VIDYA JYOTHI INSTITUTE OF TECHNOLOGY

An Autonomous Institution
Aziznagar Gate, C.B. Post, Hyderabad – 500075, Telangana, India.

B.Tech Syllabus (R-18)

Department of
Civil Engineering

ACADEMIC REGULATIONS
Definitions of Key Words

Academic Year: An academic year is referred as the period consisting of two consecutive semesters with 16 weeks each of instructional period followed by both the semester exams.

Course: A plan of study of a particular subject leading to an examination. All the courses need not carry the same weight. A course may be designed to comprise of lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/ viva/ seminars/ assignments/ presentations etc. or a combination of some of these.

Choice Based Credit System (CBCS): Choice Based Credit System (CBCS) is the program in which the students have a choice to choose from the prescribed courses and can learn at their own pace and the entire assessment is graded-based on a credit system.

Credit Point: It is the product of Grade Point and Number of Credits for a course.

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

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student of all the semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to 2nd decimal place.

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

Letter Grade: It is an index of the performance of students in a said course.
Grades are denoted by letters O, A+, A, B+, B, C, P and F.
Programme: An Educational Programme leading to the award of a Degree.

Semester: Each semester will consist of 16-18 weeks of academic work equivalent to 90 actual teaching days.

Semester Grade Point Average (SGPA): It is a measure of performance of the work done by the student in a semester. It is the ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to 2nd decimal place.

Transcript or Grade Card or Certificate: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

Types of Courses: The Courses in under B. Tech, program may be of three kinds' viz., Core, Elective and Mandatory.

a) Core Course:

There may be a Core Course in every semester and are to be compulsorily studied by a student and is essential requirement for a given Programme.

b) Elective Course:

Elective Course is a course which can be chosen by the students from a pool of subjects. In general, the elective course is,

- Supportive to the discipline of study
- Providing an expanded scope of the course subjects
- Nurturing student's proficiency/skill.
- In case an elective is "Discipline centric" and is offered by the student's department itself, the elective is called **Professional elective.**
- On the other hand, if the elective is offered by the other departments or if the choice is given to the students to choose from other disciplines, the elective is called an "**Open Elective.**"

c) Mandatory Courses (Non-Credit Courses)

AICTE considers that the Course work of certain subjects is essential and as such for the award of a B.Tech degree a pass in these subjects is made mandatory. Therefore, such types of courses are referred as **mandatory courses**. As the AICTE also feels that only a familiarity with the subject content of these courses is essential, only a pass in each of these courses is required. Therefore, these subjects are included in the curriculum as non-Credit courses.

ACADEMIC REGULATIONS FOR B. TECH. (REGULAR)

Applicable for the students of B. Tech. (Regular) from the Academic Year 2020-21 onwards.

1. Courses of Study:

The following Four-year Bachelor of Technology (B.Tech.) Programs under Choice Based Credit System (CBCS) are offered with effect from the Academic Year 2018-19 onwards:

S. No.	Branch	Branch Code
I	Civil Engineering	01
II	Electrical and Electronics Engineering	02
III	Mechanical Engineering	03
IV	Electronics and Communication	04
V	Computer Science and Engineering	05
VI	Information Technology	12

2. Admission Procedure

2.1. Admissions will be done as per the norms prescribed by the Government of Telangana State.

2.2. The Government orders with regard to the admissions in vogue shall prevail.

2.3. The candidate should have passed the prescribed qualifying examination on the date of Admission.

3. Award of B. Tech. Degree

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

3.1 The candidate shall register for 160 credits and secure all the 160 credits by securing a minimum CGPA of 5.0.

3.2 The external examination in all the subjects shall be conducted at the end of each semester for all the eight semesters.

3.3 Students joining the B.Tech. Programme shall have to complete the programme within 8 years from the year of joining. Similarly, the students joining the B.Tech. Programme in the third semester directly through Lateral Entry Scheme (LES) shall have to complete the programme within 6 years from the year of joining otherwise they shall forfeit they will not be permitted to pursue their studies nor will be allowed to write the exams.

4. Program details:

4.1 The course shall be of four Academic year's duration, each academic year having two semesters. Each semester shall have a minimum **16** weeks of instruction, with a minimum of **90** Instructional Days per Semester.

4.2 **Credits:**

Credits shall be assigned to each Subject/ Courses with symbols L: T: P: C, where L stands for Lecture Period, T for Tutorial Period, P for Practical Period, C for Credits and the details are given in the following Table,

Type of course		Clock hours/ week			
		L	**T**	**P**	**C**
Theory	1)	0	-	-	04
	2)	0	-	-	03
	3)	0	-	-	02
Practical		0	0	1	0.5
Drawing	1)	0	04	-	02
	2)	0	02	-	01
Mini project, Comprehensive Viva Voce Seminar, Major project		**-**	**-**	**-**	**17**

5. Attendance Requirements

5.1 A student is eligible to write the Semester End examinations only if he/ she acquire a minimum of 75% of attendance in aggregate of all the subjects/ Courses in that Semester.

5.2 Condonation for the shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted on medical grounds with a documentary evidence approved by the Academic Committee.

5.3 A stipulated fee shall be payable towards condonation of attendance shortage.

5.4 Students, whose shortage of attendance is not condoned, are not eligible to write semester end examinations of that semester. Such students are detained and their registration for the examination stands cancelled.

5.5 A student detained due to shortage of attendance in a semester may seek re-admission into that semester, as and when offered, within four weeks from the date of the commencement of class work with the academic regulations of the batch into which he/ she gets admitted.

5.6 A student will be promoted to the next semester if he/ she satisfies the attendance requirement of the present semester.

5.7 For all mandatory, noncredit courses offered in a semester, a "Satisfactory Participation Certificate" shall be issued to the student, only after securing 75% attendance in such course. Letter Grade shall be allotted for these courses.

The courses offered in 8 semesters spread over 4 years have been classified into 8 categories under Choice Base Credit System (CBCS)

S. No.	Subject Categories	No. of Credits
1	Humanities and Social Sciences including Management course	11
2	Basic Science Course	26
3	Engineering Science courses including workshop, drawing, basics of electrical/ mechanical/ computer etc..	24
4	Professional core Courses (Theory)	46
5	Professional core Courses (Labs)	09
6	Professional Elective courses relevant to chosen specialization/	18
7	Open Elective subjects – Elective from other emerging subjects	09
8	Project work, seminar and internship in industry or appropriate work place/academic and research institutions in India/Abroad	**10+3+2+2 = 17**
9	Mandatory Course (Environmental Science & Gender Sensitization)	Nil
Total Number of credits		**160**

B. Tech Year wise distribution of credits under CBCS

S. No.	Year	Semester	Credits	Total
1	1st Year	I	18/20	**38**
		II	20/18	
2	2nd Year	I	20	**40**
		II	20	
3	3rd Year	I	21	**42**
		II	21	
4	4th Year	I	20	**40**
		II	20	
Total No. of Credits				**160**

6. Promotion regulations

6.1 A student shall be promoted from B.Tech., I Year to II Year only if he/she fulfils the academic requirements of securing 50% of total credits (19 credits out of 38 credits, up to I year II Semester), from all the examinations, whether or not the candidate takes the examinations.

6.2 A student shall be promoted from B.Tech., II Year to III Year only if he/she fulfils the academic requirement of securing 50% of total credits (39 out of 78 credits, up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.

6.3 A student shall be promoted from B.Tech., III year to IV year only if he/she fulfils the academic requirement of securing 50% of total credits (60 out of 120 credits) up to III year II semester), from all the examinations, whether or not the candidate takes the examinations.

7. Minimum Academic Requirements

The following minimum academic requirements are to be satisfied in addition to the requirements mentioned under item no.5.

7.1 A student shall deemed to have satisfied the minimum academic requirements and has earned the credits allotted to each theory/ practical/ design/ drawing subject/ project and secured not less than 35% marks in Semester End Examination (SEE), and minimum 40% of marks in the sum total of the internal evaluation and Semester end examination taken together.

7.2 The student has to pass the failed courses by appearing the supplementary examinations as per the requirement for the award of degree.

7.3 A student shall register and put up minimum Attendance and earn all 160 Credits for the award of degree.

7.4 Student, who fails to earn 160 credits as indicated in the course structure within eight academic years from the year of his/her admission, shall forfeit the seat in B. Tech. course and admission stands cancelled.

7.5 When a student is detained due to shortage of attendance in any semester, no Grade allotments or SGPA/CGPA calculations will be done for that entire Semester in which a student got detained.

7.6 When a Student is detained due to lack of Credits in any year, he may be readmitted after fulfilment of the Academic Requirements, with the Academic Regulations of the Batch into which he gets readmitted. If there are any Professional Electives/ Open Electives, the same may also be re-registered if offered. However, if those Electives are not offered in later Semesters, then alternate Electives may be chosen from the same set of Elective Subjects offered under that category.

7.7 A student is eligible to appear in the End Semester Examination in any Subject/ Course, but absent at it or failed (thereby failing to secure P Grade or above), may reappear for that subject/ Course at the supplementary exam as and when the examinations are conducted. In such cases, his Continuous Internal Evaluation(CIE) assessed earlier for that subject/ Course will be carried over, and added to the marks to be obtained in the supplementary examinations, for evaluating the performance in that subject.

7.8 A student with a final CGPA (at the end of the UGP) < 5.00 will not be eligible for the Award of the Degree.

8 Evaluation - Distribution and weight age of Marks

8.1 The performance of a student in each semester shall be evaluated Subject-wise (irrespective of Credits assigned) for a maximum of 100 marks for Theory or Seminar or Drawing/Design or Industry Oriented Mini-Project or Minor Course, etc. For Practical's a maximum of 75 Marks shall be evaluated. However, B. Tech. Project work (Major Project) will be evaluated for 200 Marks. These evaluations shall be based on 25% CIE (Continuous Internal Evaluation) and 75% SEE (Semester End Examinations) and a Letter Grade corresponding to the % marks obtained shall be given.

8.2 For theory subjects the distribution shall be 25 marks for Continuous Internal Evaluation (CIE) and 75 marks for the Semester End- Examination (SEE).

8.3 For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination will be conducted for 20 marks and consists of Part-A (Short Answer Questions) for 6 marks and Part-B (Long Answer Questions) for 14 marks with duration of 90 Minutes. First midterm examination shall be conducted for 2.5 units of syllabus and second midterm Examination shall be conducted for remaining 2.5 units. The Average marks secured by a student in I and II Midterm examination are considered and shall be taken as the final marks secured by the student towards Continuous Internal Evaluation in the theory subject.

8.4 In case a few students are absent due to health reasons or any other unavoidable circumstances, or if the performance of some of the students is very poor, all such cases will be referred to a standing committee consisting of the Controller of examinations (Chairman), HoD of the concerned dept. and the Academic coordinator. On the recommendation of the committee, a makeup test will be conducted on payment of fee fixed by the examination branch.

8.5 In order to improve the attendance and to encourage the students who are regular to the college, 5 marks in each subject will be given to the students as per the percentage of attendance shown in the table,

Table: - Marks for attendance

S. No	Percentage of attendance	Marks to be awarded
1.	Less than 75%	nil
2.	75% to 80%	3
3.	80% to 85%	4
4.	85% and above	5

8.6 The Semester End Examination will be conducted for 75 marks which consist of two parts viz. i). Part-A for 25 marks, ii). Part –B for 50 marks. Part-A is compulsory, which consists of ten questions (numbered from 1 to 10) two from each unit carrying 2/3 marks each. Part-B consists of five questions (numbered from 11 to 15) carrying 10 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice (i.e., there will be two questions from each unit and the student should answer any one question).

8.7 For practical subjects there shall be a continuous evaluation during the Semester for 25 marks. Out of the 25 marks for internal evaluation, day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination shall be evaluated for 10 marks conducted by the concerned laboratory teacher.

8.8 The Practical End Semester Examination shall be conducted with an external examiner and the laboratory teacher for 50 marks. The external examiner shall be appointed by the Principal from the panel of examiners recommended by the Chairman, Board of Studies of respective departments.

8.9 For the subject having design and/ or drawing, (such as Engineering Graphics, Engineering Drawing, and Machine Drawing), the distribution shall be 25 marks for Internal Evaluation (5 marks for day-to-day work and 20 marks for internal tests) and 50 marks for Semester End Examination. There shall be one internal test in a semester and shall be considered for the award of marks for internal test.

8.10 There shall be an industry-oriented mini-Project, to be taken up during the vacation after III year II Semester examination. However, the mini project and its report shall be evaluated in IV year I Semester at the time of practical exams. The industry oriented mini project shall be submitted in report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external examiner, Head of the department, the supervisor of mini project and a senior faculty member of the department. There shall be no internal marks for industry oriented mini project.

8.11 There shall be a seminar presentation in IV-year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of Head of the Department, Seminar Supervisor and a Senior Faculty member. The seminar report shall be evaluated for 50 marks. There shall be no external examination for the seminar.

8.12 There shall be a Comprehensive Viva-Voce in IV year II semester. The Comprehensive Viva-Voce will be conducted by a committee consisting of Head of the Department and two Senior Faculty members of the department and is evaluated for 100 marks. The Comprehensive Viva-Voce is intended to assess the students understanding of the subjects he studied during the B. Tech. course. There will be no External Examiner for the Comprehensive Viva-Voce.

8.13 Out of a total of 200 marks for the major project work, 50 marks shall be for Internal Evaluation and 150 marks for the End Semester evaluation. The End Semester evaluation (viva-voce) shall be conducted by committee. The committee consists of an external examiner, Head of the Department, the supervisor of project and a senior faculty member of the department. The topics for industry oriented mini project, seminar and project work shall be different from each other. The evaluation of project work shall be conducted at the end of the IV year II Semester. The internal evaluation shall be on the basis of two seminars given by each student on the topic of his project.

8.14 The Laboratory marks and the sessional marks awarded by the faculty are subject to scrutiny by the Institution whenever/wherever necessary. In such cases, the sessional and laboratory marks awarded by the teacher will be referred to a College Academic Committee. The Committee will arrive at a scaling factor and the marks will be scaled accordingly. The recommendations of the Committee are final and binding. The laboratory records and internal test papers shall be preserved as per the University rules and produced before the Committees of the University as and when asked for.

8.15 Candidates shall be permitted to apply for recounting/revaluation of SEE scripts within the stipulated period with payment of prescribed fee.

9.0. Malpractice Rules

S. No.	Nature of Malpractices/ Improper conduct during examinations	Punishment
	If the candidate:	
1 (a)	Possesses any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical).	a) Expulsion from the examination of the performance in that subject only of all the candidates involved. b) In case of an outside, he/she will be handed over to the police and a case is registered against him/ her.
(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.	
2	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	
3	Impersonates any other candidate in connection with the examination.	a) The candidate who has impersonated shall be expelled from examination hall. b) The candidate is also debarred and forfeits the seat in the college. c) The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/ year. d) The candidate is also debarred for two consecutive semesters from class work and all Semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

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.	a) Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. b) The candidate is also debarred for two consecutive semesters from class work and all Semester end examinations. c) 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.	Cancellation of the performance in that subject.
6	Refuses to obey the orders of the Chief Superintendent/ Assistant Superintendent/ any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer in charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	a) The concerned students will be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. b) The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	a) Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work & shall not be permitted for the remaining examinations of the subjects of that semester/year. b) The candidate is also debarred for two consecutive semesters from class work and all Semester 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 (or) if a student comes in a drunken condition to the examination hall.	
9.	If a student of the college, who is not a candidate for the particular examination or any person not connected with the examination.	
10.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the head of Institute for further action for a suitable punishment.	

All the cases pertaining to malpractices in examinations will be referred to a committee constituted by the Chief Controller of Examination and the committee will suggest action as per the guidelines mentioned above.

10. Grading Procedure:

10.1. Marks will be awarded to indicate the performance of each student in each theory subject, or Lab/Practical, or Seminar, or Project, or Mini-Project, Minor Course etc., based on the % marks obtained in CIE+SEE (Continuous Internal Evaluation + Semester End Examination, both taken together) as specified, and a corresponding Letter Grade shall be given.

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

Letter Grade	Performance	Grade Points	% of marks Secured (Class Intervals)
O		10	Greater than or equal to 90%
A+	Excellent	9	80% and less than 90%
A	Very	8	70% and less than 80%
B+	Good	7	60% and less than 70%
B	Average	6	50% and less than 60%
C	Pass	5	40% and less than 50%
F	Fail	0	Below 40%
AB	Absent	0	Absent

10.3. A student obtaining F Grade in any subject shall be considered 'Failed' and will be required to reappear as 'Supplementary Candidate' in the end Semester Examination (SEE), as and when offered. In such cases; his Internal Marks (CIE Marks) in those Subject(s) will remain same as those he obtained earlier.

10.4. A Letter Grade does not imply any specific % of Marks.

10.5. In general, a student shall not be permitted to repeat any Subject/Course (s) only for the sake of Grade Improvement' or 'SGPA/ CGPA Improvement'. However, he has to repeat all the Subjects/Courses pertaining to that Semester, when he is detained.

10.6. A student earns Grade Point (GP) in each Subject/ Course, on the basis of the Letter Grade obtained by him in that Subject/ Course (excluding Mandatory non-credit Courses). Then the corresponding 'Credit Points' (CP) are computed by multiplying the Grade Point with Credits for that particular Subject/ course. Credit Points (CP) = Grade Point (GP) x Credits for a Course.

10.7. The Student passes the Subject/ Course only when he gets GP ≥ 5 (P Grade or above).

11. Registration/ Dropping

11.1. Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the academic calendar. It is absolutely necessary for the student to register for courses in time.

11.2. A student at the end of III year I semester either having the CGP of ≥ 7.0 or having passed all previous courses in first attempt with a minimum CGPA ≥ 5.0 is allowed to register an additional theory course with the recommendations of the faculty advisor & HOD of the dept.

11.3. Departments will notify at the time of registration about the minimum number of students to be enrolled for a particular open elective to be offered.

11.4. Any student may be barred from registering for any course for specific reasons like disciplinary action or any other illegal activities carried out by a student, which is detrimental to the discipline of the college.

11.5. Dropping of Courses: Within four weeks after the commencement of the semester, the student may, in consultation with his / her faculty advisor, drop one or more courses without prejudice to the minimum number of credits. The dropped courses are not recorded in the Grade Card.

11.6. After Dropping, minimum credits registered shall be 20.

12. Earning of Credits

A student shall be considered to have completed a Course successfully and earned the credits if he/she secures an acceptable letter grade in the range 'O' to 'P'. Letter grade 'F' in any Course implies failure of the student in that Course and no credits earned.

13. Passing Standards:

13.1. A student shall be declared successful or 'passed' in a Semester, only when he gets a SGPA ≥ 5.00 (at the end of that particular Semester).

13.2. In such cases, his Internal Marks (CIE Marks) in those Subject(s) will remain same as those obtained earlier. In these considerations, the newly secured Letter Grades will be recorded and taken into account for calculation of SGPA and CGPA, only if there is an improvement.

13.3. A Student shall be declared successful or 'passed' in any Non-Credit Subject/ Course, if he secures a 40% marks or **P** grade in the end sem. exam conducted by the college along with the other examinations.

13.4. After the completion of each Semester, a Grade Card or Grade Sheet (or Transcript) shall be issued to all the registered students of that semester, indicating the Letter Grades and Credits earned. It will show the details of the courses registered (Course Code, Title, No. of Credits, Grade Earned etc.), Credits earned, SGPA, and CGPA.

14. Eligibility for the award of B.Tech. Degree

A student shall be eligible for award of the B. Tech degree if he/she fulfils all the following Conditions:

14.1. The students should successfully complete all the components prescribed in the Programme of study to which he/ she is admitted.

14.2. The student should also obtain CGPA greater than or equal to 5.0.

14.3. Not having any pending disciplinary action.

15. Evaluating of Grade Point Averages:

15.1. SGPA and CGPA the *credit index* can be used further for calculating the Semester Grade Point Average *(SGPA)* and the Cumulative Grade Point Average *(CGPA)*, both of which being important performance indices of the student. While *SGPA* is equal to the *credit index* for a semester divided by the total number of *credits* registered by the student in that semester, *CGPA* gives the sum total of *credit indices* of all the previous semesters divided by the total number of *credits* registered in all these semesters. Thus, The Grade Point Average (GPA) will be calculated according to the formula:

Where Ci = number of credits for the course i, Gi = grade points obtained by the student in the course.

$$GPA = \frac{\sum CiGi}{\sum Ci}$$

15.2. Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation. SGPA is rounded off to TWO Decimal Places.

SGPA will be computed as follows;

∑ [(Course *credits*) X (*Grade points*)] (for all Courses passed in that semester)

∑ [(Course *credits*)] (for all courses registered in that semester).

15.3. To arrive at Cumulative Grade Point Average (CGPA), the formula is used considering the student's performance in all the courses taken in all the semesters completed up to the particular point of time. CGPA is rounded off to TWO Decimal Places.

CGPA will be computed as follows:

∑ [(Course *credits*) X (*Grade points*)] (for all Courses passed up to that semester)

∑ [(Course *credits*)] (for all Courses registered until that semester)

CGPA is thus computed from the I Year First Semester onwards, at the end of each Semester, as per the above formula. However, the SGPA of I year I Semester itself may be taken as the CGPA, as there are no cumulative effects.

15.4. **Illustrative Example:**

An illustrative example given in below Table below indicates the use of the above two equations in calculating SGPA and CGPA, both of which facilitate the declaration of academic performance of a student, at the end of a semester and at the end of successive semesters respectively. Both of them shall be normally calculated up to the second decimal position, so that the *CGPA,* in particular, can be made use of in rank ordering the student's performance in a class. If two students get the same *CGPA*, the tie should be resolved by considering the number of times a student has obtained higher *SGPA;* But, if it is not resolved even at this stage, the number of times a student has obtained higher grades like O, A, B etc shall be taken into account in rank ordering of the students in a class.

Year and Semester	Course No.	Credits	Grade	Grade Points	Credit Points
I Year I sem	XX101	5	A	8	40
I Year I sem	XX102	4	F	0	00
I Year I sem	XX103	3	A+	9	27
I Year I sem	XX104	4	F	0	00
I Year I sem	XX105	5	C	5	25
I Year I sem	XX106	5	P	4	20
Total		26(18*)			112
SGPA = 112/26 = 4.31			**CGPA = 4.31**		
I Year II Sem	XX107	5	B+	7	35
I Year II Sem	XX108	4	A	8	32
I Year II Sem	XX109	3	C	5	15
I Year II Sem	XX110	5	P	4	20
I Year II Sem	XX111	4	A+	9	36
I Year II Sem	XX112	2	F	0	00
I Year II Sem	Xx113	2	A	8	16
Total		25(23			154
SGPA = 154/25 = 6.16 CGPA = 266/51 = 5.22					

*Total No. of credits excluding those with 'F'; this is particularly important to keep track of the number of credits earned by a student up to any semester.

