANNING: Concept of land use – Locational attributes of land use – Land use planning information system – Activity system and choice of space qualities – System approach and physical planning – Approach to land use planning– Introduction to spatial planning at regional level – Choice theory and advocacy planning and their application action plan and its relevance – Development plan types – Scope and objectives – Principles of landscape design

UNIT V **(09 Periods)**

REGIONAL PLANNING AND STANDARDS : Planning practices in India – Method of identifying urban and regional problem – Setting of goals objectives and priorities – Performance standards – Spatial standards and standard for utilities – Classification of regions – Regionalization and delineation techniques for various types of regions – Cluster and factor analysis method.

Total Periods:45

TEXT BOOKS

1. Biswas Hiranmay, *Principles of Town Planning and Architecture*, 1st Edition, Vayu Education of India, 2012
2. Satish Chandra Agarwala, *Architecture and Town Planning*, Dhanpat Rai and Company, 2008.

REFERENCE BOOKS

1. Rangwala, K.S., *Town Planning*, Charotar Publishing House, 2014
2. Hiraqskar, G.K., *Fundamentals of Town Planning,* Dhanpat Rai & Sons, 2001.
3. A.Bandopadhyay, *Text book of Town Planning*, Books and Allied, 2000.
4. Faludi, Andreas, *Planning Theory*, Pergamon Press, 1973.

IV B.Tech II Semester

14BT80114: RAILWAY, HARBOUR AND AIRPORT ENGINEERING

[PROFESSIONAL ELECTIVE – IV]

Internal Marks	External Marks	Total	L	T	P	C
30	70	100	3	1	–	3

PREREQUISITES: Surveying, Soil Mechanics

COURSE DESCRIPTION: Railway, Airport, Harbor: Development and Planning – Siting Considerations – Geometric Design– Alignment and Drainage –Construction and Equipment . Railway Engineering: Tracks, Curves, Alignment. Airport Engineering: Runway & Lighting Systems – Tunneling

COURSE OUTCOMES:

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

1. Acquire knowledge on railway engineering, airport and harbor engineering .
2. Assemble, analyze, and appropriately apply transportation engineering data from existing graphics, reports, and other documents .
3. Design of Railway Tracks, airport runway and layout of harbor, tunnels and Geometrics and other components & maintenance and safety aspects
4. Understand the safety and maintenance aspects of railway tracks, runway, harbours and tunnels .

DETAILED SYLLABUS:

UNIT I **(08 Periods)**

RAILWAY ENGINEERING: Railway terminology – railway track –rails – rail joints and welding of rails – creep of rails – sleepers – track fittings and fastenings – ballast – subgrade and embankments – points and crossings – construction and renewal of track – track drainage – maintenance of track – safety in railways – modernization of tracks for high speeds –

UNIT II **(09 Periods)**

GEOMETRIC DESIGN OF RAILWAY TRACK: necessity of design of a railway track – Gradient and grade compensation: ruling gradient, momentum gradient, Pusher or Helper gradient, Gradient in station yards, Grade compensation on curves – speed of the train, safe speed on curves – Radius of degree of curve – Super elevation or cant: Objects of providing super elevation, Relationships of super elevation, gauge, speed and radius of curve, average speed, limits of super elevation, cant deficiency, negative super elevation – curves: necessity, effects of curvature, types of curves, necessity of providing transition curve, types of transition curves, length of transition curves – Realignment of curves by string line

method: procedure for string lining the curves, computation of slews or shifts, slewing curve to the adjustment – widening of gauge on curves, shift

UNIT III **(10 Periods)**

AIRPORT ENGINEERING: Airport planning – Airport characteristics – airport obstructions – airport capacity and configuration – taxiway design – structural design of airport pavements – maintenance and rehabilitation of airfield pavements – visual aids – airport grading and drainage – environmental guidelines for air port projects

UNIT IV **(09 Periods)**

DOCKS AND HARBOURS: Dry docks and Spillways – Transition shed and warehouses – Quays, jetties and wharfs– tide, wind and wave – Dry docks (repair dock) – maintenance dredging – maintenance of ports and harbours – navigational aids

UNIT V **(09 Periods)**

TUNNELING: Tunnels – Tunnel Surveying – Methods of Tunneling in soft strata, Pneumatic process or compressed air methods – Tunneling in rock – safety precautions in tunneling work – tunnel lining – shafts and caissons in tunneling – tunnel drainage – tunnel ventilation, dust prevention and lighting – tunneling for underground railway and tube railway – tunnels conveying water

Total Periods:45

TEXT BOOKS

1. S.C. Saxena, S.P. Arora, a Text Book of *Railway Engineering,* 7th Edition, Dhanpat Rai Publications Pvt Ltd, New Delhi, 2014.
2. S.K. Khanna and Arora, *Airport Planning and Design,* 6th Edition, Nemchand and Brothers, 2012

REFERENCE BOOKS

1. KK Chitkara, *Construction Project Management: Planning, Scheduling and Controlling*, Tata McGraw Hill Education Pvt. Ltd., 2010
2. SP Chandola, *A Text book of Transportation Engineering*, S Chand & Co Ltd, 2011

NOTE. Booklet containing relevant extracts from Standards and Codes, should be made available to Students during examinations

IV B.Tech II Semester
14BT80121:**COMPREHENSIVE VIVA–VOCE**

Internal Marks	External Marks	Total	L	T	P	C
0	100	100	-	-	-	2

PREREQUISITES: —

COURSE DESCRIPTION:

Assessment of student learning outcomes.

COURSE OUTCOMES:

Comprehensive Viva-Voce enables a successful student to

1. Demonstrate knowledge in the program domain.
2. Exhibit professional etiquette suitable for career progression.
3. Present views cogently and precisely.

IV B.Tech. II Semester
14BT80122:**PROJECT WORK**

Internal Marks	External Marks	Total	L	T	P	C
60	140	200	-	-	20	10

PREREQUISITES: —

COURSE DESCRIPTION:
Identification of topic for the project work; Literature survey; Collection of preliminary data; Identification of implementation tools and methodologies; Performing critical study and analysis of the topic identified; Time and cost analysis; Implementation of the project work; Preparation of thesis and presentation.

COURSE OUTCOMES: On completion of project work the student will be able to

1. Demonstrate in-depth knowledge on the project topic.
2. Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.
3. Design solutions to the chosen project problem.
4. Undertake investigation of project problem to provide valid conclusions.
5. Use the appropriate techniques, resources and modern engineering tools necessary for project work.
6. Address the issues related to health and safety of the society
7. Provide solutions for sustainability through society and environmental related projects
8. Understand professional and ethical responsibilities while executing the project work.
9. Function effectively as individual and a member in the project team.
10. Develop communication skills, both oral and written for preparing and presenting project report.
11. Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.
12. Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.