REGULATIONS, COURSE STRUCTURE AND SYLLABUS

(Aligned with AICTE Model Curriculum 2018-19)

SITE18 Regulations

For

I & II B.Tech.

Civil Engineering

With effective from the Academic Year 2018-19

VISION

Confect as a premier institute for professional education by creating technocrats who can address the society`s needs through inventions and innovations.

MISSION

- Partake in the national growth of technological, industrial arena with societal responsibilities
- Provide an environment that promotes productive research
- Meet stakeholder’s expectations through continued and sustained quality improvements

QUALITY POLICY

Sasi Institute of Technology and Engineering is committed to achieve global standards and excellence in teaching, research and consultancy by creating conducive environment in the fields of technological, managerial studies with professionalism and global outlook ensuring continuous improvement.

Chapter-I

UG Regulations

Chapter – I

B.Tech. Regulations

Short Title and Commencement

The regulations listed under this head are common for all degree level under graduate programs (B.Tech.) offered by the college with effect from the academic year 2018-19 and they are called as "SITE18" regulations.

The regulations here under are subject to amendments as may be made by the Academic Council of the college from time to time, keeping the recommendations of the Board of Studies in view. 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.

Definitions

a. "Commission" means University Grants Commission (UGC)

b. "Council" means All India Council for Technical Education (AICTE)

c. "University" Means Jawaharlal Nehru Technological

University Kakinada (JNTUK)

d. "College" means Sasi Institute of Technology & Engineering, Tadepalligudem.

e. "Program" Means any combination of courses and /or requirements leading to award of a degree

f. "Course" Means a subject either theory or practical identified by its course title and code number and which is normally studied in a semester.

g. For example, (Data Structures) is a course offered at third semester of B.Tech (CSE) and its code is (18CSCST3020)

h. "Degree" means an academic degree conferred by the university upon those who complete the undergraduate curriculum

i. "Regular Student" means student enrolled into the four year programme in the first year

j. "Lateral entry Students" Means student enrolled into the four year programme in the second year

Academic Programs

Nomenclature of Programs

The nomenclature and its abbreviation given below shall continue to be used for the degree programs under the University, as required by the Council and Commission. The name of specialization shall be indicated in brackets after the abbreviation. For e.g. UG engineering degree in Mechanical Engineering program is abbreviated as B.Tech. (ME). Bachelor of Technology (B.Tech.) degree program offered in:

1. Civil Engineering (CE)
2. Computer Science and Engineering (CSE)
3. Electronics and Communication Engineering (ECE)
4. Electrical and Electronics Engineering (EEE)
5. Information Technology (IT)
6. Mechanical Engineering (ME)

Duration of the Programs

- **Normal Duration**
  - The duration of program for regular students shall be four years consisting of eight semesters
  - The duration of the program for lateral entry students who are admitted in second year shall be three years consisting of six semesters.
- **Maximum Duration**
  - The maximum period which a student can take to complete a full time program shall be double the

normal duration of the program, i.e., for regular students eight years.

– For lateral entry students the maximum duration is six years.

- **Minimum Duration of a Semester**
  – Each semester consists of a minimum of 90 instruction days with about minimum 25 and maximum 35 contact periods per week

Admission Criteria

The eligibility criteria for admission into UG engineering programs are as per the norms approved by government of Andhra Pradesh from time to time. The sanctioned seats in each program in the college are classified into CATEGORY-A and CATEGORY-B at first year level and Lateral Entry at second year level.

- **CATEGORY – A Seats:** These seats will be filled as per the norms approved by the Government of Andhra Pradesh.
- **CATEGORY – B Seats:** These seats will be filled by the College as per the norms approved by the Government of Andhra Pradesh.
- **CATEGORY – Lateral Entry Seats**: Lateral entry

candidates shall be admitted into the Third semester directly as per the norms approved by government of Andhra Pradesh. The percentages of Category-A, Category-B and Lateral Entry Seats are decided time to time by the Government of Andhra Pradesh.

Credit System

Credit means quantifying and recognizing learning. Credit is measured in terms of contact hours per week in a semester.

Credit Structure

A typical Credit Structure for course work (B.Tech Program) based on the above definition is given in the Table 1.

Table 1: Typical Credit Allocation Scheme for Course

Lectures (L)	Tutorials (T)	Practical (P)	Total Periods	Total Credits
3	1	0	4	3
0	0	3	3	1.5

Semester Course Load

The average course load shall be fixed at 20 credits per semester with its minimum and maximum limits being set at 17.5 and 23 credits, respectively.

Grade Points and Letter Grade for a Course

The grade points and letter grade will be awarded to student in each course based on his/her performance as per the grading system shown in the Table 2.