16. Award of Division

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

CGPA	Class Awarded	
≥8.00	First Class with	From the CGPA secured from 160 credits
≥6.50 - <8.00	First Class	
≥5.50 - <6.50	Second Class	
≥5.00 - <5.50	Pass Class	

16.2. The marks obtained in Internal Evaluation (IE) and Semester End Examination (SEE) will be shown in the memorandum of marks.

16.3. For the purpose of awarding first Class with Distinction (CGPA ≥ 8.0), the student must obtain the minimum required CGPA within 4 academic years or within 3 academic years in case of Lateral Entry candidates by clearing all the courses.

16.4. Candidates with disciplinary action pending/ prevented from writing the end semester examinations due to reason in any semester are not eligible for the award of First Class with Distinction. Such candidate's even if the CGPA ≥ 8.0 shall be placed in first class.

16.5. For the purpose of awarding First, Second and Pass Class, CGPA obtained in the examinations appeared within the maximum period allowed for the completion of course shall be considered as per the regulations.

16.6. A student with final CGPA (at the end of the UGP) < 5.00 will not be eligible for the award of the Degree.

16.7. The CGPA can be converted to equivalent percentage of marks by using the equation., % of Marks = (CGPA - 0.5) X 10.

17. Consolidated Grade Card

A consolidated grade card containing credits & grades obtained by the candidates will be issued after completion of the four years B. Tech Programme.

18. Withholding of Results

If a student is having any discipline related issues pending, the result of the student will be withheld and will not be allowed to move into the next semester. His/ her degree will be withheld in such cases and the matter will be referred to the academic council for final decision.

19. Transitory Regulations

19.1. Discontinued, detained for attendance, detained for want of credits, or failed students are eligible for readmission as and when the course is offered during the subsequent academic year as per the college admission procedures.

19.2. Students on transfer from a non-autonomous or from an autonomous college shall complete all the courses of the concerned programme not covered in the earlier organization. However, he/ she should take the remaining courses in the programme along with the other students.

19.3. There shall be no branch transfers after the cut-off date of admissions made in the B.Tech. I year.

20. Transcripts

After successful completion of the total program of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee.

21. Supplementary Examinations

In addition to the Regular end semester examinations, Supplementary Examinations for the previous semesters will be conducted along with end sem. Examinations. A student can appear for any number of supplementary examinations till he/she clears all courses which he/ she could not clear in the first attempt. However, the maximum stipulated period cannot be relaxed under any circumstances.

22. Graduation Ceremony

22.1. The College shall have its own annual Graduation Ceremony for the award of degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

22.2. The College shall institute Prizes and Awards to meritorious students, for being given away annually at the Graduation Ceremony.

23. Termination from the Program

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

23.1. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

23.2. The student fails to satisfy the norms of discipline specified by the institute from time to time.

24. Non-Credit Courses (Mandatory Courses)

24.1. Requirement of 75% attendance as per the college regulations is compulsory of completing the mandatory courses.

24.2. Specified number of Mandatory Courses among the designated ones is compulsory requirement for all the students for the award of B.Tech. Degree.

24.3. Although these courses do not carry any credits, performance in these subjects is evaluated following the procedure adopted for other subjects with the same marks. However, their performance will be indicated in the student's memo of marks as Satisfactory/ Unsatisfactory.

24.4. Although mandatory courses are Non-Credit Course, all the students should secure a minimum of 40% marks in the end sem. exam conducted by the college along with the other examinations for the award of B.Tech., degree.

25. Amendments

The Academic regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.

26. General

26.1. Wherever the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

26.2. The academic regulation should be read as a whole for the purpose of an interpretation.

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

26.4. The college may change the academic regulations, course structure & syllabi at any time.

ACADEMIC REGULATIONS FOR B. TECH. (LATERAL ENTRY STUDENTS)

Applicable for the students admitted into II Year B. Tech. (Lateral Entry Scheme) from the Academic Year 2019-20 and onwards.

1. Eligibility for award of B. Tech. Degree (LES)

1.1 The LES candidates shall pursue a course of study for not less than three academic years and not more than six academic years.

1.2 The candidate shall register for 122 credits and secure 122 credits by securing a minimum CGPA of 5.0 from the exams. of B.Tech. II to IV year for the award of B.Tech. Degree.

1.3 The students, who fail to fulfil the requirement for the award of the degree in six Academic years from the year of admission, shall forfeit their seats. The attendance regulations of B. Tech. (Regular) shall be applicable to B.Tech. (LES).

2. Promotion Rule

2.1. A student shall be promoted from B.Tech., II Year to III Year if he/ she gets at least a minimum of 20 out of 40 credits, up to II year II semester, from all the examinations, whether or not the candidate takes the examinations.

2.2. A student shall be promoted from III year to IV year if he/ she gets a minimum of 41 out of 82 credits, up to III year II semester, from all the examinations, whether or not the candidate takes the examinations.

2.3. A student shall register and put up minimum attendance in all 122 credits and earn all 122 credits to be eligible for the award of B.Tech degree.

2.4. A student, who fails to earn 122 credits as indicated in the course structure within six academic years, shall forfeit his/ her admission in B.Tech. Course.

3. Award of Class

A student, who satisfies all the requirements prescribed for the completion of the B.Tech program, is eligible for the award of the said degree, in any one of the following four classes:

CGPA	Class Awarded	
≥8.00	First Class with	From the CGPA secured from 122 credits
≥6.50 - <8.00	First Class	
≥5.50 - <6.50	Second Class	
≥5.00 - <5.50	Pass Class	

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

5. The malpractice rules and procedures for evaluating the SGPA and CGPA mentioned under points 9 - 27, are also applicable to the later entry students.

COURSE STRUCTURE FOR B.TECH I YEAR

B. Tech. I Year I Semester

S.No.	Course Category	Course Title	L	T	P	C
1	BS-1	Mathematics-I	3	1	0	4
2	BS-2	Chemistry	3	1	0	4
3	BS-Lab 1	Chemistry Lab	0	0	3	1.5
4	H&S-1	English	2	0	0	2
5	H&S_Lab 1	English Language Skills Lab (ELSL)	0	0	2	1
6	ES-1	Programming for Problem Solving-I	2	0	0	2
7	ES-Lab 1	Programming for Problem Solving Lab-I	0	0	2	1
8	ES-Lab 2	Engineering Workshop	0	1	3	2.5
		Total	**10**	**3**	**10**	**18**

B. Tech. I Year I Semester

S.No.	Course Category	Course Title	L	T	P	C
1	BS-3	Mathematics-II	3	1	0	4
2	BS-4	Engineering Physics	3	1	0	4
3	BS-Lab 2	Engineering Physics Lab	0	0	3	1.5
4	ES-2	Engineering Mechanics	4	0	0	4
5	ES-3	Engineering Graphics & Modeling	1	0	3	2.5
6	H&S-Lab 2	English Communication Skills Lab (ECSL)	0	0	2	1
7	ES-4	Programming for Problem Solving-II	2	0	0	2
8	ES-Lab 3	Programming for Problem Solving Lab-II	0	0	2	1
		Total	**13**	**2**	**10**	**20**

COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S –2	Professional Communication	2	0	0	2
2	BS – 5	Numerical Methods & Partial Differential Equations	3	0	0	3
3	ES – 1	Fluid Mechanics	3	0	0	3
4	PC – 1	Solid Mechanics – I	4	0	0	4
5	PC – 2	Engineering Geology	3	0	0	3
6	PC – 3	Surveying & Geomatics	3	0	0	3
7	PC Lab – 1	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab – 2	Engineering Geology Lab	0	0	2	1
9	MC – 1	Environmental Science	2	0	0	0
		Total	**20**	**0**	**4**	**20**

B. Tech. II Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	BS – 6	Probability & Statistics	3	0	0	3
2	ES – 2	Principles of Electrical Engineering	3	0	0	3
3	PC – 4	Solid Mechanics - II	3	0	0	3
4	PC – 5	Environmental Engineering	3	0	0	3
5	PC – 6	Structural Analysis	3	0	0	3
6	PC – 7	Building Materials and construction Techniques	3	0	0	3
7	PC Lab – 3	Environmental Engineering Lab	0	0	2	1
8	PC Lab – 4	Solid Mechanics Lab	0	0	2	1
9	MC – 2	Gender sensitization	2	0	0	**0**
		Total	**20**	**0**	**4**	**20**

COURSE STRUCTURE FOR B.TECH III YEAR

B. Tech. III Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S-3	Managerial Economics and Financial Analysis	3	0	0	3
2	PC – 8	Design of Reinforced Concrete Structures	3	0	0	3
3	PC – 9	Geotechnical Engineering	3	0	0	3
4	PC – 10	Concrete Technology	3	0	0	3
5	PE – 1	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE – 1	Open Elective	3	0	0	3
7	ES Lab – 1	CAD Lab.	0	0	2	1
8	H&S Lab-3	Advance Communication Skills Lab	0	0	2	1
9	MC-3	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total number	**20**	**0**	**4**	**21**

B. Tech. III Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC – 11	Foundation Engineering	3	0	0	3
2	PC – 12	Design of Steel Structures	3	0	0	3
3	PC – 13	Hydraulics & Hydraulic Machinery	3	0	0	3
4	PC – 14	Water Resources Engineering	3	0	0	3
5	PE – 2	1. Construction Engineering Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
6	OE – 2	Open Elective	3	0	0	3
7	PC Lab – 5	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab – 6	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
9	MC-4	Personality Development & Behavioural Skills	2	0	0	1
		Total number	**20**	**0**	**4**	**21**

COURSE STRUCTURE FOR B.TECH IV YEAR

B. Tech. IV Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	PC – 15	Highway Engineering	3	0	0	3
2	PC – 16	Estimation & Costing	3	0	0	3
3	PE – 3	1. Pre stressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
4	PE – 4	1. Railway Airport and Harbour Engineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
5	OE – 3	Open Elective	3	0	0	3
6	PC Lab – 7	Concrete & Highway Material Lab	0	0	2	1
7	PC Lab - 8	Computational Lab	0	0	2	1
8	PW-1	Industry Oriented Mini Project	0	0	5	3
		Total number	**15**	**0**	**9**	**20**

B. Tech. IV Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC – 17	Rehabilitation and Retrofitting of structures	3	0	0	3
2	PC – 18	Remote Sensing & GIS	3	0	0	3
3	--	Technical Seminar	0	0	2	2
4	--	Comprehensive Viva Voce	0	0	0	2
5	PW-2	Major Project	0	0	20	10
		Total number	**6**	**0**	**22**	**20**

Open electives offered by Civil engineering Department

OE – 1	1. Elements of Civil Engineering 2. Smart City
OE – 2	1. Green Building Technologies 2. Environmental Pollution & Control Methods
OE – 3	1.Remote Sensing & GIS 2.Introduction to Earthquake Engineering

COURSE STRUCTURE FOR B.TECH (FAST TRACK)

B. Tech. I Year I Semester

S.No.	Course Category	Course Title	L	T	P	C
1	BS-1	Mathematics-I	3	1	0	4
2	BS-2	Chemistry	3	1	0	4
3	BS-Lab 1	Chemistry Lab	0	0	3	1.5
4	H&S-1	English	2	0	0	2
5	H&S_Lab 1	English Language Skills Lab (ELSL)	0	0	2	1
6	ES-1	Programming for Problem Solving-I	2	0	0	2
7	ES-Lab 1	Programming for Problem Solving Lab-I	0	0	2	1
8	ES-Lab 2	Engineering Workshop	0	1	3	2.5
		Total	**10**	**3**	**10**	**18**

B. Tech. I Year II Semester

S.No.	Course Category	Course Title	L	T	P	C
1	BS-3	Mathematics-II	3	1	0	4
2	BS-4	Engineering Physics	3	1	0	4
3	BS-Lab 2	Engineering Physics Lab	0	0	3	1.5
4	ES-2	Engineering Mechanics	4	0	0	4
5	ES-3	Engineering Graphics & Modeling	1	0	3	2.5
6	H&S_Lab 2	English Communication Skills Lab (ECSL)	0	0	2	1
7	ES-4	Programming for Problem Solving-II	2	0	0	2
8	ES-Lab 3	Programming for Problem Solving Lab-II	0	0	2	1
		Total	**13**	**2**	**10**	**20**

B. Tech. II Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S –2	Professional Communication	2	0	0	2
2	BS – 5	Numerical Methods & Partial Differential Equations	3	0	0	3
3	ES – 1	Fluid Mechanics	3	0	0	3
4	PC – 1	Solid Mechanics– I	4	0	0	4
5	PC – 2	Engineering Geology	3	0	0	3
6	PC – 3	Surveying & Geomatics	3	0	0	3
7	PC Lab – 1	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab – 2	Engineering Geology Lab	0	0	2	1
9	MC – 1	Environmental Science	2	0	0	0
		Total	**20**	**0**	**4**	**20**

B. Tech. II Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	BS – 6	Probability & Statistics	3	0	0	3
2	ES – 2	Principles of Electrical Engineering	3	0	0	3
3	PC – 4	Solid Mechanics – II	3	0	0	3
4	PC – 5	Environmental Engineering	3	0	0	3
5	PC – 6	Structural Analysis	3	0	0	3
6	PC – 7	Building Materials and construction Techniques	3	0	0	3
7	PC Lab – 3	Environmental Engineering Lab	0	0	2	1
8	PC Lab – 4	Solid Mechanics Lab	0	0	2	1
9	MC – 2	Gender sensitization	2	0	0	**0**
		Total	**20**	**0**	**4**	**20**

B. Tech. III Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S-3	Managerial Economics and Financial Analysis	3	0	0	3
2	PC – 8	Design of Reinforced Concrete Structures	3	0	0	3
3	PC – 9	Geotechnical Engineering	3	0	0	3
4	PC – 10	Concrete Technology	3	0	0	3
5	PE – 1	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE – 1	Open Elective	3	0	0	3
7	ES Lab – 1	CAD Lab.	0	0	2	1
8	H&S Lab-3	Advance Communication Skills Lab	0	0	2	1
9	MC – 3	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**20**	**0**	**4**	**21**

B. Tech. III Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC – 11	Foundation Engineering	3	0	0	3
2	PC – 12	Design of Steel Structures	3	0	0	3
3	PC – 13	Hydraulics & Hydraulic Machinery	3	0	0	3
4	PC – 14	Water Resources Engineering	3	0	0	3
9	PC – 15	Rehabilitation and Retrofitting of structures	3	0	0	3
5	PE – 2	1. Construction Engineering Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
6	OE – 2	Open Elective	3	0	0	3
7	PC Lab – 5	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab – 6	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
10	MC-4	Personality Development & Behavioural Skills	2	0	0	1
		Total	**23**	**0**	**4**	**24**

B. Tech. IV Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	PC – 16	Highway Engineering	3	0	0	3
2	PC – 17	Estimation & Costing	3	0	0	3
3	PC – 18	Remote Sensing & GIS	3	0	0	3
4	PE – 3	1. Pre stressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
5	PE – 4	1. Railway Airport and Harbour Engineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
6	OE-3	Open Elective	3	0	0	3
7	PC Lab – 7	Concrete & Highway Material Lab	0	0	2	1
8	PC Lab - 8	Computational Lab	0	0	2	1
9	PW-1	Industry Oriented Mini Project	0	0	5	3
		Total	**18**	**0**	**9**	**23**

B. Tech. IV Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	--	Technical Seminar	0	0	2	2
2	--	Comprehensive Viva Voce	0	0	0	2
3	PW-2	Major Project	0	0	20	10
		Total	**0**	**0**	**22**	**14**

Open Electives offered by Civil Engineering Department

OE – 1	1. Elements of Civil Engineering 2. Smart City
OE – 2	1. Green Building Technologies 2. Environmental Pollution & Control Methods
OE – 3	1. Remote Sensing & GIS 2. Introduction to Earthquake Engineering

MATHEMATICS I
(Matrices and Calculus)

I Year I Semester

L	T	P	C
3	1	0	4

Course Outcomes:

1. Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
2. Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
3. Analyze the convergence of sequence and series.
4. Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
5. Examine the extrema of functions of two variables with/ without constraints.

UNIT-I:

Matrices and Linear System of Equations:

Matrices and Linear system of equations: Real matrices – Symmetric, skew - symmetric, Orthogonal. Complex matrices: Hermitian, Skew – Hermitian and Unitary. Rank-Echelon form, Normal form. Solution of Linear Systems – Gauss Elimination, Gauss Jordan & LU Decomposition methods.

UNIT-II:

Eigen Values and Eigen Vectors:

Eigen values, Eigen vectors – properties, Cayley-Hamilton Theorem (without Proof) - Inverse and powers of a matrix by Cayley-Hamilton theorem – Diagonalization of matrix- Quadratic forms: Reduction to Canonical form, Nature, Index, Signature.

UNIT-III:

Sequences & Series:

Basic definitions of Sequences and series, Convergence and divergence, Ratio test, Comparison test, Cauchy's root test, Raabe's test, Integral test, Absolute and conditional convergence.

UNIT-IV:

Beta & Gamma Functions and Mean Value Theorems:

Gamma and Beta Functions-Relation between them, their properties – evaluation of improper integrals using Gamma / Beta functions.

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Generalized Mean Value theorem (all theorems without proof) – Geometrical interpretation of Mean value theorems.

UNIT-V:

Functions of Several Variables:

Partial Differentiation and total differentiation, Functional dependence, Jacobian Determinant-Maxima and Minima of functions of two variables with constraints and without constraints, Method of Lagrange Multipliers.

Textbooks:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Advanced Engineering Mathematics, Jain & Iyengar, Narosa Publications.

Reference Books:

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2nd Edition), Michael D. Greenberg.

CHEMISTRY

I Year I Semester

L	T	P	C
3	1	0	4

Course Outcomes:

1. Acquire knowledge of atomic, molecular and electronic changes related to conductivity.
2. Apply the various processes of treatment of water for both domestic and industrial purpose.
3. Apply the knowledge of electrode potentials for the protection of metals from corrosion.
4. Analyze the major chemical reactions that are used in the synthesis of compounds.
5. Apply the knowledge of polymers in every day's life.

UNIT- I:

Atomic and Molecular Structure:

Introduction, Concept of atomic and molecular orbitals, LCAO, Molecular orbitals of di-atomic molecules, Molecular orbital energy level diagrams of diatomic molecules (N_2, O2 & F_2). Pi-molecular orbitals of butadiene and benzene.

Crystal field theory (CFT): Crystal field theory, Crystal field splitting patterns of transition metal ion d- orbital- tetrahedral, octahedral and square planar geometries.

UNIT- II:

Water Technology:

Hardness of water, expression of hardness ($CaCO_3$ equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: characteristics, treatment of water for domestic supply. Desalination of brackish water: reverse osmosis. Alkalinity of water and its determination. Boiler feed water and its treatment: Internal treatment (colloidal, phosphate calgon conditioning of water). External treatment (ion –exchange process).

UNIT- III:

Electrochemistry and Corrosion:

Electrode, electrode potential, galvanic cell, cell reactions and cell notation, cell EMF, types of electrodes (Calomel electrode and Quinhydrone electrode) , Determination of P^H using quinhydrone electrode. Nernst equation, Numerical problems.

Batteries: Introduction to cell and battery, Primary (lithium cell) and secondary cells, (lead-Acid cell, and Lithium ion cells). Fuel cells – Hydrogen – Oxygen fuel cell, advantages and engineering applications of fuel cells.

Corrosion: Introduction, types of corrosion: chemical and electrochemical corrosion, factors affecting the rate of corrosion: nature of the metal, position of metal in galvanic series, purity of metal, nature of corrosion product , nature of environment : effect of temperature, effect of pH, humidity. Corrosion control methods: Cathodic protection: sacrificial anode method and impressed current cathode method. Protective coatings: metallic coatings (anodic and cathodic), methods of application on metals, electroplating (of copper), electroless plating (of Ni) , organic coatings- paints.

UNIT-IV:

Stereochemistry:

Structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity. Conformations of cyclic (cyclohexane) and acyclic systems (Ethane).

Organic Reactions and Synthesis of a Drug Molecule:

Introduction to reactions involving substitution (SN1 & SN2), addition(addition of HBr to propene, Markownikoff and Anti Markownikoff addition), elimination, oxidation(oxidation of alcoholsusing $KMnO_4$ & CrO_3), reduction(reduction of carbonyl compounds by $LiAlH_4$ & $NaBH_4$). Synthesis of a commonly used drug molecule- paracetamol and Asprin.

UNIT-V:

Polymer Chemistry:

Introduction, classification of polymers, types of polymerization (addition and condensation, mechanisms not included). Plastics- types of plastics -thermoplastics and thermosetting plastics. Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and Terelene (Dacron). Elastomers: natural rubber, structure, vulcanization. Synthetic rubbers: Buna-S, Butyl rubber & Thikol rubber. Conducting polymers: classification and applications.

Biodegradable polymers: Types, examples: Polyhydroxy butyrate (PHB), Poly-Hydroxybutyrate-co-b-Hydroxy valerate (PHBV) ,Polyglycolic acid (PGA) , Polylactic acid (PLA) ,Poly (Î-caprolactone) (PCL). Applications of biodegradable polymers.

Textbooks:

1. Engineering Chemistry, P.C Jain & Monica Jain, Dhanpat Rai Publications,2017.
2. Engineering Chemistry, Bharathi Kumari. Y, VGS Publications,2018.

Reference Books:

1. March's Advanced Organic Chemistry, Smith, Wiley Publications,2017.
2. Engineering Chemistry, Shiva Sankar, TMH Publications, 2010.

CHEMISTRY LAB

I Year I Semester

L	T	P	C
0	0	3	1.5

Course Outcomes:

1. Determination of parameters like hardness, alkalinity and chloride content in water.
2. Estimation of rate constant of a reaction from concentration-time relationships.
3. Determination of physical properties like adsorption, surface tension and viscosity.
4. Synthesize a small drug molecule and analyze a salt sample.
5. Calculation of strength of compound using instrumentation techniques.

Choice of 10-12 experiments from the following:

1. Estimation of total hardness of water by EDTA method.
2. Determination of alkalinity of water.
3. Determination of chloride content of water.
4. Estimation of HCl by conductometric titration.
5. Estimation of mixture of acids by conductometric titration.
6. Estimation of HCl by potentiometric titration.
7. Estimation of Fe^{2+} by potentiometry using $KMnO_4$.
8. Determination of the rate constant of a reaction.
9. Determination of surface tension.
10. Determination of viscosity of a lubricant.
11. Chemical analysis of a salt.
12. Synthesis of a polymer/drug.
13. Adsorption of acetic acid by charcoal.
14. Determination of Saponification /acid value of an oil.

Reference Books:

1. Practical Engineering Chemistry by Mukkanti, B.S. Publications, 2010.
2. Volga's Qualitative Inorganic Chemistry by PEAR Publications 2010.

ENGLISH

I Year I Semester

L	T	P	C
2	0	0	2

Course Outcomes:

1. Infer the importance of scientific discoveries in promoting social responsibilities.
2. Comprehend the given texts and respond appropriately for technical and professional purposes.
3. Communicate confidently and transfer information into various forms of writing.
4. Understand the importance of health and nutrition for a better society.
5. Present various forms of business writing skills for successful careers.

UNIT-I:

'The Raman Effect' from the prescribed textbook **'English for Engineers'**

Grammar : Articles & Prepositions

Reading : Reading and Its Importance- Techniques for Effective Reading.

Writing : Organizing principles of paragraphs in documents.

Vocabulary: The concept of word Formation, synonyms, antonyms, and standard abbreviations.

UNIT-II:

'Ancient Architecture in India' from the prescribed textbook **'English for Engineers'**

Reading : Improving Comprehension Skills – Techniques for good comprehension

Writing : Sentence Structures, Use of phrases and clauses in sentences
Writing Formal Letters - Eg. Letter of Complaint, Letter of Requisition, Job Application with Resume.

Vocabulary: Root words and acquaintance with prefixes and suffixes from foreign languages in English, to form derivatives

UNIT-III:

'Blue Jeans' from the prescribed textbook **'English for Engineers'**

Grammar: Tenses: Types and uses.

Reading : Sub-skills of Reading- Skimming and Scanning

Writing : Identifying Common Errors in Writing
Subject-Verb agreement in number, gender and person
Information Transfer-Process writing

UNIT-IV:

'What Should You Be Eating' from the prescribed textbook **'English for Engineers'**

Reading : Intensive Reading and Extensive Reading

Writing : Nature and Style of Sensible Writing
Describing & Defining
Identifying common errors in writing

UNIT-V:

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook **'English for Engineers'**

Vocabulary : Technical Vocabulary and their usage

Reading : Reading Comprehension-Exercises for Practice

Writing : Cohesive Devices

Précis Writing

Technical Reports-Introduction, Characteristics of a Report – Categories of Reports, Formats- Structure of Reports (Manuscript Format) –Types of Reports - Writing a Report.

Textbooks:

1. English for Engineers, Sudarshana, N.P. and Savitha, C. Cambridge University Press, 2018.

Reference Books:

1. Effective Technical communication, Muhammed Rizvi, TMH, 2008.
2. Advanced English Grammar, Hewings, Cambridge University Press, 2010.

ENGLISH LANGUAGE SKILLS LAB

I Year I Semester

L	T	P	C
0	0	2	1

Course Outcomes:

1. Reproduce speech sounds and improve fluency in language.
2. Understand syllables and consonant clusters for appropriate pronunciation.
3. Exhibit effective professional skills with rhetoric eloquence.
4. Deliver enthusiastic and well-practiced presentation.
5. Learn Task-Based Language Learning (TBLL) through various language learning activities effectively.

Exercise-I:

CALL Lab:

Introduction to Pronunciation- Speech Sounds, Vowels and Consonants- Practice for Listening

ICS Lab:

Ice-Breaking activity and JAM session

Exercise-II:

CALL Lab:

Silent Letters, Consonant Clusters, Homographs

ICS Lab:

Common Everyday Situations: Conversations and Dialogues

Exercise-III:

CALL Lab:

Syllables

ICS Lab:

Communication at Workplace, Social and Professional Etiquette

Exercise-IV:

CALL Lab:

Word Accent and Stress Shifts

ICS Lab:

Formal Presentations, Visual Aids in Presentations

Exercise-V:

CALL Lab:

Intonation, Situational dialogues for practice

ICS Lab:

Interviews, Types of Interviews

Reference Books:

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian, Macmillan Publishers, 2010.
2. Speaking English Effectively, Mohan, Macmillan Publishers, 2010.

PROGRAMMING FOR PROBLEM SOLVING-I

I Year I Semester

L	T	P	C
2	0	0	2

Course Outcomes:

1. Design Algorithms and Flowcharts for real world applications using 'C'.
2. Know the usage of various operators in Program development.
3. Design programs involving decision and iteration structures.
4. Apply the concepts code reusability using Functions.
5. Analyze various searching and sorting techniques using Arrays.

UNIT-I:

Problem Solving Using Computers: Introduction, Algorithms, Flowcharts and Pseudo code, Applications of C language.

Overview of C Language: Introduction, Salient Features of C Language, Structure of a "C" Program.

C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input/ Output Statements with suitable illustrative "C" Programs.

UNIT-II:

Operators: Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative "C" Programs.

UNIT-III:

Statements in C:

Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, and Switch-Statement with suitable illustrative "C" Programs.

Loop Control Statements: while, do-while and for with suitable illustrative "C" Programs.

UNIT-IV:

Functions: Introduction to Functions, benefits of functions, types of functions, Function calls, return vs exit (), Parameter Passing mechanism: Call-by-Value, Recursion, Storage Classes.

UNIT-V:

Arrays: Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions.

Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Insertion Sort.

Textbooks:

1. COMPUTER SCIENCE: A Structured Programming Approach Using C, B.A.Forouzon and R.F. Gilberg, Third edition, 2016.
2. C and Data Structures, Ashok N. Kamthane, Pearson Education.

Reference Books:

1. Problem Solving Using C, M.T. Somashekara, PHI, 2nd Edition 2009.
2. Computer Fundamentals and Programming in C, A.K.Sharma, 2nd Edition, University Press.
3. Programming in C 2/e, PradipDey and Manas Ghosh, Oxford University Press, 2nd Edition 2011.
4. The Fundamentals of Computers, Rajaraman V., 4th Edition, Prentice Hall of India, 2006.
5. Programming in C, R S Bichker, University Press, 2012.

PROGRAMMING FOR PROBLEM SOLVING LAB – I

L	T	P	C
0	0	2	1

I Year I Semester

Course Outcomes:

1. Apply the specification of syntax rules for numerical constants and variables, data types.
2. Know the Usage of various operators and other C constructs.
3. Design programs on decision and control constructs.
4. Develop programs on code reusability using functions.
5. Implement various searching and sorting techniques using arrays.

Week 1:
Ubuntu and Linux Commands.

Week 2:
Designing of flowcharts and algorithms using raptor tool
1. Areas of Polygons.
2. Calculation of Simple and Compound Interest.
3. Swapping of Two numbers with and without temporary variable.
4. Checking whether a number is even or odd.
5. Sum of first 'n' natural numbers.
6. Checking a number whether it is divisible by any given number.
7. Evaluation of mathematical expressions.
8. Programs using scanf( ) and printf( ) statements.

Week 3:
Programs on operators.(Minimum 4 Programs)

Week 4, 5 & 6:
Programs on Conditional Statements. (Minimum 12 Programs)

Week 7,8 & 9:
Programs on Control Statements. (Minimum 12 Programs)

Week 10 &11:
Programs on Functions. (Minimum 6 Programs)

Week 12:
Programs on One Dimensional Arrays. (Minimum 3 Programs)

Week 13:
Programs on Two Dimensional Arrays. (Minimum 2 Programs)

Week 14:
Implementation of Linear Search and Binary Search.

Week 15:
Implementation of Bubble Sort and Insertion Sort.

Week 16:
Review

ENGINEERING WORKSHOP

I Year I Semester

L	T	P	C
0	1	3	2.5

Course Outcomes:

1. Understanding the tools and methods of using to fabricate engineering components
2. Applying the measuring techniques to verify the dimensional accuracy
3. Evaluating various methods and trades of workshop in the component building

(i) Lectures & videos:

Detailed contents

1. Manufacturing Methods- Metal Forming, Machining, Advanced manufacturing methods (2 lectures)
2. CNC machining, Additive manufacturing (2 lectures)
3. Fitting operations & power tools (1 lecture)
4. House wiring (1 lecture)
5. Carpentry (1 lecture)
6. Plastic moulding (1 lecture)
7. Metal casting (1 lecture)
8. Welding (1 Lecture)

(ii) Workshop Practice:

Detailed contents:

1. Machine shop (Lathe machine)
2. Fitting shop
3. Carpentry
4. House Wiring
5. Welding shop (Arc welding)
6. Tin Smithy

Reference Books:

1. Elements of Workshop Technology, Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Manufacturing Engineering and Technology, Kalpakjian S. and Steven S. Schmid, 4th edition, Pearson Education India Edition, 2002.

MATHEMATICS - II
(Ordinary Differential Equations and Vector Calculus)

I Year II Semester

L	T	P	C
3	1	0	4

Course Outcomes:

1. Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
2. Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
3. Find the Laplace Transform of various functions and apply to find the solutions of differential equations.
4. Evaluate the multiple integrals and identify the vector differential operators physically in engineering problems.
5. Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

UNIT-I:

First order Ordinary Differential Equations and their Applications:

Formation of Differential equations, Differential equations of first order and first degree: exact, linear and Bernoulli, Applications of ODE: Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-II:

Higher Order Linear Differential Equations:

Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X) $= e^{ax}, \sin ax, \cos ax \text{ and } x^k, e^{ax}V(x), x^kV(x)$. Method of variation of parameters.

UNIT-III:

Laplace Transforms:

Laplace transform of standard functions – Inverse transform – first shifting Theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem – Dirac's delta function – Convolution theorem – Periodic function - Differentiation and integration of transforms – Application of Laplace transforms to ordinary differential equations.

UNIT-IV:

Multiple Integrals & Vector Differentiation:

Multiple integrals - double and triple integrals – change of order of integration (Only Cartesian form)- change of variables (Cartesian to Polar for double integral, Cartesian to Spherical for triple integral). Gradient- Divergence- Curl and their related properties - Potential function - Laplacian and second order operators.

UNIT-V:

Vector Integration:

Line integral, work done, Surface and Volume integrals. Vector integrals theorems: Green's, Stoke's and Gauss Divergence Theorems (Only Statements & their Verifications).

Textbooks:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Advanced Engineering Mathematics, Jain & Iyengar,Narosa Publications.

Reference Books:

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2nd Edition), Michael D. Greenberg.

ENGINEERING PHYSICS

I Year II Semester

L	T	P	C
3	1	0	4

Course Outcomes:

1. Interpret the forced damped harmonic oscillations and Transverse waves.
2. Identify various optical phenomena of light.
3. Explain the working principle of optical fibers and lasers.
4. Describe the crystalline structures of solids.
5. Classify magnetic and dielectric behavior of materials.

UNIT-I:

Oscillations and Waves:

Simple harmonic motion, equation of simple harmonic motion, Simple Pendulum, Torsional pendulum, damped harmonic motion-heavy, critical and light damping, energy decay in a damped harmonic oscillator, power dissipation, quality factor. Forced vibration, steady state motion of forced damped harmonic oscillator, Amplitude of forced vibration, Resonance, Electrical analogy of simple harmonic oscillator.Transverse waves in a stretched string, differential equation, reflection and transmission of transverse waves at a boundary, standing waves.

UNIT-II:

Wave Optics:

Huygen's principle, superposition of waves, coherence and methods to produce coherent sources, young's double slit experiment, interference by parallel thin film by reflection, Newton's rings. Diffraction: Introduction, Fraunhofer diffraction at single slit, plane diffraction Gratings and its resolving power. Polarization: Introduction, methods of polarization, double refraction- Nicol Prism.

UNIT-III:

Fiber Optics and Lasers:

Introduction, total internal reflection, acceptance angle and numerical aperture, losses associated with optical fibers, step and graded index fibers, applications of optical fibers. Introduction to interaction of radiation with matter: stimulated absorption, spontaneous emission and stimulated emission, Einstein's coefficients and their relation, characteristics of a laser, components of a laser: active medium, pumping source, optical resonator. Population inversion, Construction and working of Ruby laser, He-Ne laser and Semiconductor laser. Applications of lasers.

Unit-IV:

Crystal Structures, Crystal Planes and XRD:

Space lattice – Unit cell – Lattice parameter – Crystal systems – Bravais lattices, Atomic radius – Co-ordination number - Structures and Packing fractions of Simple Cubic – Body Centered Cubic – Face Centered Cubic crystals. Miller Indices for Crystal planes and directions – Inter planar spacing of orthogonal crystal systems –Diffraction of X-rays by crystal planes and Bragg's law–Powder method – Applications of X-ray diffraction.

UNIT-V:

Dielectric and Magnetic properties of Materials:

Dielectric polarization, permittivity and dielectric constant, polar and non-polar dielectrics, Electronic, Ionic and Orientation Polarization – Calculation of electronic and Ionic Polarizability – Internal fields – Claussius – Mossotti equation – Basic concepts of Piezo, Pyro and Ferro electricity, applications of dielectrics.Introduction to magnetism – Basic definitions - Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – properties of Anti ferro and Ferri magnetic materials, applications.

Textbooks:

1. Engineering Physics, P K Palanisamy, Scietech publication.
2. Engineering Physics, Hitendra K Malik, A K Singh, McGraw Hill Edition (I) Private Limited.

Reference Books:

1. A Text book of Engineering Physics, M N Avadhanulu, P G Kshirsagar; S Chand.
2. Physics Volume I & II, Resnick and Halliday, John Wiley and sons, Inc.

ENGINEERING PHYSICS LAB

L	T	P	C
0	0	3	1.5

I Year II Semester

Course Outcomes:

1. Characterize the mechanical properties of given material.
2. Demonstrate various types of oscillation and rotational motion to determine mechanical parameters.
3. Evaluate the magnetic Induction along the axis of current carrying coil.
4. Apply optical phenomena to characterize optical sources and components.
5. Characterize LCR and RC circuits.

List of Experiments

1. Torsional pendulum: Determination of Rigidity modulus of a material.
2. Fly-wheel: Determination of moment of Inertia.
3. Melde's Experiment: Determination of frequency of electrically maintained tuning fork.
4. Sonometer: Determination of velocity of transverse wave in a string.
5. Newton's rings: Determination of the radius of curvature of the given lens by forming Newton's rings.
6. Diffraction grating: Determination of wavelength of given light using diffraction grating.
7. Dispersive power: Determination of dispersive power of the prism material using spectrometer.
8. Single Slit Diffraction using Lasers- Determination of Wavelength of a Monochromatic Source.
9. Stewart & Gee's experiment: Determination of magnetic field along the axis of current carrying coil.
10. LCR Circuit: Determination of Resonance frequency of forced electrical oscillator.
11. RC- Circuit: Determination of time constant of RC-circuit.
12. Optical Fiber: Determination of Numerical Aperture of Optical Fiber.

Note: Any 10 experiments are to be performed

ENGINEERING MECHANICS

I Year II Semester

L	T	P	C
4	0	0	4

Course Outcomes:

Understand the concepts of engineering mechanics

1. Apply the laws of mechanics for various engineering applications
2. Analyze the motion of body
3. Evaluate performance of various engineering components interms of their energy capacities

UNIT-I:

Introduction to Engineering Mechanics - Force Systems: Basic concepts, particle equilibrium in 2D & 3D, rigid body equilibrium, system of forces, coplanar concurrent forces, components in space, resultant, moment of forces and its application, couples and resultant of force system, equilibrium of system of forces, free body diagrams, equations of equilibrium of coplanar systems and spatial systems.

UNIT-II:

Friction: Types of friction, limiting friction, laws of friction, static and dynamic friction, motion of bodies, wedge friction, screw jack & differential screw jack, centroid and centre of gravity, centroid of lines, areas and volumes from first principle, centroid of composite sections, centre of gravity and its implications, theorem of pappus.

UNIT-III:

Area Moment of Inertia: Definition, moment of inertia of plane sections from first principles, theorems of moment of inertia, moment of inertia of standard sections and composite sections, product of inertia, parallel axis theorem, perpendicular axis theorem

Mass Moment of Inertia: Moment of inertia of masses, transfer formula for mass moments of inertia, mass moment of inertia of composite bodies.

UNIT-IV:

Review of Particle Dynamics: Rectilinear motion, plane curvilinear motion, relative and constrained motion, work-kinetic energy, power, potential energy, impulse-momentum (linear, angular), impact (direct and oblique).

UNIT-V:

Kinetics of Rigid Bodies: Basic terms, general principles in dynamics, types of motion, D'Alembert's principle and its applications in plane motion and connected bodies, work energy principle and its application in plane motion of connected bodies, kinetics of rigid body rotation.

Textbooks:

1. Engineering Mechanics, Shames and Rao (2006), Pearson Education
2. Singer's Engineering Mechanics, Statics & Dynamics, Reddy Vijay Kumar K. and J. Suresh Kumar (2010),

Reference Books:

1. Engineering Mechanics, Timoshenko S.P and Young D.H., McGraw Hill International Edition, 1983.
2. Engineering Mechanics, Andrew Pytel, Jaan Kiusalaas, Cengage Learning, 2014.
3. Mechanics for Engineers, Beer F.P & Johnston E.R Jr. Vector, TMH, 2004.
4. Engineering Mechanics, Hibbeler R.C & Ashok Gupta, Pearson Education, 2010.
5. Engineering Mechanics – Statics & Dynamics, Tayal A.K., Umesh Publications, 2011.
6. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press, 2008.
7. Engineering Mechanics, Volume-II Dynamics, Meriam. J. L., John Wiley & Sons, 2008.

ENGINEERING GRAPHICS & MODELING

I Year II semester

L	T	P	C
1	0	3	2.5

Course Outcomes:

1. Understand the concepts of engineering drawing of planes, solids and the CAD drawing software.
2. Applying the principles of engineering graphics while drawing the engineering components.
3. Analyze the sectional views for their configurations.
4. Evaluate the surfaces of solids developed for further processing in the engineering applications.

UNIT– I:

Introduction to Engineering Drawing: Principles of engineering graphics and their significance, usage of drawing instruments, conic sections, including the rectangular hyperbola- General method only. Cycloid, Epicycloid, Hypocycloid. Scales – Plain & Diagonal only.

Introduction to CAD: Introduction to CAD software and its importance, standard toolbar/menus and navigation tools used in the software, using basic commands limits ,units, grid, test , move, offset ,mirror, rotate, trim, extend, fillet etc. drawing lines using line command. Drawing spline, ellipse, circle, rectangle etc.. Concept of layers and dimensioning.

UNIT-II:

Principles of Orthographic Projections: Conventions, projections of points, projections of lines (first angle projection) inclined to both planes (traces and midpoint problem to be excluded).

Implementation of CAD: Drawing orthographic projections of points and lines using a CAD package.

UNIT – III:

Projections of the Planes: Projections of regular planes inclined to both the planes.

Projections of Solids: Projections of regular solids inclined to both the planes (prisms, pyramids, cones and cylinders, change of potion method only).

Implementation in CAD: Drawing orthographic projection of planes and regular solids using a CAD package.

UNIT – IV:

Sections and Sectional Views of Right Angular Solids: Prism, Cylinder, Pyramid, Cone. Development of surfaces of right regular solids - Prism, Pyramid, Cylinder and Cone.

Implementation in CAD: Concept of hatching, drawing sectional views of solids and the development of right regular solids using a CAD package.

UNIT-V:

Principles of Isometric projection: Isometric scale, isometric views, conventions, isometric views of lines, planes, simple solids, conversion of isometric views to orthographic views and vice-versa, conventions.

Implementation in CAD: Drawing isometric views of simple solids. Drawing isometric views from giving orthographic views and vice-versa using a CAD package.

Note: Implementation in CAD (For Internal Evaluation Weightage Only)

Textbooks:

1. Engineering Drawing, Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Charotar Publishing House.

Reference Books:

1. Engineering Graphics, Agrawal B. & Agrawal C. M. (2012), TMH Publication, Text book on Engineering Drawing, Narayana, K.L. & P Kannaiah (2008), Scitech Publishers.
2. Engineering Drawing and Computer Graphics, Shah, M.B. & Rana B.C. (2008), Pearson Education.
3. http://docs.autodesk.com/ACDMAC/2013/ENU/PDFs/acdmac_2013_users_guide.pdf

ENGLISH COMMUNICATION SKILLS LAB

L	T	P	C
0	0	2	1

I Year II Semester

Course Outcomes:

1. Understand the variants in pronunciation.
2. Identify the diverse purposes of listening and speaking.
3. Discuss ideas in diverse communicative settings.
4. Exhibit increased confidence in public speaking.
5. Display critical thinking, problem solving and decision making skills through GD's.

Exercise-I:

CALL Lab:

Common Indian Variants in Pronunciation – Differences between British and American Pronunciation.

ICS Lab:

Spoken vs. Written language -Formal and Informal English- Introducing Oneself and Others.

Exercise-II:

CALL Lab:

Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening.

ICS Lab:

Features of Good Conversation – Strategies for Effective Communication Role-Play- Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise-III:

CALL Lab:

Information Transfer

ICS Lab:

Descriptions-Narrations-Giving Directions and Guidelines-Giving Instructions-Seeking Clarifications-Asking for and Giving Directions-Thanking and Responding-Agreeing and Disagreeing-Seeking and Giving Advice-Making Suggestions.

Exercise-IV:

CALL Lab:

Past Tense Marker and Plural Marker

ICS Lab:

Public Speaking- Exposure to Structured Talks - Non-verbal Communication- Making a Short Speech - Extempore

Exercise-V:

CALL Lab:

Intonation- Sentence Stress -Weak Forms and Strong Forms.

ICS Lab:

Group Discussion, Mock Group Discussion sessions

Reference Books:

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian Macmillan Publishers, 2010
2. Speaking English Effectively, Mohan, Macmillan Publishers, 2010

PROGRAMMING FOR PROBLEM SOLVING-II

L	T	P	C
2	0	0	2

I Year II Semester

Course Outcomes:

1. Identify various string handling functions in 'C'.
2. Develop programs with user defined data types.
3. Use Dynamic memory allocation functions with pointers.
4. Distinguish between Stacks and Queues.
5. Analyze various Dynamic Data Structures.

UNIT – I:

Overview of Arrays and Functions.

Strings: Introduction to Strings, String I/O, String Operations with and without built-in functions (strlen( ), strcmp( ), strcat( ),strcpy( ) and strrev( )).

UNIT -II:

Structures: Definition and Initialization of Structures, Accessing structure members, Nested Structures, Array of Structures, Structures and Functions, Unions, typedef, Enumerated Data types.

UNIT-III:

Pointers: Introduction to Pointers, Pointer Arithmetic, Pointers and Arrays, Pointer to Structure, Pointers and Strings, Parameter passing mechanism: Call by Reference, Pointer to Pointer, Dynamic Memory Allocation.

UNIT-IV:

Introduction to Data Structures: Lists and Operations, Linear and Non linear Data structures.

Stacks- Introduction to Stacks, Operations, Implementation of Stack using Arrays.