Table 2: Grade points and letter grade scheme for a course

Theory	Lab/Project	Grade Points	Letter Grade
85-100%	85-100%	10	Ex
75-84%	75-84%	9	A+
70-74%	70-74%	8	A
65-69%	65-69%	7	B+
60-64%	60-64%	6	B
50-59%	55-59%	5	C
40-49%	50-54%	4	D
< 40%	< 50%	0	F (Fail)

Semester Grade Points Average (SGPA)

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as shown in eq.1

$$\text{SGPA}= \frac{CR*GP}{\text{CR (for all courses offered in semester)}} \quad \text{--- (1)}$$

Where CR = Credits of a course

GP = Grade points awarded for a course

SGPA is calculated for the candidates who passed all the courses in that semester.

Cumulative Grade Point Average (CGPA)

The Cumulative Grade Point Average is a calculation of the average of all courses required for obtaining the degree. The CGPA is calculated as shown in eq.2

$$\text{CGPA} = \frac{CR * GP}{\text{CR (for all courses offered in semester)}} \quad \text{--- (2)}$$

Where CR = Credits of a course

GP = Grade points awarded for a course

Curriculum Framework

General Issues

– Curriculum framework is important in setting the right direction for a Degree program as it takes into account the type and quantum of knowledge necessary to be acquired by a student to qualify for a award in his/her chosen branch or specialization.

– Besides, this also helps in assigning the credits for each course, sequencing the courses semester-wise and finally arriving at the total number of courses to be studied and the total number of credits to be earned by a student to fullfil the requirements for conferment of degree.

- Each theory course shall consist of five units.

Curriculum Structure

The curriculum structure is designed in such a way that it facilitates the courses required to attain the expected knowledge, skills and attitude by the time of their graduation as per the needs of the stakeholders. The curriculum structure consists of various course categories (as described in 1.6.3 to 1.6.9) to cover the depth and breadth required for the program and for the attainment of program outcomes of the corresponding program. Each Programme of study will be designed to have 40-45 theory courses and 16-18 laboratory courses. The distribution and types of courses offered from the above is indicated in the following table 3.

Induction Program

The Induction Program for two weeks is designed to make the newly joined students feel comfortable, sensitize them towards exploring their academic interests and activities, reducing competition and making them work for excellence, promote bonding within them, build

Table 3: Comparison of Number of credits given by AICTE and Approved credits

S. No.	Category	No. of Credits									
		ECE		EEE		CSE/IT		ME		CE	
		AICTE	Approved	AICTE	Approved	AICTE	Approved	AICTE	Approved	AICTE	Approved
1	Humanities and Social Sciences	12	11	12	11	12	11	12	11	12	08
2	Basic Science courses	25	23	26	25	24	26	25	26	26	26
3	Engineering Science courses	24	23	20	20	29	29.5	24	23	29	24.5
4	Professional Core courses	48	56	53	62	49	48.5	48	55	47	56.5
5	Professional Elective Courses	18	20	18	15	18	18	18	18	23	21
6	Open elective courses	18	12	18	12	12	12	18	12	11	9
7	Project work , Seminar and Internship	15	15	11	15	15	15	15	15	12	15
8	Mandatory Courses	-	-	-	-	-	-	-	-	-	-
Total Credits		**160**	**160**	**158**	**160**	**159**	**160**	**160**	**160**	**160**	**160**

relations between teachers and students and building of character. The Universal Human Values component, which acts as an anchor, develops awareness and sensitivity, feeling of equality, compassion and oneness, draw attention to society and nature, and character to follow through. It also makes them reflect on their relationship with their families and extended family in the college. It also connects students with each other and with teachers so that they can share any difficulty they might be facing and seek help. Induction Program covers

- Physical activity
- Creative arts
- Universal human values
- Literary and Proficiency modules
- Lectures by Eminent People
- Visits to local Areas & Familiarization to Dept./Branch & Innovations

Institutional Core

Institutional Core courses give the knowledge, skills and attitude expected in UG engineering graduates of all programs. The courses offered under this category are:

1. **Humanities and Social Sciences**

   Humanities and Social Science Courses shall include Technical English, Constitution of India, Professional Ethics and Human Rights, Environmental Studies, Personality Development & Professional Communication, Management Science, Engineering Economics and Financial Management and English Language Communication Skills Lab.