Queues- Introduction to Queues, Operations, Implementation of Queue using Arrays.

UNIT-V:

Linked Lists: Introduction to Linked List, Operations on Single Linked List (search, Insertion & Deletion).

Files: Introduction to Files, File Operations (Open, Close, read & Write).

Textbooks:

1. COMPUTER SCIENCE: A Structured Programming Approach Using C, B.A.Forouzon and R.F. Gilberg, Third edition, 2016.
2. C and Data Structures, Ashok N. Kamthane, Pearson Education.

Reference Books:

1. Problem Solving Using C, M.T. Somashekara, PHI, 2nd Edition 2009.
2. Computer Fundamentals and Programming in C, A.K.Sharma, 2nd Edition, University Press.
3. Programming in C 2/e, PradipDey and Manas Ghosh, Oxford University Press, 2nd Edition 2011.
4. The Fundamentals of Computers, Rajaraman V., 4th Edition, Prentice Hall of India, 2006.
5. Programming in C, R S Bichker, University Press, 2012.

PROGRAMMING FOR PROBLEM SOLVING LAB – II

L	T	P	C
0	0	2	1

I Year II Semester

Course Outcomes:

1. Build programs on various string handling functions.
2. Develop applications on user defined data types.
3. Apply dynamic memory allocation through pointers.
4. Implement linear data structures through stacks and queues.
5. Create linked list dynamically through stacks and queues.

Week 1:
Programs on Arrays and Functions. (Minimum 3 Programs)

Week 2 & 3:
Programs on Strings with and without string built-in Functions. (Minimum 6 Programs)

Week 4:
Programs on Accessing Structures and Nested Structures. (Minimum 3 Programs)

Week 5 & 6:
Programs on Array of Structures, Structures and Functions. (Minimum 5 Programs)

Week 7:
Programs on Unions, typedef and enum. (Minimum 4 Programs)

Week 8:
Programs on Pointers, pointer arithmetic, pointer expression, One Dimensional and Two dimensional arrays. (Minimum 4 Programs)

Week 9:
Programs on Pointer to structure, Call by Reference, Pointer to Pointer. (Minimum 3 Programs)

Week 10:
Programs on Dynamic Memory Allocation Functions. (Minimum 3 Programs)

Week 11:
Programs on Stacks and Queues using Arrays.

Week 12 & 13:
Programs on Single Linked List.

Week 14 & 15:
Programs on File Operations. (Minimum 6 Programs)

Week 16:
Review

COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S –1	Professional Communication	2	0	0	2
2	BS – 1	Numerical Methods & Partial Differential Equations	3	0	0	3
3	ES – 1	Fluid Mechanics	3	0	0	3
4	PC – 1	Solid Mechanics – I	4	0	0	4
5	PC – 2	Engineering Geology	3	0	0	3
6	PC – 3	Surveying & Geomatics	3	0	0	3
7	PC Lab – 1	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab – 2	Engineering Geology Lab	0	0	2	1
9	MC – 1	Environmental Science	2	0	0	0
		Total	**20**	**0**	**4**	**20**

II/II Semester

S. No.	Category	Course Title	L	T	P	C
1	BS – 2	Probability & Statistics	3	0	0	3
2	ES – 2	Principles of Electrical Engineering	3	0	0	3
3	PC – 4	Solid Mechanics - II	3	0	0	3
4	PC – 5	Environmental Engineering	3	0	0	3
5	PC – 6	Structural Analysis	3	0	0	3
6	PC – 7	Building Materials and construction Techniques	3	0	0	3
7	PC Lab – 3	Environmental Engineering Lab	0	0	2	1
8	PC Lab – 4	Solid Mechanics Lab	0	0	2	1
9	MC – 2	Gender sensitization	2	0	0	**0**
		Total	**20**	**0**	**4**	**20**

PROFESSIONAL COMMUNICATION

L	T	P	C
2	0	0	2

B.Tech. II Year I Sem

Course Outcomes

1. Acquire enhanced personality
2. Exhibit appropriate professional etiquette
3. Practice team building with strong communication skills
4. Develop problem solving skills and decision-making
5. Demonstrate effective presentation skills

UNIT-I

Self Appraisal: Self Introspection/ Self Retrospection; Introducing self & others; Goal setting; SWOT Analysis,

UNIT- II

Professional Etiquette: Etiquette-Telephone Etiquette- Netiquette; Email, Social Network; Behavioural Traits; Case study

UNIT-III

Team Building: Leadership skills-Case Studies; Team Essentials; Negotiation Skills; Group Discussion-Functional Aspects

UNIT-IV

Logical Thinking and Analytical Reasoning: Decision Making; Problem Solving; Conflict management; Case Study

UNIT-V

Presentation Skills: Poster Presentation;Oral Presentation-Individual Presentation, Team, Presentation, Thematic Presentation

Textbook

1. Ashrif Rizvi. Effective Technical Communication, Tata Mc Gahill, 2011

Reference Books

1. Speaking and Writing for Effective Business, Soundaraja, Macmillan, 2010.
2. English for Professional Success, Hector Sanchez, Thomson, 2010.

NUMERICAL METHODS AND PARTIAL DIFFERENTIAL EQUATIONS

L	T	P	C
3	0	0	3

II Year I Semester

Outcomes

After learning the contents of this course the students must be able to:

1. Develop skills in solving engineering problems involving Algebraic and transcendental equations.
2. Acquires the knowledge of interpolation in predicting future out comes based on the present knowledge and also to fit different types of Curves.
3. To know various types of numerical methods in solving engineering problems.
4. Classify the nature of second and Higher order partial differential equations and find the solutions of linear and non linear PDE.
5. To apply Partial differential Equations in different engineering problems.

UNIT-I

Numerical Techniques: Solution of Algebraic and Transcendental Equations:

Introduction - The Bisection Method- The Method of False Position- The Iteration Method- Newton-Raphson Method. Solving system of linear Non- Homogeneous equations by Jacobi's and Gauss- Seidel Iteration methods.

UNIT-II

Curve Fitting and Numerical Integration:

Curve fitting: Fitting a straight line -second degree curve-exponential curve, power curve by method of least squares.

Numerical integration – General Quadrature (Newton's Cote's formula), Trapezoidal rule, Simpson's rule $\left(\frac{1}{3}^{rd} \ \& \frac{3}{8}^{th}\right)$.

UNIT-III

Numerical Solutions of Initial Value Problems:

Numerical solution of Ordinary Differential equations: Introduction- Solution by Taylor's series method- Picard's Method of successive approximations Single step methods-Euler's Method Runge-Kutta (second and classical fourth order) Methods- Predictor Corrector method- Adam's Bashforth method .

UNIT-IV

Partial Differential Equations:

Introduction- Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions- Solutions of first order Linear (Lagrange) Equation, Nonlinear Equations- Charpits Method.

UNIT-V

Applications of Partial Differential Equations:

Introduction- Classification of general second order partial differential equations- Method of separation of variables for second order equations- Applications of Partial Differential Equations- One dimensional wave equation One dimensional heat equation- Steady State two dimensional Heat equation (or Laplace equation).

Textbooks

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers,2015,35th Edition
2. Numerical Methods, S. S. Sastry – PHI Publications,2012, 5th Edition.

Reference Books

1. Numerical Methods, E. Balaguruswamy, Tata-Mc Graw Hill. Ed.
2. Numerical Methods, by SRK Iyengar& RK Jain, New Age International Publishers.
3. Ordinary and Partial Differential Equations: Theory and Applications: Shah and, Nita H, PHI Publications.

FLUID MECHANICS

L	T	P	C
3	0	0	3

II Year I Semester

Outcomes

After completion of this course students will be able to

1. Understand the Concepts of fluid properties and the relationship between them and to obtain the principles of continuity, momentum, and energy as applied to fluid motions.
2. Differentiate various flow lines and to formulate the Continuity equation for One dimensional, Two dimensional and three dimensional flows.
3. Formulate the Euler's and Bernoulli's equation with practical applications, to determine the discharge over notches and weirs and to apply the Momentum equation for a pipe bend.
4. Evaluate the head losses in pipes, flow between parallel plates and to solve the pipe network problems.
5. Demonstrate Boundary layer concepts and to explain the separation of the boundary layer.

UNIT-I

Introduction: Dimensions and units Physical properties of fluids, specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, Hydrostatic law atmospheric, gauge and vacuum pressure measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers. Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces Center of pressure. Derivations and problems.

UNIT-II

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

UNIT- III

Fluid dynamics and measurement of flow: Surface and body forces Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, (Navier Stoke's equations (Explanationary) Momentum equation and its application forces on pipe bend. Pitot tube, Venturi meter and orifice meter classification of orifices, flow over rectangular, triangular, trapezoidal and Stepped notches Broad crested weirs.

UNIT- IV

Closed conduit flow: Reynold's experiment Characteristics of Laminar & Turbulent flows. Laws of Fluid friction Darcy's equation, ,variation of friction factor with Reynold's number Moody's Chart, Minor losses pipes in series pipes in parallel Total energy line and hydraulic gradient line. Pipe network problems, flow between parallel plates, flow through long tubes,flow through inclined tubes.

UNIT- V

Boundary Layers: Approximate Solutions of NavierStoke's Equations Boundary layer concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent boundary layers (no derivations) BL in transition, separation of BL, control of BL, flow around submerged objects Drag and Lift Magnus effect.

Textbooks

1. Fluid Mechanics, Modi and Seth, Standard book house, 2019,22 Edition.
2. Fluid Machines, R.K.Rajput, S. Chand &company Ltd. 2011 Edition.

References

1. A text of Fluid mechanics and hydraulic machines, Dr. R.K. Bansal,Laxmi Publications (P) ltd., New Delhi, 2005
2. Fluid Mechanics, Frank.M., White (Tata Mc.GrawhillPvt. Ltd.) Mc Graw-Hill Higher, 2010, Edn 7.

SOLID MECHANICS – I

II Year I Semester

L	T	P	C
4	0	0	4

Course Outcomes

Students who successfully complete this course will have demonstrated ability to

1. Examine stress strain, elastic constants and strain energy.
2. Analyse the shear force and bending moment diagrams of beams and relationship between them.
3. Evaluate the flexural and shear stresses for various beam cross sections.
4. Calculate principal stresses and strains using analytical and graphical solutions for the safety using failure theories.
5. Determine the deflections of beams with various loadings using different methods.

UNIT- I

Simple Stresses and Strains: Elasticity and plasticity Types of stresses and strains Hooke's law stress-strain diagram for mild steel Working stress Factor of safety Lateral strain, Poisson's ratio and volumetric strain Elastic modulii and the relationship between them Bars of varying section composite bars Temperature stresses, Elastic constants.

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

UNIT- II

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

UNIT- III

Flexural Stresses: Theory of simple bending Assumptions Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis Determination of bending stresses Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections Design of simple beam sections.

Shear stresses: Derivation of formula Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

UNIT- IV

Principal Stresses and Strains: Introduction Stresses on an inclined section of a bar under axial loading compound stresses Normal and tangential stresses on an inclined plane for biaxial stresses Two perpendicular normal stresses accompanied by a state of simple shear Mohr's circle of stresses Principal stresses and strains Analytical and graphical solutions.

UNIT- V

Deflection of Beams: Bending into a circular arc slope, deflection and radius of curvature Differential equation for the elastic line of a beam Double integration and Macaulay's methods Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load Mohr's theorems Moment area method application to simple cases including overhanging beams.

Conjugate Beam Method: Introduction Concept of conjugate beam method. Difference between a real beam and a conjugate beam.Deflections of determinate beams with constant and different moments of inertia.

Textbooks

1. Strength of Materials, R.K.Bansal, Lakshmi Publications House Pvt. Ltd.2010
2. Strength of Materials, S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.2008

References

1. Mechanics of Structures, Vol-I, H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt., 2014, 31st Edition :
2. Strength of Materials, D.S Prakash Rao, Universities Press Pvt. Ltd.1999

ENGINEERING GEOLOGY

II Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes

Students who successfully complete this course will have demonstrated ability to

1. Classify and compare different rocks and minerals across the construction site.
2. Identify and build the knowledge on main and most common igneous, sedimentary and metamorphic rocks encountered by foundations and sites.
3. Define and Interpret the geological structures in the geological maps and cross sections
4. Understand the importance of graphical studies and various geophysical methods.
5. Illustrate the factors which affect the dams, reservoirs and tunnels.

UNIT- I

Introduction: 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 of rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite"

UNIT- II

Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals.Study of physical properties of some common rock forming minerals. [Examples: Feldsper, Quartiz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chromite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite]

Petrology: Definition of rock, Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous, Sedimentary and metamorphic rocks their distinguishing features, Megascopic and microscopic study of rocks [eg: Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate]

UNIT- III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults uncomfornities, and joints – their important types and case studies. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilisation of soils, Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

UNIT- IV

Importance of geophysical studies: Principles of geophysical study by Gravity methods, Magnetic methods, Electrical methods, Seismic methods, Radiometric methods and Geothermal method, Special importance of Electrical resistivity methods, and seismic refraction methods, Improvement of competence of sites by grouting etc, fundamental aspects of rock mechanics and Environmental Geology.

UNIT- V

Geology of Dams, Reservoirs And Tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site, analysis of dam failures of the past, factor's contributing to the success of a reservoir, geological factors influencing water lightness and life of reservoirs – Purposes of tunneling, effects of Tunneling on the ground role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

Textbooks

1. Engineering Geology, N.Chennakesavulu, Mc-Millan, India Ltd. 2005 2nd edition
2. Engineering Geology for Civil Engineers, P.C. Varghese, PHI Learning, 2012

References

1. Principles of Engineering Geology &Geotechnics, Krynine& Judd, CBS Publishers & Distribution.
2. Engineering Geology, Subinoy Gangopadhyay, Oxford university press.

SURVEYING & GEOMATICS

II Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes

Students who successfully complete this course will have demonstrated ability to

1. Students will be able to perform a detailed surveying at any site by any method.
2. Ability to use modern survey equipment to measure angles and distances.
3. Ability to measure differences in elevation, draw and utilize contour plots, and calculate volumes for earthwork.
4. To develop applications of environmental remote sensing and GIS which can directly enhance service delivery on land use management, ground water management/prospects, agriculture, forestry, food and water security, disaster management, etc.
5. Avail the need for lifelong learning through the discussion of recent changes in survey procedures and equipment.

UNIT- I

Introduction to surveying: Overview of plane surveying (chain, compass, theodolite and plane table), Objectives, Principles and classifications, Scales, Conventional Symbols, Signals.

UNIT- II

Distances and direction: Distance measurement methods, use of chain, tape and electronic distance measurements, meridians, azimuths and bearings, declination, computation of angle.

UNIT- III

Leveling and contouring: Concept and Terminology, Temporary adjustments – method of leveling. Characteristics and Uses of contours – methods of conducting contour surveys and their plotting. Embankments and cutting for a level section and two level sections with and without transverse slopes.

UNIT- IV

Modern field surveying systems: Principle of electronic distance measurements, types of EDM instruments, distomat, total station – parts of a total station – accessories – advantages and applications, field procedure for total station survey, errors in total station survey.

UNIT- V

Introduction toRemote Sensing: Global positioning systems – segments, GPS measurements, errors in biases, surveying with GPS, Co-ordinate transformation, accuaracyconsiderations,electromagnetic spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, Remote sensing data aquisation, platforms and sensors, visual image interpreatation, digital image processing.

Textbooks

1. Surveying (Vol – 1 & 2), S K Duggal, Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004, 10th edition.
2. Remote sensing geographical Information system, M. Anji Reddy, B.S. publications, 2001.

References

1. Surveying and Leveling, R. Subramanian, Second Edition Oxford University Press 2012.
2. Surveying Theory and Practice, James M. and Anderson Edward M., Mikhail Tata McGraw Hill January 1998, 7th edition.

SURVEYING & GEOMATICS LAB

II Year I Semester

L	T	P	C
0	0	2	1

Outcomes

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

1. Apply the principle of surveying for civil Engineering Applications
2. Calculation of areas
3. Drawing plans and contour maps using different measuring equipment at field level
4. To learn the applications of GPS in surveying system
5. Write a technical laboratory report

List of experiments

1. Survey of an area by chain surveying.
2. Determination of two inaccessible points by using prismatic compass.
3. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
4. Radiation & intersection method by plane table survey.(Any one exercise)
5. Exercise on fly levelling using dumpy level.
6. An exercise on L.S, C.S and Plotting
7. Trigonometric leveling – Heights and distance problem
8. Determination of Area & Remote height using total station
9. Traversing & Contouring using total station
10. Distance, gradient, Diff. height between two inaccessible points using total station
11. Study on use of GPS for data collection
12. Collection of Point Data, Line Data, and Polygon Data using GPS.

Note: Any 10 experiments are to be performed

ENGINEERING GEOLOGY LAB

II Year I Semester

L	T	P	C
0	0	2	1

Outcomes

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

1. To study the physical properties and identification of minerals referred under the theory.
2. Describe and identify the rocks referred under the theory.
3. Illustrate the Microscopic study of rocks.
4. Interpret and draw the sections for geological maps showing tilted beds, faults, unconformities etc.,
5. Solve the simple structural geological problems.

List of experiments

1. Study of physical properties and identification of minerals.
2. Study of physical properties and identification of rocks (Igneous Rocks)
3. Study of physical properties and identification of rocks (Sedimentary Rocks)
4. Study of physical properties and identification of rocks (Metamorphic Rocks)
5. Microscopic study of rocks
6. Microscopic study of Minerals
7. Study of Geological Structures like Faults and Folds
8. Study of Geological Structures like Tilted Bed models and unconformities
9. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
10. Calculation of Dip using strike method.
11. Calculation of Dip using dip method.
12. Calulation of Dip using different angels/inclinations.

Note: Any 10 experiments are to be performed

ENVIRONMENTAL SCIENCE

II Year I/II Semester

L	T	P	C
2	0	0	0

Course Outcomes

Students will be able to:

1. Define and explain the structure and functions of ecosystem, value of biodiversity, threats and conservation of biodiversity.
2. Explain the limitations of the resources and impacts of over utilization of all natural resources.
3. Explain the sources and effects of environmental pollutions and list the available techniques to control the pollution.
4. Explain the global environmental issues like climate change, ozone hole and can explain the scope of EIA, Environmental Management Plan, environmental audit and list the EIA methods.
5. Mention the salient features of environmental acts and rules, define the sustainable goals along with measures required for the sustainability.

UNIT-I

Ecosystem: Definition, Scope and Importance of ecosystem, Structure and Functions of ecosystem: Food chains, Food Web and Ecological Pyramids, Flow of energy; Bio-magnification.

Biodiversity and Biotic Resources: Introduction, Definition, levels of Biodiversity, Value of biodiversity, Hot spots of biodiversity, Threats to biodiversity, conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT-II

Natural Resources: Classification of Resources, **Water resources**: use and over utilization of surface and ground water, Dams: benefits and problems, Rain water harvesting; **Energy resources**: growing energy needs, Renewable and Non Renewable Energy resources. **Land resources**: land degradation – Landslide and Soil Erosion; **Forest Resources –** Uses and Exploitation.

UNIT-III

Environmental Pollution And Control: Types of Pollution, Sources, Effects and Control measures of Air Pollution ,Water Pollution ,Soil Pollution and Noise Pollution.

UNIT-IV

Global Environmental Problems and Global Efforts: Green house effect, Global Warming, climate change and their impacts on human environment; Ozone depletion and Ozone depleting substances (ODS); Aid Rains.

Environmental Impact Assessment (EIA): Scope of EIA and EIA methods, scope of Environmental audit and Environmental Management Plan.

UNIT-V

Environmental Policy, Legislation, Rules And Regulations: Salient features of Environmental Protection act, Air (Prevention and Control of pollution) Act- 1981, Water (Prevention and Control of pollution) Act-1974, Forest Conservation Act, Municipal solid waste, Hazardous waste, E-waste, Bio-medical waste, Radioactive waste Rules.

Towards Sustainable Future: Concept of Sustainable Development, Sustainable goals defined by UN, Threats to Sustainability, Environmental Education, Role of IT in Environment, Smart Cities, Concept of Green Building, Low Carbon Lifestyle, Life cycle assessment and Ecological Foot Print.

Textbooks

1. Environmental Studies, Anubha Kaushik, New age International Publishers,2008, 4th Edition.
2. Environmental studies, Erach Bharucha,University Grants Commission, University Press, 2005.

References

1. Environmental Science: Towards a Sustainable Future, Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.

PROBABILITY AND STATISTICS

II Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes

After learning the contents of this course the students must be able to:

1. To differentiate among random variables involved in the probability models which are useful for all branches of engineering.
2. Derive relationship among variety of performance measures using probability distributions.
3. Acquire elementary knowledge of parametric and non parametric –tests and understand the use of observing state analysis for predicting future conditions.
4. Identify and examine situations that generate using problems and able to solve the tests of ANOVA for classified data.
5. Apply proper measurements, Indicators and techniques of Correlation and regression analysis.

UNIT-I

Probability And Random Variables

Introduction to Probability, Random variables- Discrete and Continuous, Expectation, Probability Distribution Function, Mass Function/ Density Function of a Probability Distribution.

UNIT-II

Probability Distributions

Fitting of Binomial, Poisson & Normal distributions and their properties (only Statements) Moment Generating Functions of the above three distributions and hence finding the mean and variance.

UNIT-III

Sampling Theory & Testing Of Hypothesis I

Sampling Distribution-Definition of Sample, Population, and Types of Sampling. Estimation-Point estimation, Interval estimation, Testing of Hypothesis- Null hypothesis – Alternative hypothesis, Type I, & Type II errors – critical region confidence interval for mean, Testing of hypothesis for single mean and difference between the means for large samples. Confidence interval for the proportions, Tests of hypothesis for the proportions- single and difference between the proportions for large samples

UNIT-IV

Testing Of Hypothesis II

Small Samples - t-distribution, F-Distribution, χ^2 distribution, ANOVA for one-way classified data

UNIT-V

Correlation, Regression & Curve Fitting

Coefficient of Correlation-Regression coefficients- The lines of Regression- The Coefficient of Rank Correlation.

Curve Fitting- Fitting a Straight line- Second Degree Polynomial Exponential, Power Curve by Method of Least Squares.

Textbooks

1. Probability and Statistics for Engineers, Richard Arnold Johnson, Irvin Miller and John E Freund, New Delhi Prentice Hall, 2016, 9th edition.
2. Probability and Statistics, T. K. V. Iyangar others, S. Chand Publications

References

1. Fundamentals of Mathematical Statistics, S C Guptha and V K Kapoor, S Chand.
2. Introductory Methods of Numerical Analysis, S SSastry, PHI Learning PVT Ltd.

PRINCIPLES OF ELECTRICAL ENGINEERING

II Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes: After this course the student can

1. Understand basics of electrical circuit components and their characteristics
2. Analyze the electrical circuits with A.C excitation
3. Understand the working principle and operation of transformers
4. Understand the fundamentals concepts of D.C Machines
5. Apply the concepts of the electrical engineering to design the low voltage electric installations

UNIT I

Introduction To Electrical Engineering

Ohm's law, basic circuit components, Kirchhoff's laws, simple problems.

Network Analysis

Basic definitions, types of elements, types of sources, resistive networks, inductive networks, capacitive networks, and series parallel circuits, star delta and delta star transformation., Network theorems- Superposition, Thevenins's, Maximum power transfer theorems and simple problems.

UNIT II

Alternating Quantities

Principle of ac voltages, waveforms and basic definitions, root mean square and average values of alternating currents and voltage, form factor and peak factor, phasor representation of alternating quantities, the J operator and phasor algebra, analysis of ac circuits with single basic network element, single phase series circuits.

UNIT III

Transformers

Principles of operation, Constructional Details, Ideal Transformer and Practical Transformer, Losses, Transformer Test, Efficiency and Regulation Calculations (Topics of this unit are only for elementary treatment and simple problems).

UNIT IV

D.C. Machines

D.C Generators

Principle of operation of dc machines, types of D.C generators, EMF equation of D.C generator.

D.C Motors

Principle of operation of dc motors, types of D.C motors, torque equation, simple problems

UNIT V

Electrical Appliances:

Fuse, Circuit Breakers, Difference between Fuse and Circuit Breaker, Electrical relay, Types of Batteries, Battery backup, RPS, UPS (Elementary Treatment only), Earthing-types of earthing.

Textbooks

1. Principles of Electrical Engineering, V.K Mehta, Rohit Mehta, S.Chand Publications, 2008.Reprint (Edition).
2. Basic Electrical Engineering, T.K. Nagsarkar and M.S. Sukhija, Oxford University Press, 2017, 3rd Edition.

References

1. Basic Electrical Engineering, Abhijit Chakrabarthi, Sudiptanath, Chandrakumar Chanda, Tata-McGraw- Hill.
2. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI.
3. Basic Electrical Engineering, D. P. Kothari , I.J. Nagrath, McGraw-Hill.
4. Basic concepts of Electrical Engineering, PS Subramanyam, BS Publications.
5. Basic Electrical Engineering, S.N. Singh, PHI.

SOLID MECHANICS – II

II Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes

Students who successfully complete this course will have demonstrated ability to

1. Realize the basic concepts of torsion and locate the bending stress
2. Identify the types of columns and calculate the failure load for various end conditions
3. Understand the basic concepts of direct and bending stresses and calculate the bending moment
4. Differentiate about thin and thick cylinders and calculate the various stresses
5. Determine the stresses due to Unsymmetrical bending of beams and locate the shear

UNIT- I

Torsion of circular shafts: Theory of pure torsion – Derivation of Torsion equations $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending, torsion and end thrust – Design of shafts according to theories of failure.

Springs: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT- II

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

UNIT- III

Direct and bending stresses: Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both axis.

UNIT- IV

Thin cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains changes in dia, and volume of thin cylinders – Thin spherical shells.

Thick cylinders: Introduction – Lame's theory for thick cylinders Derivation of Lame's formulae distribution of hoop and radial stresses across thickness design of thick cylinders compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

UNIT- V

Unsymetrical bending: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axis – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Deflection of beams under unsymmetrical bending.

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

Textbooks

1. Strength of Materials, R.K.Bansal, Lakshmi Publications House Pvt. Ltd, 2015,6th edition.
2. Strength of Materials, R.K Rajput, S.Chand & Company Ltd., 2017,4th revised edition.

References

1. Fundamentals of Solid Mechancis, M.L.Gambhir, PHI Learning Pvt. Ltd 2009
2. Strength of Materials, S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.2008.

ENVIRONMENTAL ENGINEERING

II Year II Semester

L	T	P	C
3	0	0	3

Course Outcomes

Students who successfully complete this course will have demonstrated ability to

1. Predict the population forecasting and test the quality of water.
2. Design the filter and apply disinfection practices for water treatment.
3. Design water distribution system and examine sewage.
4. Analysis and design sewerage system.
5. Design different units of sewage treatment plant and trickling filters.

UNIT – I

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards, sources of water – Comparison from quality, quantity and other considerations – intakes – infiltration galleries.

UNIT – II

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

UNIT – III

Water distribution systems: Types of layouts of distribution system- design of distribution system- Hardy cross and equivalent pipe methods – service reservoirs – determination of storage capacity. Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows, combined flow – characteristics of sewage – examination of sewage – B.O.D – C.O.D equations.

UNIT – IV

Design of sewers: Shapes and materials sewer appurtenances manholes inverted siphon catch basins flushing tanks ejectors, pumps and pump houses house drainage components requirements sanitary fitting traps one pipe and two pipe systems of plumbing.

UNIT –V

Design of different units: sedimentation tank design of screens grit chambers principles and design of biological treatment trickling filters.

Textbooks

1. Water supply and sanitary Engineering,G.S. Birdi, Dhanpat Rai& Sons Publishers 2010,8th edition.

Reference

1. Water Supply Engineering Vol. 1, B.C.Punmia, Laxmi Publications Pvt.Ltd, New Delhi, 2008.2nd Edition.
2. Waste water Engineering Vol. II, by Ashok Jain &Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi, 2008.2nd Edition.

STRUCTURAL ANALYSIS

II Year II Semester

L	T	P	C
3	0	0	3

Outcomes

Students who successfully complete this course will be able to

1. Analyze propped cantilever, fixed beams for external loadings and support settlements.
2. Understand the concept of Slope deflection, moment distribution method and analysis of continuous beams.
3. Calculate the deflection of beams by different methods for determining slope and deflection and understand the concept of three hinged arches.
4. Analyze the pin-jointed plane frames.
5. Draw the influence line diagram for moving loads and calculate critical stress resultants.

UNIT- I

Propped cantilever and fixed beams: Determination of static and kinematic indeterminacies for beams Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia, subjected to uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams for Propped Cantilever and Fixed Beams – Deflection of Propped cantilever and fixed beams; effect of sinking of support, effect of rotation of a support.

UNIT- II

Continuous beams: Introduction – Continuous beams, Clapeyron's theorem of three moments – Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed – continuous beams with overhang, Effects of sinking of supports. Derivation of slope – deflection equation, application to continuous beams with and without settlement of supports.Analysis of continuous beams with and without settlement of supports using Moment Distribution Method, Shear force and Bending moment diagrams, Elastic curve.

UNIT– III

Energy theorems: Introduction – Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem – Unit Load Method. Deflections of simple beams and pin-jointed plane trusses. Deflections of statically determinate bent frames.

Arches: Introduction – Types of Arches – Comparision between Three hinged and Two hinged Arches. Linear Arch. Eddy's theorem. Analysis of Three hinged arches (Semicircular, Segmental and parabolic arches without temperature effect and yielding of support).

UNIT- IV

Analysis of perfect frames: Types of frames Perfect, Imperfect and Redundant pin jointed frames. Analysis of determinate pin jointed frames using method of joints, method of sections for vertical loads, horizontal loads and inclined loads.

UNIT- V

Moving loads and influence lines: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads – Equivalent uniformly distributed load – Focal length. Definition of influence line for SF, Influence line for BM – load position for maximum SF at a section – Load position for maximum BM at a section – Point loads, UDL longer than the span, UDL shorter than the span – Influence lines for forces in members of Pratt and Warren trusses. Equivalent uniformly distributed load. Focal length.

Textbooks

1. Structural Analysis Vol –I & II, V.N.Vazirani and M.M.Ratwani, Khanna Publishers,2008,16th edition.
2. Structural Analysis Vol I & II, G.S.Pandit and S.P.Gupta, Tata McGraw Hill Education Pvt. Ltd. 2008, 2 edition.

References

1. Mechanics of Structures Vol –II, H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.2007.
2. Basic Structural Analysis, C.S.Reddy., Tata McGraw Hill Education Pvt. Ltd 2001.
3. Structural Analysis -I , S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.2009.

BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES

II Year II Semester

L	T	P	C
3	0	0	3

At the conclusion of the course students will be able to:

1. Identify the various building materials
2. Understand the minimum standard required to designate and use the material in construction.
3. Understand the uses of different material like concrete, masonry, wood, steel or with a combination of these materials in construction domain.
4. Describe various types of interior and exterior finishes.
5. Various tests required for the building material.

UNIT-I

Stones & Bricks: Building stones – classifications and quarrying – properties – structural requirements, Composition of Brick earth – manufacture and structural requirements, classification – Field and laboratory tests on bricks (compressive strength, water absorption, efflorescence, dimension and warpage).

Masonry: Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry, Bonds in brick work, Header, Stretcher, English, Flemish bond, Stone masonry, Requirements of good stone masonry, Classification, characteristics of different stone masonry, Joints in stone masonry. Types of walls; load bearing, partition walls, cavitywalls.

UNIT- II

Cement &Admixtures: Ingredients of cement – manufacture – Chemical composition – different types of cement and its uses, Hydration – field & lab tests on cements, Admixtures – mineral & chemical admixtures – uses.

Tiles, Timber and Glass: Introduction, Classification of Tiles, Tests on Tiles (Water absorption, Bulk density & Abrasion). Timber Structure, Types and properties, seasoning. Glass – properties, classification.

UNIT- III

Metals in constructions: Principle and characterstics of steel, Aluminium, Classification of steel, Tests on metals (Tension, Brittleness test, hardness test)

Paints: Purpose, types, ingredients and defects, Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces.

UNIT- IV

Miscellaneous Materials: Gypsum – Classification, Plaster of Paris, Gypsum wall Plasters, Gypsum Plaster Boards, Adhesives, Heat and sound insulating materials, Geosynthetics.

Modern Materials: Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products –Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles–Geomembranes and Geotextiles for earth reinforcement.

UNIT- V

Plastering and Pointing: Purpose, materials and methods of plastering and pointing, defects in plastering – Stucco plastering, lathe plastering. Damp proofing **–** causes, effects and methods. Formwork **–** Requirements – types of form work – standards – scaffolding – shoring – underpinning.

Textbooks

1. Engineering Materials, Rangwala, S. Chand and Company Ltd.2017,43rd edition.
2. Building Construction,B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd.2008,10th edition.

References

1. Building Materials, Duggal, New Age International.4th revised ed. 2010
2. Building Materials, P.C.Varghese, PHI. 2nd revised ed. 2015

ENVIRONMENTAL ENGINEERING LAB

II Year II Semester

L	T	P	C
0	0	2	1

Outcomes

After the completion of the course student should be able to

1. Understand principles and their practical application in water treatment.
2. Determine physical, chemical and biological characteristics of water and wastewater.
3. Determine the optimum dose of coagulant.
4. Estimate the chloride, nitrate and iron content in water.
5. Summarize the solutions using titration, conductivity meter, pH meter, turbidity meter and DO meter.

List of experiments

1. Determination of pH and turbidity
2. Determination of Conductivity and total dissolved solids
3. Determination of Alkalinity and Acidity
4. Determination of Chlorides
5. Determination of Iron
6. Determination of Dissolved Oxygen
7. Determination of Nitrates
8. Determination of Optimum dose of Coagulant
9. Determination of Chlorine Demand
10. Determination of B.O.D
11. Determination of C.O.D
12. Presumptive Coliform test

Note: Any 10 experiments are to be performed

SOLID MECHANICS LAB

II Year II Semester

L	T	P	C
0	0	2	1

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

1. Predict the behavior of materials under impact, hardness, tensile and compressive loads.
2. Determine elastic constants by flexural and torsion test.
3. Determine the spring constants under various loadings.
4. Understand the deflection of materials under bending.
5. Understand basic material properties stress and strain.

List of experiments

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

Note: Any 10 experiments are to be performed

GENDER SENSITIZATION

L	T	P	C
2	0	0	0

B.Tech. II Year II Sem

Course Outcomes

1. To develop awareness about gender discrimination and take measurable steps to counter it.
2. To identify the basic dimensions of biological, sociological, psychological and legal aspects of gender.
3. To acquire knowledge about gendered division of labour in relation to politics and economics.
4. To prepare the students against gender violence.
5. To prepare the students to work and live together as equals.

UNIT-I

Understanding Gender

Gender: Why Should We Study It?
Socialization: Making Women, Making Men Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT-II
Gender And Biology
Missing Women: Sex Selection and Its Consequences
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary
Two or Many?Struggles with Discrimination.

UNIT-III
Gender AndLabour
Housework: the Invisible Labour
"My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics
Fact and Fiction.Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT-IV
Issues Of Violence
Sexual Harassment: Say No!
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence: Speaking Out
Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.
Thinking about Sexual Violence
Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of Violence.

UNIT-V
Gender: Co - Existence
Just Relationships: Being Together as Equals
Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Additional Reading: Rosa Parks-The Brave Heart.

Textbook

1. "Towards a World of Equals: A Bilingual Textbook on Gender", A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote,Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, Telugu Akademi, Hyderabad,Telangana State,2015.

References

1. Seeing like a Feminist , Menon, Nivedita, New Delhi, Zubaan, Penguin Books, 2012.
2. I Fought For My Life…and Won, Abdulali Sohaila.

COURSE STRUCTURE FOR B.TECH III YEAR

B. Tech. III Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	H&S-2	Managerial Economics and Financial Analysis	3	0	0	3
2	PC – 8	Design of Reinforced Concrete Structures	3	0	0	3
3	PC – 9	Geotechnical Engineering	3	0	0	3
4	PC – 10	Concrete Technology	3	0	0	3
5	PE – 1	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE – 1	Open Elective	3	0	0	3
7	ES Lab – 1	CAD Lab.	0	0	2	1
8	H&S Lab-1	Advance Communication Skills Lab	0	0	2	1
9	ES – 2	Quantitative Methods & Logical Reasoning	2	0	0	1
		Total	**20**	**0**	**4**	**21**

B. Tech. III Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC - 11	Foundation Engineering	3	0	0	3
2	PC – 12	Design of Steel Structures	3	0	0	3
3	PC – 13	Hydraulics & Hydraulic Machinery	3	0	0	3
4	PC – 14	Water Resources Engineering	3	0	0	3
5	PE – 2	1. Construction Engineering Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
6	OE – 2	Open Elective	3	0	0	3
7	PC Lab – 5	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab – 6	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
9	H&S-3	Personality Development & Behavioural Skills	2	0	0	1
		Total	**20**	**0**	**4**	**21**

MANAGERIAL ECONOMICS & AND FINANCIAL ANALYSIS

L	T	P	C
3	0	0	3

III Year I Semester

Pre requisites

- Probability and statistics
- Operation research
- Mathematics-I
- Environmental studies

Outcomes

At the end of the course the students are expected to

1. Understand the importance of certain basic issues governing the business operations namely demand and supply, production function, cost analysis
2. Apply managerial tools and techniques in obtaining optimal solutions for business problems
3. Differentiate the various forms of business organizations
4. Evaluate and interpret the financial statements of companies using ratios
5. Apply the methods of capital budgeting in effective investment decision making

UNIT –I

Introduction to Managerial Economics& Demand Analysis:

Definition, Nature and Scope of Managerial Economics.Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT –II

Production & Cost Analysis:

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts (Opportunity cost vs outlay costs, Fixed, variable and semi variable costs, marginal cost vs average cost, out of pocket vs book cost, imputed cost, implicit & explicit cost, incremental and decremental cost, sunk vs future cost, separable and joint costs) Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems) - Managerial Significance.

UNIT –III

Markets & New Economic Environment:

Types of competition and Markets, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Pricing: Objectives and Policies of Pricing.Methods of Pricing. Business: Features and evaluation of different forms of Business Organization: Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, New Economic Environment: Changing Business Environment in Post-liberalization scenario.

UNIT –IV

Introduction to Financial Accounting & Financial Analysis:

Accounting concepts and Conventions - Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).Financial Analysis: Analysis and Interpretation of Liquidity Ratios (current ratio, quick ratio), Activity Ratios(inventory turnover ratio, debtors turnover ratio), and Capital structure Ratios(debt equity ratio, interest coverage ratio) and Profitability ratios(gross profit ratio, net profit ratio, operating profit ratio, P/E ratio, EPS). Du Pont Chart.

UNIT –V

Capital Budgeting:

Capital and its significance, Types of Capital, Estimation of Fixed and Working capital requirements, Methods and sources of raising capital, Capital Budgeting: features of capital budgeting proposals, Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR) ,Net Present Value Method (simple problems), IRR and PI method.

Textbooks

1. Managerial Economics and Financial Analysis, Aryasri, TMH, 2012.
2. Financial Accounting for Management 2e, Paresh Shah, Oxford Press, 2015.

References

1. Managerial Economics in a Global Economy, Domnick Salvatore , Thomson, 2012.
2. Financial Accounting A Managerial Perspective, Narayanaswamy, Pearson, 2012.
3. Financial Accounting, S. N. Maheswari& S.K. Maheswari, Vikas, 2012.

DESIGN OF REINFORCED CONCRETE STRUCTURES

L	T	P	C
3	0	0	3

III Year I Semester

Course Outcomes

Upon successful completion of this course students will be abe able to

1. Understand the various design concepts and design a beam under flexure and draw the reinforcement details.
2. Design the beam under shear and torsion, Calculate the anchorage and development length and check the serviceability requirements for RC structural elements.
3. Analyze and solve various RC slabs and draw the reinforcement details
4. Classify short, long columns and draw the reinforcement details
5. Explore the design concept of footing & staircase

UNIT – I

Concepts of RC design: Introduction- Structure - Components of structure - Different types of structures - Loads – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load **-** Working stress method – Ultimate load method – Limit State method – Stress-strain curve for concrete, steel – Partial safety factor – Characteristic values – Stress Block parameters – IS: 456 2000 provisions.

Design and detailing of beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – II

Shear, torsion and bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, IS Code provisions. Design examples in simply supported and continuous beams, detailing.Limit state of serviceability for deflection and cracking – IS Code provisions.

UNIT – III

Design and detailing of slabs: Design of one way, two way and continuous slabs using IS Codal provisions and coefficients, Cantilever slab / Canopy slab. Introduction to Yield line theory.

UNIT – IV

Design and detailing of short and long columns: Subjected to axial loads – uniaxial and biaxial bending – IS Code provisions.

UNIT – V

Design and detailing of footings and staircase: Different types of footings – Design of isolated, square, rectangular and circular footings – Introduction to combined footings. Design of staircase (dogleged type)

Textbooks

1. Reinforced concrete design, N.Krishna Raju & R.N Pranesh, New Age International publishers New Delhi, 2003.
2. Reinforced Concrete Design, Pillai and Menon , Tata McGraw Hill, 2009.

Reference

1. Fundamentals of Reinforced Concrete deisign, M.L Ghambhir, Prentice Hall of India, 2013.
2. Plain and Reinforced Concrete, Vol. I, Jain &Jaikrishna, Nemchand Brother, 2012.

IS Code

1. IS: 456 2000 Indian Standard plain and reinforced concrete - code of practice (Fourth Revision) Tenth Reprint APRIL 2007
2. SP16, Design Aids for Reinforced Concrete to IS 456:1978

Note : IS: 456 2000 and SP16 need to be provided during examination

GEOTECHNICAL ENGINEERING

L	T	P	C
3	0	0	3

III Year I Semester

Course Outcomes

On successful completion of this course, it is expected that the students will be able to,

1. Illustrate the soil formation and classification.s
2. Explain the Hydrostatic effect in soil mass.
3. Illustrate the stress distribution mechanism and compaction in soil mass.
4. Illustrate the mechanism of consolidation.
5. Identify the Shear strength parameters through analytical and experimental approach.

UNIT – I

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass,volume relationship – Relative density.

Index properties of soils: Grain size analysis – Sieve and Hydrometer methods –consistency limits and indices – I.S. Classification of soils.

UNIT – II

Permeability: Soil water capillary rise flow of water through soils Darcy's law, Permeability Factors affecting laboratory determination of coefficient of permeability Permeability of layered soils – Insitu permeability tests (Pumping in & pumping out test).

Effective stress & seepage through soils: Total, neutral and effective stresses – principle of effective stress – quick sand condition – Introduction to Seepage through soils – Flow nets – Characteristics and Uses of flow nets.

UNIT – III

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

Stress distribution in soils: Boussinesq's and Westergaard's theories for point loads ,uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under a point load along the vertical and horizontal plane.

UNIT – IV

Consolidation: Types of compressibility – immediate settlement, primary consolidation and Secondary consolidation **–** stress history of clay; e-p and e-log-p curves – normal consolidation soil, over consolidated soil and under consolidated soil – pre-consolidation Pressure and its determination – Terzaghi's 1-D consolidation theory.

UNIT – V

Shear strength of soils: Introduction of shear strength **–** Mohr - Coulomb Failure theories – Types of laboratory strength tests – Direct Shear test, Vane shear test – strength tests based

on drainage conditions – Tri-Axial test strength envelops – Shear strength of sands – dilatancy, Critical void ratio – Concept of liquefaction.

Textbooks

1. Soil Mechanics and Foundation Engg, Arora, K.R., Standard Publishers and Distributors, Delhi, 2010, 7th edition.
2. Principles of Foundation Engineering, Braja M. Das,Cengage Learning, 2011, 7th edition.

References

1. Geotechnical Engineering, Venkataramiah, C., New Age International Pvt . Ltd, 2010, 3rd edition.
2. Soil Mechanics , Lambe and Whitman, T.W., Indian Wiley, 2009.

CONCRETE TECHNOLOGY

L	T	P	C
3	0	0	3

III Year I Semester

Course Outcomes

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

1. Understanding the properties of cements and admixtures.
2. Analyse the properties of aggregates.
3. Evaluate the properties of fresh concrete.
4. Analyse the behavior of hardened concrete and durability of concrete.
5. Design the concrete mix using IS Code and describe the special concretes.

UNIT – I

Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement.

Admixtures :Types of admixtures – mineral and chemical admixtures.

UNIT – II

Aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – III

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT – IV

Hardened Concrete : Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Non-destructive testing methods

Elasticity, Creep & Shrinkage– Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – V

Mix Design : Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

Special Concretes: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete.

Textbooks

1. Concrete Technology, M.S.Shetty, S.Chand&Co., 2015, 7thed

References

1. Concrete Technology, M.L. Gambhir., Tata Mc. Graw Hill Publishers, New Delhi 2004, 5thed.
2. Concrete Technology, A.R. Santha Kumar, Oxford university Press, New Delhi 2006

ADVANCED STRUCTURAL ANALYSIS (PE1)

L	T	P	C
3	0	0	3

III Year I Semester

Course Outcomes

On successful completion of this course, it is expected that the students will be able to,

1. Analyze the continuous beams, portal frames by Kani's method.
2. Differentiate Static and kinematic Indeterminacy of Trussesby Castiglione's second theorem.
3. Evaluate the shear forces and bending moments in Two-Hinged arches and to execute secondary stresses due to rise of temperature and Elastic Shortening of rib.
4. Analyze the Multi-storey frames by approximate methods for gravity (vertical) and horizontal loads.
5. Understand the concept of Matrix method for the analysis of continuous beams and Pin jointed plane frames.

UNIT – I

Kani's method: Analysis of continuous beams and portal frames including side sway due to unsymmetrical vertical loading.

UNIT – II

Indeterminate Trusses: Determination of Static and Kinematic indeterminacies – Analysis of trusses having single and two degrees of internal and external indeterminacies – Castigliano's second theorem.

UNIT – III

Two hinged arches: Introduction – classification of two hinged arches – analysis of two hinged parabolic arches, analysis of circular arches – secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

UNIT – IV

Approximate methods of analysis: Introduction – Analysis of multi – storey frames for lateral loads: Portal Method, Cantilever Method. Analysis of multi storey frames for gravity (vertical) loads. Substitute frame method.

UNIT – V

Matrix Methods of Analysis: Introduction – Static and Kinematic Indeterminacy – Analysis of continuous beams including settlement of supports, using the stiffness method. Analysis of pin-jointed determinate plane frames using the stiffness method – Analysis of single bay single storey frames, including side sway, using the stiffness method. Analysis of continuous beams up to three degrees of the indeterminacy using flexibility method. Shear force and Bending Moment diagrams.

Textbooks

1. Structural Analysis Vol –I &II by Vazarani and Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G.S. PanditS.P.Gupta Tata McGraw Hill Education Pvt. Ltd.

References

1. Mechanics of Structures Vol –II, H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.2016, 32nd Edn.
2. Basic Structural Analysis, C.S.Reddy., Tata McGraw Hill Publishers, 2019, 3rd Edn

BUILDING PLANNING & DRAWING (PE1)

L	T	P	C
3	0	0	3

III Year I Semester

Course Outcomes

On successful completion of this course, it is expected that the students will be able to,

1. Identify various building components, conventional signs and symbols.
2. Illustrate the building bye-laws and the principles of planning.
3. Understand about the building services and safety.
4. Design and Sketch the plans of various types of buildings and detailing of doors, windows, etc.
5. Understand the elements of perspective drawing involving simple problems.

UNIT – I

Basic components of buildings: Design of various elements of building like various types of footing, open foundation, raft, grillage, pile and well foundation, drawing of frames of doors or windows, various types of door, window, and ventilators, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

Drawing practice: Sketches of various building components, one drawing sheet of various building components like doors, windows, lintels and arches, stairs foundation etc.

UNIT – II

Building planning: provision on national building code, building bye-laws, open area, setbacks, FAR terminology, principles of architectural composition (ie. Unity, contrast etc) , principles of planning orientation.

Drawing practice: one drawing sheet each of services and interiors of buildings.

UNIT – III

Building Services: Introduction of building services like water supply and drainage, electrification, ventilation and lighting and staircases, fire safety, thermal insulation, acoustics of buildings.

Drawing practice: one drawing sheet containing detailed planning of one/ two bedroom residential building

UNIT – IV

Design and Drawing of Building: Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors , windows, ventilators and staircases etc.

Drawing practice: one drawing sheet each of residential building, institutional buildings

UNIT – V

Perspective Drawing: Elements ofPerspective Drawing involving simple problems , one point and two point Perspectives, principles of energy efficient buildings

Drawing practice: One drawing sheet on each one point and two point Perspectives problem.

NOTE

Alternate weeks two periods of drawing class should be conducted. The end examination paper should consist of Part – A and Part – B. Part – A should consist of theory questions on the syllabus while Part – B should consist of 4 questions on drawing out of which 2 to be answered. Weightage for Part – A is 60 % and Part – B is 40 %. In exam drawing board should be provided.

Textbooks

1. Building Planning and Drawing, N Kumar swamy and Kameswar Rao, charator pubications, , 2015, 7th Edition.
2. Building planning Design and scheduling, Gurucharan Singh Jagdish Singh, 2008, 2nd edition.

References

1. Building drawing with an integrated approach to built environment , Shah , Kale & Patki , 2002, fourth edition.

AIR POLLUTION AND CONTROL METHODS (PE1)

III Year I Semester

L	T	P	C
3	0	0	3

Course Outcomes

On successful completion of this course, it is expected that the students will be able to,

1. Find the sources, causes & effects of air pollution.
2. Understand the meteorological components and the plume behavior for atmospheric stability conditions.
3. Identify the types of equipments to control the particulates at sources.
4. Miimize the control measures of NOX, SOX and other gaseous emissions.
5. Examine the SPM, SOx, NOx and CO emission standards.

UNIT – I

Air Pollution: Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources. Effects of Air pollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT – II

Meteorology: plume Dispersion; properties of the atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity; Influence of Meteorological phenomena on Air Quality-wind rose diagrams. Lapse Rates, Pressure Systems.

UNIT – III

Control of particulates Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers.

UNIT – IV

Control of gaseous emissions: General Methods of Control of NO_x and SO_x emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling-adsorption- absorption-combustion.

UNIT – V

Air Quality Management: Monitoring of SPM, SO_x; NO_x and CO Emission Standards- air sampling- sampling techniques- high volume air sampler- stack sampling- analysis of air pollutants- air quality standards air pollution control act.

Textbooks

1. Air pollution, M.N.Rao and H.V.N.Rao, Tata Mc.Graw Hill Company, 2017.
2. Air pollution, Wark and Warner, Harper & Row, New York, 1981.

References

1. An introduction to air pollution, R.K. Trivedy and P.K. Goel , B.S publications, 1986.

CAD LAB

L	T	P	C
0	0	2	1

III Year I Semester

Course Outcomes

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

1. Assess the Software with aiding source.
2. Draft the Plan and Elevation & Sectional views of the buildings.
3. Develop the components of the building.
4. Replicate the detailing of framed and Industrial structures.
5. Interpret the isometric and orthogonal projection of buildings.

List of Experiments

1. Introduction to the basic commands of CADD software .
2. Practice exercises on basic commands of CAD software.
3. Drawing of single line plans Single storey buildings .
4. Drawing of plans of Multi storied buildings with Brick thickeness (Max G+2)
5. Developing sections and elevations of Single storey buildings
6. Detailing of different types (any 2 types) of doors and its components by using CAD
7. Detailing of different types (any 2 types) of windows and its components by using CAD
8. Detailed drawing of Roof trusses by using CAD
9. Exercises on the development of working of building by using CAD
10. Planning of commercial building (School building)
11. Fundamentals of Building Information Modelling (BIM)
12. Demonstrationon workflow in using BIM in the building life cycle

Note: Any 10 experiments are to be performed

ADVANCED COMMUNICATION SKILLS (ACS) LAB

B.Tech. III Year I Sem

L	T	P	C
0	0	2	1

Course Outcomes

1. Develop sound communication skills in various situations with the help of enriched vocabulary.
2. Practice reading techniques for a faster and better comprehension.
3. Exhibit strong writing skills to express ideas effectively.
4. Demonstrate effective presentation skills.
5. Use appropriate verbal and non-verbal skills for a successful career.

UNIT-I:

Activities on Fundamentals of inter-personal Communication and Building Vocabulary – Starting a conversation – responding appropriately and relevantly – using the right body language - Role Play in different situations & Discourse Skills – using visuals – Synonyms and antonyms, word roots, one word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

UNIT-II:

Activities on Reading Comprehension – General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

UNIT-III:

Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/ Resume writing/ Statement of purpose - E-correspondence/ Technical report writing / Portfolio writing – planning for writing – improving one's writing.

UNIT-IV:

Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e-mails/assignments etc.

UNIT-V:

Activities on Group Discussion and interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation. Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video – conference and Mock Interviews.

Reference Books

1. Technical Communication, Meenakshi Raman & Sangeeta Sharma, Oxford University, 2011, 2nd Edition.
2. Functional English for Success, Orient Longman, 2014.

QUANTITATIVE METHODS & LOGICAL REASONING

(Common for all Branches)

III Year I Semester

L	T	P	C
2	0	0	1

Course Outcomes

At the end of the completion of the course a student is expected –

1. To perform well in various competitive exams and placement drives.
2. To solve basic and complex mathematical problems in short time.
3. To become strong in Quantitative Aptitude and Reasoning which can be applied for GRE, GATE, GMAT or CAT exam also.
4. To develop problem solving skills and analytical abilities, which play a great role in corporate and industry set up.

Quantitative Aptitude and Reasoning:

Unit – I :

Number System: Speed Maths, Numbers, Factors, Prime & Co Primes, LCM & HCF, Divisibility Rules, Finding Unit Place Digit and Last Two Digits of an Expression

Ratio, Proportion and Variations: Definition of Ratio, Ratio of Proportion, Comparison of Ratios, Compound ratio, Direct and Indirect Proportion

Percentages: Converting Fractions and Decimal into Percentages, Successive Percentage, Populations, Expenditure and Savings

Profit and loss: Relation between Cost Price and Selling Price, Discount and Marked Price, Gain or Loss Percentages on Selling Price

Simple and Compound Interest: Problems on Interest (**I**), Amount (**A**), Principal (**P**) and Rate of Interest (**R**) difference between the Simple Interest and Compound Interest for 2 and 3 years.

Unit – II :

Partnership: Relation between Partners, Period of Investment and Shares

Averages, Ages and Allegation : Average of Different Groups, Change in Averages by Adding, Deleting and Replacement of Objects, Problems on ages, Allegation Rule, Mean Value of the Mixture, Replacement of Equal Amount of Quantity.

Time and Work: Men and Days, Work and Wages, Pipes and Cisterns, Hours and Work, Alternate Days Concept,

Time and Distance: Difference between the Average and Relative Speeds, Reaching the Destination Late and Early, Stoppage Time Per Hour, Time and Distance between Two Moving Bodies : Train Crossing Man - same and opposite directions, Speed of Boat and Stream,

Unit – III :

Progressions and Quadratic Equations : Arithmetic, Geometric and Harmonic Progressions, Arithmetic Mean, Geometric Mean and Harmonic Mean and their Relations. General form of Quadratic Equation, Finding the Roots of Quadratic Equation, Nature of the Roots.

Permutation and Combination: Fundamental Rules, Problems on Permutations & combinations.

Probability : Definition of probability, Notations and Formulae, Problems on Probability.

Data Interpretation and Data Sufficiency: Tabular and Pie-charts, Bar and Line Graphs, Introduction to Data Sufficiency, Problems on Data Sufficiency.

Unit – IV :
Deductions: Statements and conclusions using Venn diagram and Syllogism Method

Series completion: Number series, Alphabet series, Letter Series.

Coding and Decoding: Letter coding, Number coding, Number to letter coding, Matrix Coding, Substitution, Mixed Letter Coding, Mixed Number Coding, Deciphering Individual Letter Codes by Analysis.

Analytical Reasoning Puzzles:
Problems on Linear, Double line-up and Circular Aarrangements, Selections and Comparisons.

Blood Relations:
Defining the various Relations among the Members of a Family, Solving Blood Relation Puzzles by using Symbols and Notations. Problems on Coded Relations.

Unit – V :
Direction sense Test: Sort of directions in puzzles distance between two points, problems on shadows, Application of triangular triplets.

Clocks: Relation between Minute-Hour Hands, Angle vs Time, Exceptional Cases in Clocks

Calendars: Definition of a Leap Year, Finding the Odd days, Finding the Day of any Random Calendar Date, repetition of Calendar Years.

Cubes and Dices: Finding the Minimum and Maximum Number of Identical Pieces and Cuts, Painting of Cubes and cuts, Problems on Dice.

Venn Diagrams: Circular Representation of given words, Geometrical Representation of Certain class, Set theory based Problems.

Textbooks

1. Verbal Reasoning, GL Barrons, Pinterest, Latest Edition 2019.
2. A Modern Approach to Logical Reasoning & Quantitative Aptitude, R S Agarwal, S. Chand, Publications, 2019, Revised edition.

Reference Books:

3. Quantitative Aptitude, G.L Barrons, Pinrest, 2019
4. Quantitative Aptitude, Abhijit Guha, Mc Graw Hills, 2019.
5. Quantitative Aptitude, U. Mohan Rao, SCITECH.

FOUNDATION ENGINEERING

L	T	P	C
3	0	0	3

III Year II Semester

Course Outcomes

Upon successful completion of yhis course students will be able to

1. Organize the preparation and programme of soil investigation.
2. Examine the earth pressure theories and stability of retaining walls.
3. Evaluate the bearing capacity of soil and allowable settlement.
4. Analyse the capacity and settlement of pile foundation.
5. Analyse the stability of finite and infinite slopes using various methods.

UNIT – I

Soil Exploration: Need methods of soil exploration boring and sampling methods penetration tests plate load test pressure meter planning of soil exploration programme and preparation of soil investigation report.

UNIT – II

Earth pressure theories: Rankine's theory of earth pressure earth pressures in layered soils Coulomb's earth pressure theory

Retaining walls: Types of retaining walls stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity. Drainage from backfill, introduction to reinforced earth walls.

UNIT – III

Bearing capacity and settlement foundation: Types choice of foundation location and depth safe bearing capacity Terzaghi, Mayerhof, Skempton and IS methods. Safe bearing pressure based on SPT N value Allowable bearing pressure; safe bearing capacity allowable settlement of structures and plate load test allowable settlements of structures.

UNIT – IV

Pile foundation: Types of piles load carrying capacity of piles based on static pile formulae dynamic pile formulae Pile Capacity through SPT and CPT results pile load tests load carrying capacity of pile groups in sands and clays Settlement of pile groups negative skin friction

UNIT – V

Slope stability: Infinite and finite earth slopes types of failures factor of safety of infinite slopes stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices Taylor's Stability Number- stability of slopes.

Textbooks

1. Basic and Applied Soil Mechanics, Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi: , 2016, 3rd edition
2. Principles of Foundation Engineering, Braja M. Das, Cengage Learning, 2011, 7th edition

References

1. Soil Mechanics and Foundation Engineering, VNS Murthy, CBS Publishers and Distributors, 2016.
2. Geotechnical Engineering, S. K.Gulhati & Manoj Datta, Tata Mc.Graw Hill Publishing company New Delhi, 2005.

DESIGN OF STEEL STRUCTURES

L	T	P	C
3	0	0	3

III Year II Semester

Outcomes

Upon successful completion of this coursestudentswill be able to do

1. Classify the types of connections and specifications as per IS: 800-2007.
2. Apply the provisions of IS: 800-2007 to design tension members.
3. Analyze and design compression members.
4. Illustratebehaviour of beams and design strengths as per IS code.
5. Adapt IS code procedures to design welded plate girder.

UNIT – I

Theory and introduction: Materials – types of structural steel – mechanical properties of steel Concepts of plasticity – yield strength. Loads – and combinations local buckling behavior of steel. Concept of limit State Design – Limit States – Design Strengths- deflection limits – serviceability – stability check, Bolted connections – Riveted connections – IS – 800 – 2007 - specifications – Design strength – efficiency of joint – prying action. Welded connections – Types of welded joints – specifications - design requirements.

UNIT – II

Design of tension members: Design strength – Design procedure – Design ofTension member Design procedure splice - lug angle.

UNIT – III

Design of compression members: Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns

UNIT – IV

Design of Beams: Design of Beams – Plastic moment – Bending and shear strength / buckling Built-up sections – laterally / supported beams –Web Buckling and Web Crippling strength.

UNIT – V

Design of Welded Plate girders – elements – economical depth – design of main section – connections between web and flange – design of end bearing stiffenersand intermediate stiffeners.

Textbooks

1. Design of steel structures, N. Subramanian, Oxford University Press, 2009.
2. Structural Design and Drawing, N.Krishna Raju, Universities Press, 2009 , 3rd edition.

References

1. Design of Steel structures, K.S. Sai Ram, Person Education, 2010.
2. Design of Steel Structures, Edwin H. Gaylord, Jr. Charles N. Gaylord and James Stallmeyer, Tata McGraw-Hill Education pvt. Ltd., 2010.

IS Codes

1. IS: 800 – 2007
2. IS : 875 Part III 2000

Note: IS: 800–2007, IS:875 need to be provided during the examination

HYDRAULICS & HYDRAULIC MACHINERY

L	T	P	C
3	0	0	3

III Year II Semester

Course Outcomes

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

1. Explain the concept of different types of flows, designing of most Economical section of open channel & to understand the concept of specific energy.
2. Demonstrate the concept of dimensional quantities and the application of similitude concepts in designing a model and prototype.
3. Understand the concept, working applications of impact of jets with the importance of Constructing velocity triangles.
4. Compare the design concept of Pelton, Francis and Kaplan turbines, Centrifugal pumps along with the most economical designs.
5. Determine the working mechanism of different types of the pumps with their important characteristic curves

UNIT – I

Open channel flow - I

Introduction: Definition of open channel, Comparison between pipe flow and open-channel flow,Types of open channels, Geometric elements and hydraulic properties of an open channel section,Classification of open-channel flows steady, unsteady, uniform, non-uniform, gradually varied, rapidly varied, spatially varied.

Uniform Flow: through open channel by Chezy's, Manning's, Kutter's, and Bazin formulae; Equivalent roughness Horton's method; Computation of normal depth and velocity; Determination of normal and critical slopes; hydraulically efficient channel section.

Critical Flow: Energy considerations in open-channels: Specific energy, critical depth, computation of critical depth, specific energy diagram, critical, sub-critical, and super critical flows, alternate depths; Transitions – channel with a hump, and change in width.

UNIT – II

Open channel flow - II

Gradually Varied Flow: Basic assumptions; Derivation of differential equation of GVF; Other forms of GVF; Characteristics and classification of flow profiles for Mild, Critical, Steep, horizontal, and adverse slopes; control sections; Analysis of flow profiles; Computation of GVF by numerical method – Direct-Step method,

Rapidly Varied Flow: Characteristics of RVF; Hydraulic Jump in horizontal rectangular channels – momentum equation formulation for the jump, sequent-depth ratio, energy loss; Classification of jumps according to Froude's number; Basic characteristics of the jump - Height of jump, length of jump, location of jump

UNIT – III

Dimensional Analysis: Philosophy of DA; Principle of Dimensional Homogeneity; Methods used - Rayleigh's method and Buckingham's Pi theorem; Common dimensionless groups in fluid mechanics.

Modelling and Similitude: Geometric, kinematic, and dynamic similarities; Similarity requirements or modelling laws; model and prototype relations; Distorted and non-distorted models.

UNIT – IV

Turbo Machines-I: Turbines: Layout of a typical Hydroelectric power plant; Various heads and head losses; Classification of turbines based on – energy available at inlet, direction of flow of water through runner, position of turbine shaft, availability of head, and specific speed; Efficiencies of a turbine; Working, working proportions, velocity diagram, work done, and efficiencies of a Pelton Wheel and reaction turbine; Performance of turbine – unit head, unit speed, unit power, and unit discharge; Cavitation.

UNIT – V

Turbo Machines-II: Centrifugal Pumps: Components of a centrifugal pump; Selection of Centrifugal pumps based on specific speed; classification of pumps; Priming of a centrifugal pump; Working of a centrifugal pump; Expression for work done on the impeller (also called as fundamental equation of centrifugal pump); Maximum suction lift; Various heads of a pump – Suction head, delivery head, static head, and manometric head; Losses and Efficiencies – Mechanical, manometric, overall, and volumetric; Cavitation in pumps; Multistage pumps - Pumps in series and parallel.

Textbooks

1. Flow in Open Channels, Subramanya K., Tata McGraw Hill Publishing Company Limited, New Delhi., 2005.
2. Fluid mechanics and hydraulic machines, R.K. Bansal, Laxmi Publications (P) ltd., New Delhi, 2005.

References

1. Open Channel Hydraulics, Chow V. T., Mc Graw Hill Book Company,2010.
2. Elements of Open channel flow, Ranga Raju, Tata Mc.Graw Hill, Publications. 2009.

WATER RESOURCES ENGINEERING

L	T	P	C
3	0	0	3

III Year II Semester

Course Outcomes

Upon successful completion of this coursestudentswill be able to do

1. Describe the components in the hydrologic cycle and all hydrological processes and methods.
2. Analyze the flood analysis and its measurement by means of hydrograph.
3. Analyze the phenomenon of Ground water occurrence by means of aquifers.
4. Assess the methods of irrigation and its quality with help of duty delta relationship.
5. Design the canals by using standard theories.

UNIT - I

Introduction to engineering hydrology and its applications:hydrologic cycle, Types and forms of precipitation, Rainfall Measurement, Different types of rain gauges, rainfall measurement, computation of average rainfall over a basin, processing of rainfall data- Adjustment of record – rainfall double mass curve. Runoff- factors affecting runoff- runoff over a catchment – Empirical and rational formulae. Abstraction from rainfall- evaporation, factors affecting evaporation, measurement of evaporation- evaporatranspiration- penman and balney&creddle methods- infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT - II

Flood measurement and analysis: Distribution of runoff Hydrograph analysis flood hydrograph- effective rainfall- base flow-base flow separation- direct runoff hydrograph- Unit Hydrograph, definition and limitations of applications of unit hydrograph, derivation of unit hydrograph from direct runoff hydrograph and vice versa- S- Hydrograph, Synthetic unit hydrograph.

UNIT - III

Ground water occurrence: types of aquifers, Aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, Darcy's law, radial flow to wells in confined and unconfined aquifer. Types of wells Well construction well development.

UNIT - IV

Necessity and importance of irrigation: Types of irrigation, advantages and ill effects of irrigation , application of irrigation . Indian agricultural soils, methods of improving soil fertility- crop rotation, preparation of land for irrigation, standards of quality for Irrigation water. Duty and delta, factors affecting duty, Water Logging

UNIT - V

Canals and its design: Classification of canals, Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, IS standards for a canal design canal lining.
Design Discharge over a catchment, Computation of design discharge-rational formula SCS curve number method , flood frequency analysis introductory part only. Stream Gauging measurement and estimation of stream flow.

Textbooks

1. Irrigation and Water Resources & Water Power, P.N.Modi, Standard Book House 2014.
2. Engineering Hydrology, Jayaram Reddy, Laxmi publications pvt. Ltd., New Delhi, 2016, 3rd edition.

References

1. Irrigation Water Management, D.K. Majundar, Printice Hall of India. 2002.
2. Irrigation and Hydraulic structures, S.K.Grag - Khanna publishers, 2009.

CONSTRUCTION ENGINEERING &MANAGEMENT (PE2)

L	T	P	C
3	0	0	3

III Year II Semester

Course Outcomes

Upon successful completion of this course students will be able to

1. Understand the behavioural aspect of entrepreneurs, various approaches of time management, their strength and weakness.
2. Apply the concepts of project management during the construction phase, project organization, project planning and control using CPM,PERT techniques.
3. Analysis various materials and equipment's for construction work.
4. Examine the on different types of contracts and specifications.
5. Outline the labour regulations and safety in construction.

UNIT – I

Management Techniques: Roles, Management theories, Social responsibilities, Planning and strategic management, Strategy implementation, Decision making tools and techniques – Organizational structure, Human resource management motivation performance – leadership.

UNIT – II

Management Applications: Classification of Construction projects, Construction stages, Resources – Functions of Construction Management and its Applications. Preliminary Planning – Collection of Data Contract Planning Scientific Methods of Management: Network Techniques in construction management Bar chart, Gant chart, CPM, PERT, Cost & Time optimization.

UNIT – III

Resource Management: Resource planning – planning for manpower, materials, costs, equipment. Labour, Scheduling, Forms of scheduling – Resource allocation, Budget and budgetary control methods.

UNIT – IV

Contracts and Tenders: Contract – types of contract, contract document, specification, important conditions of contract – tender and tender document – Deposits by the contractor – Arbitration, Negotiation – M.Book – Muster roll – stores.

UNIT – V

Management Information System: Labour Regulations: Social Security – welfare Legislation – Laws relating to Wages, Bonus and Industrial disputes, Labour Administration – Insurance and Safety Regulations, Workmen's Compensation Act – other labour Laws – Safety in construction, legal and financial aspects of accidents in construction, occupational and safety hazard assessment, Human factors in safety, legal and financial aspects of accidents in construction, Occupational and safety hazard assessment.

Textbooks

1. Construction Planning and Management, Ghalot, P.S., Dhir,D.M., Wiley Eastern Limited, 1992.
2. Construction Project Management¸ Chitkara,K.K., Tata McGraw Hill Publishing Co, Ltd., New Delhi, 1998.

References

1. Construction Management And Planning, Sengupta B.Guha H., Tatamcgraw-hill publications,1995.

GROUND IMPROVEMENT TECHNIQUES (PE2)

L	T	P	C
3	0	0	3

III Year II Semester

Course Outcomes

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

1. Illustrate the several Ground modification mechanisms
2. Illustrate the Ground Improvement Techniques through mechanical approach.
3. Identify the different Hydraulic ground improvement techniques through Dewatering techniques.
4. Explain the quick settlement techniques through chemical and physical modification.
5. Distinguish the inclusion and confinement techniques of ground improvement.

UNIT – I

Introduction to engineering ground modification: Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, etc. and their applications.

UNIT – II

Mechanical Modification: Principles of soil densification – Properties of Compacted soil, Compaction control tests, Specification of compaction requirements, Blasting Vibrocompaction, Dynamic Tamping and Compaction piles.

UNIT – III

Hydraulic Modification: Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Filtration, Drainage and seepage control with Geosynthetics, Preloading and vertical drains, Electro-kinetic dewatering.

UNIT – IV

Physical and Chemical Modification: Modification by admixtures, Shotcreting and Guniting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting, Jet grouting, Thermal Modification, Ground freezing

UNIT – V

Modification by Inclusions and Confinement: Soil reinforcement, reinforcement with strip, bar, mesh, sheet and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

Textbooks

1. Engineering Principles of Ground Modifications, Hausmann, M. R., McGraw Hill publications, 1990.
2. Ground Improvement, Mosley, 2004, 2nd edition.

References

1. Designing with Geosynthetics, Koerner, R. M., – Prentice Hall, New Jersey, 1994.
2. Earth Reinforcement and soil structures, Jones C. J. F. P., Butterworths, London, 1985

FINITE ELEMENT METHOD (PE2)

L	T	P	C
3	0	0	3

III Year II Semester

Course Outcome

Upon successful completion of this course students will be able to

1. Explain plane stress-plane strain equations and develop displacement functions.
2. Analyze one-dimensional problems using stiffness matrix.
3. Examine the different elements based on continuity and compatibility.
4. Illustrate quadrilateral elements using nodal points and shape functions.
5. Determine displacements, strains and stresses for static loads.

UNIT – I

Introduction to Finite Element Method: Basic Equations in Elasticity Coordinate system Natural, Global Coordinate System Coordinates. Stress Strain equation concept of plane stress plane strain advantages and disadvantages of FEM. Element shapes nodes nodal degree of freedom strain displacement relations.

UNIT – II

One dimensional problem: Bar element Shape functions, stiffness matrix Strain displacement matrix formulation, FEA Beam elements stiffness matrix shape function Analysis of continuous beams stress strain relation.

UNIT – III

Two dimensional problem: FEA Two dimessional problem CSTLST element shape function stress strain Relation, Lagrangian serendipity elements Hermite polynomials regular, Irregular 2 D & 3D Element shape functions.

UNIT – IV

Isoparametric formulation: Concepts of isoparametric elements for 2D analysis 4 noded and 8 nodediso- parametric quadrilateral elements.

UNIT – V

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Textbooks

1. Finite Element Method, Daryl L. Logan, , Cengage Learning India Pvt. Ltd. 2011, 5th Edition.
2. Introduction to finite Elements in Engineering, Tirupathi R. Chandrupatla, and Ashok D. Belegundu, Prentice Hall of India, 2012, 4th revised.

References

1. Finite Element Aanalysis, P.Seshu, PHI Learning Private Limited , 2012.
2. Concepts and applications of Finite Element Analysis, Robert D. Cook et al., Wiley India Pvt. Ltd., 1988, 3rd edition.

GEOTECHNICAL ENGINEERING LAB

L	T	P	C
0	0	2	1

III Year II Semester

Course Outcomes

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

1. Demonstrate the engineering properties the soil.
2. Illustrate the field bulk and dry density of cohesive and cohesion less soils.
3. Classify the Coarse grained soils based on sieve analysis test & a grain size distribution curve.
4. Compute the shear strength of cohesive and cohesion less soil.
5. Determine the permeability of coarse grained soil and fine grained soil by constant head permeability test and falling head method.

List of Experiments

1. Atterberg's limits
2. Fileld density- core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant head test.
5. Permeability of soil variable head test.
6. Compaction test
7. C.B.R test
8. Consolidation test
9. Unconfined compression test
10. Triaxial compression test
11. Direct shear test
12. Vane shear test.

Note: Any 10 experiments are to be performed

FLUID MECHANICS & HYDRAULIC MACHINERY LAB

L	T	P	C
0	0	2	1

III Year II Semester

Course Outcomes

Students who successfully complete this course will have demonstrated ability to:

1. Describethe basic measurement techniques of fluid mechanics and its appropriate application.
2. Interpret the results obtained in the laboratory for various experiments.
3. Discoverthe practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
4. Comparethe results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
5. Write a technical laboratory report

List of experiments

1. Calibration of venture meter and Orifice meter
2. Determination of coefficient of discharge for a small orifice/mouthpiece by constant head method
3. Calibration of contracted rectangular notch and triangular notch
4. Determination of friction factor of a pipe
5. Determination of coefficient for minor losses.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of hydraulic jump.
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine
11. Performance characteristics of a single stage /multi stage centrifugal pump.
12. Performance characteristics of a reciprocating pump

Note: Any 10 experiments are to be performed

PERSONALITY DEVELOPMENT AND BEHAVIORAL SKILLS

B.Tech III Year IISem

L	T	P	C
2	0	0	1

Outcomes

1. Practice optimistic attitude for an efficient, socially viable and multi-faceted personality.
2. Demonstrate functions of non-verbal **communication in formal context.**
3. Build effective individual & team dynamics for professional accomplishments.
4. Analyze appropriate strategic Interpersonal Skills for productive workplace relationships.
5. Correspond in multiple contexts, for varied audiences, across genres and modalities.

Unit – I

Personality Development:

Definition - Various Aspects of Personality Development - Behavioural Traits.

Importance of Soft Skills for personal and professional development - Success stories.

Unit – II

Non Verbal Communication:

Kinesics, Haptics ,Proxemics, Vocalics, Oculesics

Body Language informal contexts such as Group Discussions, Presentations and Interviews.

Unit – III

Team Dynamics:

Different Types of Teams– Role of an individual – Communicating as a group or team leader

Individual Presentations/Team Presentation-Project Presentations- Case Studies

UNIT-IV

Interpersonal Skills:

Time Management- Stress Management- Emotional Intelligence- Conflict Management- Relationship Management

UNIT-V

Digital Correspondence:

Role of Multimedia in Communication Communication in a Digital Edge (Video Conference Etc.)

Social Networking: Importance and Effects.

Textbook

1. Personality Development and Soft Skills, Preparing for Tomorrow, Shikha Kapoor 2nd Edition,2020.

References

1. Barun, K Mitra, Personality Development and Soft Skills, Oxford University Press, 2nd Edition, 2016.
2. Professional Ethics.R Subramanian, Oxford University Press, 2ndEdition ,2015.

COURSE STRUCTURE FOR B.TECH IV YEAR

B. Tech. IV Year I Semester

S. No.	Category	Course Title	L	T	P	C
1	PC – 15	Highway Engineering	3	0	0	3
2	PC – 16	Estimation & Costing	3	0	0	3
3	PE – 3	1. Pre stressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
4	PE – 4	1. Railway Airport and Harbour Engineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
5	OE – 3	Open Elective	3	0	0	3
6	PC Lab – 7	Concrete & Highway Material Lab	0	0	2	1
7	PC Lab - 8	Computational Lab	0	0	2	1
8	PW-1	Industry Oriented Mini Project	0	0	5	3
		Total number	**15**	**0**	**9**	**20**

B. Tech. IV Year II Semester

S. No.	Category	Course Title	L	T	P	C
1	PC – 17	Rehabilitation and Retrofitting of structures	3	0	0	3
2	PC – 18	Remote Sensing & GIS	3	0	0	3
3	--	Technical Seminar	0	0	2	2
4	--	Comprehensive Viva Voce	0	0	0	2
5	PW-2	Major Project	0	0	20	10
		Total number	**6**	**0**	**22**	**20**

HIGHWAY ENGINEERING

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

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

1. Summarize the road developments in India from different periods.
2. Apply the concept of geometric design in real time engineering.
3. Make use of parameters related to traffic studies.
4. Design& model the intersections with specific standards.
5. Evaluate the different pavement design methods using IRC standards.

UNIT- I

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 Project.

UNIT – II

Highway geometric design: Importance of Geometric Design - Design controls and Criteria - Highway Cross Section Elements - Sight Distance Elements- Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance - Design of Horizontal Alignment - Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT- III

Traffic engineering & regulations: Basic Parameters of Traffic-Volume, Speed and Density - Traffic Volume Studies - Data Collection and Presentation - Speed studies - Data Collection and Presentation - Origin & Destination studies, Parking Studies – On street& Off street Parking - Road Accidents - Causes and Preventive Measures - Accident Data Recording – Condition Diagram and Collision Diagrams - Traffic Signs – Types and Specifications – Road Markings - Need for Road Markings-Types of Road Markings - Design of Traffic Signals – Webster Method.

UNIT- IV

Intersection design: Types of Intersections – Conflicts at Intersections – Requirements of At-Grade Intersections - Types of At-Grade Intersections: Channelized and Unchannelized Intersections – Traffic Islands - Types of Grade Separated Intersections - Rotary Intersection – Concept of Rotary – Design Factors of Rotary – Advantages and Limitations of Rotary Intersections.

UNIT -V

Pavement Design: Design of Pavements: Design of Flexible pavement by CBR method as per IRC 37-2012 and theory of empirical mechanistic method. Stresses in rigid pavement by westergards and IRC methods.

Text books

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7thedition (2000).
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna Publications – 6th Edition – 1997.

References

1. Principles of Traffic and Highway Engineering – Garber &Hoel, CengageLearning,Press 2015,5th Edition
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali and Dr.N.BLal - Khanna Publications,7th Edition.(2013).

IS Codes

1. IRC 37-2012 : Tentative guidelines for design of flexible pavement
2. IRC 58-2011: Guidelines for design of plain jointed rigid pavements.
3. IRC 81-1997 : Guidelines for design of overlay using Benkalman Beam Deflection Technique.

ESTIMATION & COSTING

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

After completion of the course, student can be able to

1. Summarize the basic principal and standard methods for working out quantities in estimating.
2. Determine the earthwork estimate of buildings, roads and canals.
3. Estimate the rate analysis of the various items of work.
4. Understand the process of contracting for roads and buildings.
5. Evaluate the valuation of buildings and provide practical knowledge of standard specifications of items of building construction.

UNIT – I

Introduction : General items of work in Building, Standard Unit Principles of working out quantities for detailed and abstract estimates – Approximate and Detailed Estimate of Buildings. principles of bar bending (introduction)

UNIT – II

Earthwork Estimation: Methods of estimation of buildings and roads.canals in cutting.

UNIT – III

Rate Analysis: Unit rate analysis for various items of building works.

UNIT – IV

Contracts : Contracts – Types of contracts – Contract Documents – Conditions of contract.

UNIT – V

Valuation of buildings: Standard specifications for different items of building construction.

Textbooks

1. Estimating and Costing, B.N. Dutta, UBS publishers, 2016, 27th edition.
2. Estimating and Costing, G.S. Birdie, 2014. 6th edition.

References

1. Standard Schedule of rates and standard data book by public works departmet.
2. I.S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.).

PRESTRESSED CONC1RETE STRUCTURES (PE3)

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

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

1. Classify the concepts, principles, types and methods of PSC structures.
2. Evaluate the losses of PSC structures.
3. Analysis and design of PSC slabs and beams using IS:1343 (2012).
4. Explain transmission of prestressing force, end block analysis by different methods.
5. Analyse the stress distribution of composite beams and asses the deflection of beams.Understand the different methods of prestressing.

UNIT – I

Introduction: Historic development- General principles of prestressingpretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.

Methods and Systems of pre stressing: Pretensioning and Post tensioning methodsand systems of prestressing like Hoyer system, MagnelBlaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

UNIT – II

Losses of Prestress: Loss of prestress in pretensioned and posttesnioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

UNIT – III

Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I sections.

Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions.

UNIT – IV

Transfer of Prestress in Pretensioned Members : Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block Analysis by Guyon, Magnel, Zienlinski and Rowe's methods – Anchorage zone reinforcement- IS Provisions

UNIT – V

Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.

Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- IS code requirements.

Textbooks

1. Prestressed concrete, N. Krishna Raju, Tata McGraw Hill Book Education– pvt.ltd, 2010, 5th Edition.
2. Prestressed Concrete, N. Rajagopalan Narosa Publishing House, 2014.

References

1. Design of prestress concrete structures, T.Y. Lin and Burn, John Wiley, New York,. 2010, 3rd Edition
2. Prestressed concrete,S. Ramamrutham DhanpatRai & Sons, Delhi, 2010.

EARTHQUAKE ENGINEERING (PE3)

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

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

1. Quantify mechanical behaviour of earth's surface, seismic hazards and its effects.
2. Identify, formulate and solves engineering problems subjected to dynamic loading conditions.
3. Understand the internal parameters of the structures for seismic design source.
4. Assess the design component or process to meet desired needs within realistic constraints.
5. Analyze and design the members for earthquake resisting parameters.

UNIT – I

Engineering Seismology: Earthquake phenomenon cause of earthquakes – Faults – Plate tectonics – Seismic waves – Terms associated with earthquakes – Magnitude/Intensity of an earthquake – scales – Energy released – Earthquake measuring instruments – Seismoscope, Seismograph, accelerograph – strong ground motions – Seismic zones of India.

UNIT – II

Theory of Vibrations: Elements of a vibratory system – Degrees of Freedom – Continuous system – Lumped mass idealization – Oscillatory motion – Simple Harmonic Motion – Free vibration of single degree of freedom (SDOF) system – undamped and damped – critical amping – Logarithmic decrement – Forced vibrations – Harmonic excitation – Dynamic magnification factor – Excitation by rigid based translation for SDOF system – Earthquake ground motion.

UNIT – III

Conceptual design: Building configurations – Introduction – Functional planning – Continuous load path – Overall form – simplicity and symmetry – elongated shapes – stiffness and strength – Horizontal and Vertical members – Twisting of buildings – Ductility – definition – ductility relationships – flexible buildings – framing systems – choice of construction materials – unconfined concrete – confined concrete – masonry – reinforcing steel.

UNIT – IV

Introduction to earthquake resistant design: Seismic design requirements – regular and irregular configurations – basic assumptions – design earthquake loads – basic load combinations – permissible stresses – seismic methods of analysis – factors in seismic analysis – equivalent lateral force method.

UNIT – V

Seismic Analysis of structures: Principles of earthquake resistant design of RC members – Structural models for frame buildings – Equivalent static analysis of any typical structure.

Text Books

1. Earthquake Resistant Design of structures ,S. K. Duggal, Oxford University Press, 2007. 1st edition
2. Earthquake Resistant Design of structures, Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd, 2006.

References

1. Seismic Design of Reinforced Concrete and Masonry Building, T. Paulay and M.J.N. Priestly, John Wiley & Sons ,1992.
2. Eartquake Resistant Design of Buidling structures, Vinod Hosur, Wiley India Pvt. Ltd, 1992.

IS Codes

1. IS: 1893 (Part-1) -2002. "Criteria for Earthquake Resistant – Design of structures." B.I.S., New Delhi.
2. IS:4326-1993, " Earthquake Resistant Design and Construction of Building", Code of Practice B.I.S., New Delhi.
3. IS:13920-1993, " Ductile detailing of concrete structures subjected to seismic force" – Guidelines, B.I.S., New Delhi.

GREEN BUILDING TECHNOLOGIES (PE4)

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

After successful completion of this course the students should able to

1. Understanthe Green building concept and focus on approaches that makes building sustainable.
2. Illustrate Green building assessment and accreditation system.
3. Able to apply low energy building strategies.
4. Designing green building and improve sustainability of infrastructure.
5. Classify the economic benefits of green buildings.

UNIT – I

Introduction: The shifting landscape of Green buildings, The driving forces for sustainable construction, Ethics and sustainability, Basic Concepts and Vocabulary, Major Environmental and resource concerns. International Building Assessment systems.

UNIT – II

The green building assessment system: Structure of the LEED suite of Building rating systems, LEED Credentials, LEED Building Design and construction Rating system, Green Globes Building Rating Tools, Structure of Green Globes for New Construction, Green Globes Assessment and Certification Process, Green Globes Professional Credentials, IGBC Building desingn, Rating system and Professional crentials

UNIT – III

Green building design: Conventional versus Green Building Systems, green materials, material selection criteria, Executing the Green Building Project, Integrated Design Process, Role of the charrette in the design process, Green Building Documentation Requirements.

UNIT – IV

Low – energy building strategies: Building Energy Issues, High Performance Building Energy Design Strategy, Passive Design Strategy, Building Envelope, Internal Load Reduction, Smart Buildings and Energy Management Systems.

UNIT – V

Green building economics and sustainable construction: General approach, The Business Case for High Performance Green Buildings, Economics of Green Building, Quantifying Green Building Benefits, Articulating Performance Goals for Future Green Buildings

Text books

1. Sustainable Construction, Charles J. Kibert, John Wiley& sons, 2016, 4th edition,
2. Sustainable Construction: Green Building Design and Delivery, Charles J. Kibert, 2007, 2nd Edition.

References

1. IGBC Referece manual 2016.

RAILWAYS, AIRPORTS AND HARBORS ENGINEERING (PE4)

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

Upon successful completion of yhis course students will be able to

1. Define and understand the various components of railways.
2. Understand and solve the geometric elements needed for the design of permanent way.
3. Define, understand, and design the various components of the airport.
4. Define, understand the planning and requirements of a harbor.
5. Improve and Visualize the working of intelligent transportation system.

UNIT – I

Introduction to railway : Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast, Gauge –Creep of Rails- Theories related to Creep – Sleeper density.

UNIT – II

Geometric design of railway track: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve, Points and Crossing, Rail Joints & Welding of Joints, Railway station& Yards, Signalizing & interlocking.

UNIT – III

Airport engineering: Airport Site selection – Runway Orientation – Basic, Runway Length – Corrections for Elevation – Airport Classification - Runway Geometric design concepts – Factors Controlling Taxiway Layout - Terminal Area – Apron – Hangar – Blast Considerations, Typical Airport Layouts – Wind rose diagram - Runway Lightening system & Marking.

UNIT – IV

Port and harbor engineering: Requirements of Port and Harbour, Classification of Port &Harbour, Features of a Harbour, Planning of Harbour, Breakwaters, Dry docks, Jetties, Aprons, Transit shed and Warehouses, Navigational aids.

UNIT –V

Intelligent transport systems:ITS Definition, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications,ITS architecture components and standards, Overview of ITS implementations in developed countries.

Textbooks

1. Transportation Engineering, S.P.Chandola, S.Chand& Co. Ltd.,2001 .
2. Highway, Railway, Airport and Harbour Engineering, K.P. Subramanian, 2010.

References

1. A Text Book of Railway Engineering, S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi. 2013, 7th Edition.
2. Harbour, Dock and Tunnel Engineering, R. Srinivasan, 2016, 28th Edition.

ADVANCED STRUCTURAL DESIGN (PE4)

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

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

1. Analyze and design of cantilever retaining wall.
2. Apply the provision of IS :3370-2009 to design water tank.
3. Apply the provision of IS 456-2000 for designing flat slab.
4. Adapt the provision of IRC 21-1987 to class AA loading to design T beam girder.
5. Summarize the force components and design principles of RCC Chimney.

UNIT – I

Design of Retaining walls: Types of retaining walls, forces on cantilever retaining wall, stability conditions of a cantilever retaining wall, proportioning of cantilever retaining wall, Introduction to counter fort retaining wall.

UNIT – II

Design of water tank: Design philosophy and requirements, I.S code recommendations regarding, Detailing in water tank, Design of circular water tank resting on ground (approximate method),I.S code method for design of circular tank, Design of elevated tank with staging.

UNIT – III

Design of flat slab: Introduction terminology related with flat slab construction, I.S code provision for flat slab, Analysis and design of flat slab, Shear in flat slab, openings in flat slab

UNIT – IV

Design of concrete bridges: IRC loading, Design of R.C slab culvert, Design of T-beam Girder Bridge.

UNIT – V

Chimneys: Different components of Chimney, Design of RCC chimney

1. Advanced reinforced concrete structures, Varghese, pranties hall of indiapvt ltd, 2008, 2nd edition.
2. Advanced reinforced concrete structures, Krishna Raju., 2010. 2nd Edition.

References

1. Reinforced concrete strctueresvol II, B.C. Punmiah, Ashok Kumar Jain and Arun Kumar Jain, lakshmi publications Pvt. Ltd, New Delhi, 2005.
2. Essentials of bridge engineering, D.John son Victor, oxford and IBM publication co pvt ltd 6th, 2007.

GROUND WATER HYDROLOGY (PE4)

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

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

1. Understand different types of aquifers and their characteristics
2. Analysis the pumping test data for different aquifers
3. Distinguish the surface and subsurface investigation methods of ground water.
4. Discuss the methods of artificial recharging of ground water.
5. Evaluation and control of saline water intrusion.

UNIT - I

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention. Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system.

UNIT - II

Ground water flow contours their applications: Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests.

UNIT - III

Unsteady flow analysis: Pumping Test Data – II: Unsteady flow towards a well – Non equilibrium

Equations – Thesis solution – Jocob and Chow's simplifications, Leak aquifers. Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic Refraction methods. Subsurface methods – Geophysical logging and resistivity logging.Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

UNIT - IV

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, Relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground Water along with Case studies.

UNIT - V

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg Relation, Shape of interface, control of seawater intrusion. Groundwater Basin Management: Concepts of conjunction use, Case studies.

Textbooks

1. Ground water Hydrology, David Keith Todd, John Wiley & Son, New York , 2004, 3rd Edition.
2. Groundwater by H.M.Raghunath, New age International Publication, 2007, 3rd Edition.

References

1. Groundwater by Bawvwr, John Wiley & sons.
2. Groundwater System Planning & Management – R.Willes &W.W.G.Yeh, Printice Hall (1987).

CONCRETE & HIGHWAY MATERIALS LAB

L	T	P	C
0	0	2	1

IV Year I Semester

Course Outcomes

1. Examine the experimental strength of aggregate materials as per codal provisions.
2. Illustrate the stability & properties of bituminous materials & mixes by conducting tests.
3. Determine the properties of cement by conducting the test.
4. Define the workability of fresh concrete by conducting tests.
5. Estimate the strength of hardened concrete by conducting destructive and non destructive testing.

LIST OF EXPERIMENTS

I. Road Aggregates

1. Aggregate Crushing Value.
2. Aggregate Impact Test.
3. Specific Gravity And Water Absorption.
4. Attrition Test.
5. Abrasion Test.
6. Shape Test.

II. Bituminous Materials

1. Penetration Test.
2. Ductility Test.
3. Softening Point.
4. Flash And Fire Point.

III. Cement and concrete

Tests on cements

1. Fineness of cement.
2. Normal Consistency of cement
3. Initial And Final Setting Time of cement.
4. Specific Gravity and Soundness of cement.
5. Compressive Strength of cement.

Tests On Concrete

1. Workability Test on Concrete By Compaction Factor , Slump cone and Vee- Bee.
2. Compressive Strength and Young's Modulus of Concrete.
3. Bulking of Sand.
4. Non Destructive Testing on Concrete (For Demonstration).

COMPUTATIONAL LAB

L	T	P	C
0	0	2	1

IV Year I Semester

Course Outcomes

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

1. Encalcate with the usage of recent softwares and its applications in the field of civil engineering.
2. Analysing the Beam and Slab using Staad Pro software.
3. Assess the frame using the Staad Pro.
4. Model&demostraing the slope of the soil source using Geostudio.
5. Analysis the settlement of footing and pile using geostudio.

List of Experiments

1. Introduction and practice of the basic functions use in the Python computing
2. To develop the programme for Bending moment, Shear force and Deflection at incremental segments of simply supported beam subjected to eccentric point load and UDL throughout the span.
3. Demonstration and explanation on basic commands used in Staad.pro
4. Analyse of Continous beam using Staad.pro
5. Analyse of slab using Staad.pro
6. Analyse of 2D frame using Staad.pro
7. Analyse of space frame using Staad.pro
8. Demonstration of adminstrator settings of Geostudio
9. Analysis of slope stability with homogeneous and stratified soil condition.
10. Stability of slope with retaining wall
11. Settlement analysis of spread footing
12. Analysis of single pile settlement

Note: Any 10 experiments are to be performed

List of Software Required

1. Staad.pro - Licenced version.
2. Geostudio - Educational version.
3. Python – Open resource.

INDUSTRIAL ORIENTED MINI PROJECT
(Summer Vacation between III- II and IV-I)

L	T	P	C
0	0	5	3

IV Year I Semester

Course Outcomes

The student will be able to

1. Interpret the literature and develop solutions for framing problem statement.
2. Select software techniques for identifying problems.
3. Analysis and test the modules of planned project.
4. Design technical report and deliver presentations.
5. Apply engineering and management principles to achieve project goals.

Content:

There shall be an industry-oriented Mini-Project, in collaboration with an industry of department specific specialization, to be taken up during the summer vacation after III year II Semester examination. However, the mini-project and its report shall be evaluated along with the project work in IV year I Semester. The industry oriented mini-project shall be submitted in a report form and presented before the committee. The committee consists of an external examiner, Head of the Department, the Supervisor of the Mini-project and a Senior Faculty member of the department. There shall be no internal marks for industry oriented mini-project.

REHABILITATION AND RETROFITTING OF STRUCTURES

L	T	P	C
3	0	0	3

IV Year II Semester

Course Outcomes

Upon successful completion of yhis course students will be able to

1. Understand the causes and prevention of deterioration in structures.
2. Identify the types of damages and the mechanisms of corrosion in steel reinforcement and fire induced damages.
3. Examine to inspect and assess the structures using techniques of visual inspection and NDT.
4. Estimate the structural damage and recommend suitable repair and strengthening methods.
5. Apply the latest health monitoring and building instrumentation methods.

UNIT – I

Maintenance And Repair Strategies: Maintenance, Repair And Rehabilitation – Facts Of Maintenance – Importance Of Maintenance – Various Aspects Of Inspection – Assessment Procedure For Evaluating a Damaged Structure – Causes Of Deterioration.

UNIT – II

Strength And Durability Of Concrete: Quality Assurance For Concrete – Strength, Durability And Thermal Properties, Of Concrete – Cracks, Different Types, Causes – Effects Due To Climate, Temperature, Sustained Elevated Temperature, Corrosion – Effects Of Cover Thickness.

UNIT – III

Special concretes: Sulphur Infiltrated Concrete, Fibre Reinforced Concrete, High Strength Concrete, High Performance Concrete, Vacuum Concrete, Self Compacting Concrete, Geopolymer Concrete, Reactive Powder Concrete, Concrete Made With Industrial Wastes.

UNIT – IV

Techniques For Repair And Protection Methods: Non-Destructive Testing Techniques, Epoxy Injection, Shoring, Underpinning, Corrosion Protection Techniques – Corrosion Inhibitors, Corrosion Resistant Steels, Coatings To Reinforcement, Cathodic Protection.

UNIT – V

Techniques For Retrofitting of structures: Strengthening Of Structural Elements, Repair of Structures Distressed Due To Corrosion, Fire, Leakage, Earthquake – demolition techniques – Engineered Demolition Methods.

Textbooks

1. Maintenance and repair of civil structures. B.L. Gupta and Amit Gupta, Standard publications. 2009.
2. Concrete Technology by A.R. Santa Kumar, Oxford university Press, New Delhi, 2006.

References

1. Non destructive Evaluation of concrete structures by Bungey – surrey university press,1989.
2. Concrete repair and maintenance illustrated, RS Means company inc W.H. Ranso (1981).

REMOTE SENSING & GIS

L	T	P	C
3	0	0	3

IV Year II Semester

Course Outcomes

After successful completion of this course the students should able to

1. Understand the concepts of Photogrammetry and compute the heights of the objects using parallax.
2. Understand the principles of aerial Photogrammetry and remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies.
3. Analyze the basic concept of GIS and its applications, able to work with GIS software in various application fields.
4. Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinate systems.
5. Understand the application of vector and raster data structure to the real world, the importance of source map and learning the on-screen digitization.

UNIT – I

EMR and its interaction with atmosphere & Earth : Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan – Boltzman and Wein‟s Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT – II

Platforms and sensors: Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

UNIT – III

Image interpretation and analysis: Types of Data Products – types of image interpretation – basic elements of image interpretation – visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT – IV

Geographic information system: Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

UNIT – V

Data entry, storage and analysis: Data models – vector and raster data – data compression data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

Text books

1. Remote Sensing and Image Interpretation, Lillesand,T.M., Kiefer, R.W. and J.W.Chipman, John Willey and Sons Asia Pvt. Ltd., New Delhi, 2004. 5th Edition.,
2. extbook of Remote Sensing and Geographical Information System, Anji Reddy, M.. BS Publications, Hyderabad, 2001. 2nd edition.

References

1. Concepts and Techniques of Geographic Information Systems,Lo. C.P.and A.K.W.Yeung Prentice Hall of India Pvt. Ltd., New Delhi, Peter A. 2002

TECHNICAL SEMINAR

L	T	P	C
0	0	2	2

IV Year II Semester

Course Outcomes

The student will be able to

1. Demonstrate the skills in identifying, analysing, and presenting a research topic.
2. Demonstrate the quality of knowledge gained from the literature survey on recent technologies.
3. Demonstrate the skills developed to communicate effectively on engineering activities with the engineering community.
4. Demonstrate ability to effectively manage time in presentation skills.
5. Design a technical report with the principal of ethics.

Content

There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the d.epartmental committee consisting of the Head of the Department, Seminar Supervisor and a Senior Faculty member.

COMPREHENSIVE VIVA VOCE

L	T	P	C
0	0	0	2

IV Year II Semester

Course Outcomes

The student will be able to

1. Explain comprehensively to answer questions from all the courses.
2. Test Oral Presentation skills by answering questions in a precise and concise manner.
3. Build confidence and interpersonal skills.
4. Support the students to face interview both in the academic and the industrial sector.
5. Improve placements and better performers in their future.

Content

The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive VivaVoce is intended to assess the students understanding of the courses he studied during the B. Tech. course of study. There are no internal marks for the Comprehensive Viva-Voce.

MAJOR PROJECT

L	T	P	C
0	0	20	10

IV Year II Semester

Course Outcomes

The student will be able to

1. Identity, Analyse and apply suitable current techniques and tools to solve a problem in the civil engineering domain and societal issues.
2. Function effectively in teams to accomplish a common goal.
3. Organise the technical report writing and communication effectively.
4. Extend in lifelong activity.
5. Define and analyse a problem to assess health, safety and legal issues.

Content

The End Semester Examination of the project work shall commence from IV-I conducted by the same committee as appointed for the industry-oriented mini-project. In addition, the Project Supervisor shall also be included in the committee. The topics for industry oriented mini project, seminar and project work shall be different from one another. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of the project.

Open electives offered by Civil engineering Department

OE – 1	1. Elements of Civil Engineering 2. Smart City
OE – 2	1. Green Building Technologies 2. Environmental Pollution & Control Methods
OE – 3	1.Remote Sensing & GIS 2.Introduction to Earthquake Engineering

Open Electives for other branches (other than Civil Engineering students)

ELEMENTS OF CIVIL ENGINEERING (OE1)

L	T	P	C
3	0	0	3

III Year I Semester

Course Outcomes

Upon successful completion of this corse the students will be able to understand

1. Understand Geological properties and Geotechnical aspect of civil engineering.
2. Plan the concept of different building byelaws and planning principles.
3. Analyse the concept of stress-strain and to identify the properties of the fluid changes treatment process.
4. Apply modern tools of surveying and understand basic concepts of concrete.
5. Evaluate the principles of highway geometric designs and types of pavements as per IRC standards. .

UNIT - I

Basics of Geotechnical Engineering and Engineering Geology: Geology branches of geology weathering of rocks mineralogy definition importance of study of minerals - classification of minerals petrology- geological classification of rocks.

Geotechnical Engineering: Soil formation- Soil structure - types of soils and its properties-clay mineralogy and its significance.

UNIT - II

Building Materials, Building Components: Stones – Classification, quarrying and methods of quarrying. Bricks – Components of Brick earth. Building Components – Lintels, arches, walls, staircase, floor and roofs, doors and windows, DPC, Building planning and building byelaws.

UNIT - III

Strength of Materials: Types of stresses and strains- hook's law- definition of the beam - types of beams– types of loads, concept of bending moment and shear for with simply supported beam.

Fluid Mechanics: Dimensions and units - physical properties of fluids – specific gravity - surface tension – viscosity - vapor pressure.

UNIT - IV

Concrete Technology: Chemical composition- aggregates – classification of aggregates. Admixtures - Types of admixtures- water cement ratio.

Surveying: Definition of surveying – principle- types of surveying-objectives and classification advanced surveying – GIS-GPS.

UNIT- V

Transportation Engineering: Highway Development in India – Necessity for Highway Planning- Different Road Development Plans; Classification of Roads - Road Network Patterns, Super elevation Types of Intersections – Introduction to flexible & rigid pavements – advantages – limitations. Parking studies- road accidents and preventive measures- traffic signs- road markings.

Textbooks

1. Basics of Civil Engineering, S.S.Bhavikatti, New Age Publishers Pvt. Ltd.2009.
2. Building Construction, B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain Laxmi Publications (P) ltd.,1, 2008, 6th ed.

References

1. Concrete Technology, A.R. Santha Kumar, Oxford university Press, New Delhi, 2006
2. Highway Engineering, S.K.Khanna & C.E.G.Justo, Nemchand& Bros., 2000, 7th edition.
3. Strength of Materials, S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd. 2008.

SMART CITY (OE1)

L	T	P	C
3	0	0	3

III Year I Semester

Course Outcomes

After successful completion of this course the students should able to

1. Understand the necessity of smart infrastructure and to promote cities that provide quality of life to citizens.
2. Explain technology-based solution on smart mobility.
3. Illustrate & introduce the smart and sustainable waste and water management for smart cities.
4. Evaluate economical models for smart infrastructure solution.
5. Create healthy and waste ridden environment.

UNIT – I

Introduction: Smart city, Need for smart city, Potential locations, Physical infrastructure, Social infrastructure, Smart City Characteristics, Ward Plan.

UNIT – II

Smart Mobility: Roads, Vehicles, Public Transport and Modal Split, Smart Electricity Supply, Smart Housing – Green Building.Connected Homes: IT – enabled living and working.

UNIT – III

Smart Water Management: Smart Sanitation- On-Site Sewage Treatment, Smart Solid Waste Management - Municipal Wet Waste Disposal.

UNIT – IV

Zero Pollution: Zero Water Pollution, Zero Air Pollution, Zero Soil Pollution, Zero Noise Pollution.

UNIT – V

Smart City Investment and Economics: Land, Power, Water, and Highway and Road/ Rail Connectivity, Fuel Pipe Lines – Case study

Textbooks

1. Introduction to Smart Cities, P.P. Anilkumar, Pearson Paperback, 2019, 1st Edn.

GREEN BUILDING TECHNOLOGIES (OE2)

L	T	P	C
3	0	0	3

III Year II Semester

Course Outcomes

After successful completion of this course the students should able to

1. Understand the Green building concept and focus on approaches that makes building sustainable.
2. Illustrate Green building assessment and accreditation system.
3. Able to apply low energy building strategies.
4. Designing green building and improve sustainability of infrastructure.
5. Classify the economic benefits of green buildings.

UNIT – I

Introduction: The shifting landscape of Green buildings, The driving forces for sustainable construction, Ethics and sustainability, Basic Concepts and Vocabulary, Major Environmental and resource concerns. International Building Assessment systems.

UNIT – II

The green building assessment system: Structure of the LEED suite of Building rating systems, LEED Credentials, LEED Building Design and construction Rating system, Green Globes Building Rating Tools, Structure of Green Globes for New Construction, Green Globes Assessment and Certification Process, Green Globes Professional Credentials, IGBC Building desingn, Rating system and Professional crentials

UNIT – III

Green building design: Conventional versus Green Building Systems, green materials, material selection criteria, Executing the Green Building Project, Integrated Design Process, Role of the charrette in the design process, Green Building Documentation Requirements.

UNIT – IV

Low – energy building strategies: Building Energy Issues, High – Performance Building Energy Design Strategy, Passive Design Strategy, Building Envelope, Internal Load Reduction, Smart Buildings and Energy Management Systems.

UNIT – V

Green building economics and sustainable construction: General approach, The Business Case for High – Performance Green Buildings, Economics of Green Building, Quantifying Green Building Benefits, Articulating Performance Goals for Future Green Buildings

Textbooks

1. Sustainable Construction, Charles J. Kibert, John Wiley& sons, 2016, 4th edition,
2. Sustainable Construction: Green Building Design and Delivery, Charles J. Kibert, 2007, 2nd Edition

References

IGBC Referece manual 2016.

ENVIRONMENTAL POLLUTION AND CONTROL METHODS (OE2)

L	T	P	C
3	0	0	3

III Year II Semester

Course Outcomes

After learning this course the students will have

1. Understanding about the various air pollutants and effect on environment.
2. Analyze quality of air in the form of air quality index and dispersion modeling.
3. Determine sampling and measurements of air Pollutants.
4. Analysis and measurement of soil contamination.
5. Predict types of noise and problems arise due to noise pollution.

UNIT - I

Introduction to Air Pollution: Air and its composition, Air Pollution, Sources of air pollution and its classification, Major air Pollutants and their characteristics, Specific group pollutants such as CFC, GHG etc. Air Pollutants from various industrial sectors.Impact of air pollution on human health and vegetation.

UNIT - II

Pollutant Dispersion: Concept of atmospheric stability. Adiabatic and Environmental Lapse rate, Plume behaviour, Effect of topography, terrain and structure on Pollutant dispersion, Effect of wind on Pollutant dispersion, Concept of maximum mixing depth and ventilation coefficient, Plume rise and Effective stack height.

UNIT - III

Air Quality: Introduction to Air quality index and Comprehensive Environmental Pollution Index etc. and its application, Sampling and measurement of air pollutants, Introduction to National Ambient Air Quality Standards.

Impacts of Air Pollution: Extreme air Pollution scenarios: Acid Rain, Global Warming, Smog, Ozone layer depletion etc. Various treaties and protocols: Kyoto Protocol and Montreal Protocol etc.

UNIT - IV

Soil Pollution : Soil contamination by chemical pollutants, sources, Remediation by plants, bioremediation by microorganisms, contamination by inorganic (including heavy metals) and organic pollutants, factors affecting uptake of contaminants, prevention and elimination of contamination, landfills. Effects of atmospheric deposition on various types of soils, cation exchange capacity (CEC) of soils.

UNIT - V

Introduction to Noise: Difference between sound and noise, Pitch and Frequency, Sound Pressure, Sound Pressure level (Decibel), Leq, and sources of noise and harmful effects of noise, noise measurement and noise control measures.

Textbooks

1. Environmental Pollution Control and Engineering, Rao C.S., New Age International (P) Limited, 1st Ed., 1991.
2. Air Pollution, Perkin, H.G. McGraw Hill, 1974.

References Books

1. Fundamentals of Environmental Chemistry, Manahan S.E., CRC Press, 2000.
2. Air Pollution: Measurement, Modeling and Mitigation, A Tiwari and J Colls, Taylor & Francis, 2010.

REMOTE SENSING AND GIS (OE3)

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

After successful completion of this course the students should able to

1. Select the type of remote sensing technique / data for required purpose.
2. Identify the earth surface features from satellite images.
3. Analyse the energy interactions in the atmosphere and earth surface features.
4. Prepare thematic maps.
5. Interpretations of satellite data for various applications.

UNIT - I

EMR and its interaction with atmosphere & Earth : Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan – Boltzman and Wein"s Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT - II

Platforms and Sensors: Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

UNIT - III

Image Interpretation and Analysis: Types of Data Products – types of image interpretation – basic elements of image interpretation – visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT - IV

Geographic information system: Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

UNIT - V

Data entry, storage and analysis: Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

Text books

1. Remote Sensing and Image Interpretation, Lillesand,T.M., Kiefer, R.W. and J.W.Chipman, John Willey and Sons Asia Pvt. Ltd., New Delhi, 2004. 5th Edition.,
2. extbook of Remote Sensing and Geographical Information System, Anji Reddy, M.. BS Publications, Hyderabad, 2001. 2nd edition.

References

1. Concepts and Techniques of Geographic Information Systems, Lo. C.P.and A.K.W.Yeung Prentice Hall of India Pvt. Ltd., New Delhi, Peter A. 2002

INTRODUCTION TO EARTHQUAKE ENGINEERING (OE3)

L	T	P	C
3	0	0	3

IV Year I Semester

Course Outcomes

Upon successful completion of this course students will be able to

1. Understand the Interior Earth' surface, fault attenuation, different wave propagation in Earthquake events.
2. Classify different earthquake hazards and its effects.
3. Examine the mechanical behavior of earth surface and its significance.
4. Evaluate the quantification of Hazard effects - approach methods.
5. Predict the vibration motion and how it influences the earth's surface.

UNIT – I

Introduction to Earthquake: Interior of Earth– Big bang theory, Earthquakes phenomenon cause of earthquakes, Nature and Occurrence of earthquakes effects of earthquakes, Consequences of Earthquake damage Terms associated with earthquakes.

UNIT – II

Earthquake and Ground Motion: Strong Ground Motion -Stress, Strain, & Seismic Waves Faults- Plate tectonics – Different plate theories, Tectonic plates, fault types, Response of Structure to Earthquake Motion, Earthquake classification, Measurements of earthquakes – Magnitude/Intensity of earthquake-scales.

UNIT – III

Engineering Seismology: Fundamentals of wave motion – seismic wave types. Stress tensor, strain tensor, stress-strain relations, Generalized wave equation. Reflection and refraction of plane waves at a plane boundary- independence of SH and P and of SV waves – boundary conditions, Energy conversions. Focus on Indian earthquakes.

UNIT – IV

Earthquake Measurements: Earthquake measuring, instruments–Seismoscope, Seismograph, Seismic Recording, accelerograph – Interpretation of Seismic Records –Acceleration, Velocity and Displacement – Frequency and Time Domain parameters.

Seismic Zoning: Seismic zones of India - Concept of seismic microzonation – Need for Microzonation.

UNIT – V

Seismic Hazard: Introduction to Seismic Hazard, types of hazard, Time parameters of hazards, Hazard analysis Methods – Deterministic and Probabilistic – Introduction to Site characterization, Concept of site response – Local site effects and evaluation methods.

Concepts of Earthquake Resistant Building: Building configurations – Introduction – Functional planning – Continuous load path – Characteristics of Buildings.

Textbooks

1. Earthquake Resistant Design of structures, S. K. Duggal, Oxford University Press, 2007.
2. Earthquake Resistant Design of structures, Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd, 2006.

References Books

1. Seismic Design of Reinforced Concrete and Masonry Building, T. Paulay and M.J.N. Priestly, John Wiley & Sons, 1994.
2. Eartquake Resistant Design of Buidling structures, Vinod Hosur, Wiley India Pvt. Ltd, 1992.