2. **Basic Sciences**

   Science courses shall include Engineering Physics, Engineering Chemistry, Engineering Physics Lab, Engineering Chemistry Lab, Engineering Mathematics and Biology for engineers

3. **Engineering Sciences**

   Engineering Science courses shall include Programming for Problem Solving, Basic Electrical Engineering, Basic Electronics Engineering, Basic Electronics, Engineering Mechanics, Programming for Problem Solving Lab, Basic Electrical Engineering Lab, Engineering Drawing and Workshop / Manufacturing Practice

Program Core

The program core consists of set of courses considered necessary for the students of the specific program. The courses under this category should satisfy the programs specific criteria prescribed by the appropriate professional societies.

Program Electives

The program electives are set of courses offered in the program which covers depth and breadth to further strengthen their knowledge. The students may register for appropriate electives offered in the program based on their area of interest.

Open Electives

The students are expected to learn the course offered under this category under interdisciplinary.

Industry Interaction

- Internships/Mini Project
  - The students are expected to do internship of minimum 3 weeks duration in the industry approved by respective Head of the Department. It carries two credits.

Student Practice

Student Practice Courses are aimed at improving their professional competency. Student will have to participate successfully in the activities listed below.

Student shall participate in any two events from (a) one and any one activity from [b – d], before completion of 6th semester

a) Co-curricular participation
   - Student should have participated in Technical Quizzes/Student paper contest/ Seminars/ Conferences etc., approved by the department.

b) National Service Scheme (NSS)/ National cadet Corps(NCC)/Yoga Practice
   - Student should have enrolled as a member of NSS at least for one year.

c) Games and Sports
   - Participation in the university level and above competitions.

d) Art and Cultural
   - Participation in the university level and above competitions.

Course Numbering Scheme

The Course number code consists of 11 alphabets. A typical course number code is illustrated in the following Figure-1.

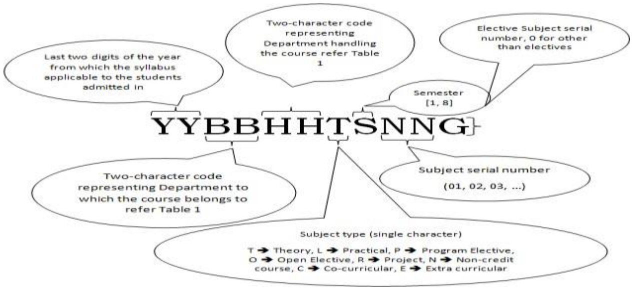

Figure 1: Course Numbering Scheme

The department codes are in given in following table 4.

Table 4: Department Codes

Department	Two-character code
Civil Engineering	CE
Electrical & Electronics Engineering	EE
Mechanical Engineering	ME
Electronics & Communications Engineering	EC
Computer Science Engineering	CS
Information Technology	IT
Management Science	MS
Mathematics	MA
Physics	PH
Chemistry	CH
English	EG
Biology	BI
Common to All Branches	CM

Example: STLD in 3rd semester for ECE with S.No 2

Course Code: 18ECECT3020

Examinations and Scheme of Evaluation

- **Continuous Evaluation (CE),** to be conducted by the course faculty/course coordinator all through the semester, and, to include midterm test, assignments, seminar, project and other means covering the entire syllabus of the course.
- **Semester End Examination (SE)**, to be conducted by chief controller of examinations at the end of a semester, as per the academic calendar and to include a written examination for theory courses and practical/project examination with built-in oral part for laboratory/project courses.

Continuous Evaluation (CE)

Theory Courses

- **Internal Evaluation**
  - For each theory course there shall be continuous evaluation for 30 marks. Continuous evaluation for theory courses consists of three components, namely, home assignment, mid-term examination and Class test.
  - 5 marks in each theory course shall be allotted for home assignments and Class tests. The home assignments are to be decided by the course

coordinators. There shall not be an overlap or repetition of questions/problems of home assignments with those of class tests. Separate problems are to be given for the home assignments for five marks to provide broadened exposure to the subject.

- Two midterm examinations each for 20 (15 marks for conventional paper and 5 marks for objective paper carrying 20 questions through online) will be conducted 90 minutes of theory and 20 minutes of online exam.
- The question paper shall be given in the following pattern.
  - ➢ For each midterm examination 50% syllabus should be completed. There shall be five questions considering two questions from each unit. Student should answer one question from each unit.
  - ➢ Average of two midterm exams + average of two home assignments + average of two class tests will be the final midterm examination marks.
- For the drawing subjects (such as Engineering

Graphics, Machine Drawing), the distribution shall be 30 marks for internal evaluation (15 marks for day – to – day work, 10 marks for mid term examinations and 5 marks for Class test)

- **External Evaluation**
  - The Semester end examinations shall be conducted for 3 hours duration at the end of the semester for 70 marks. The question paper shall be given in the following pattern:
  - **Part-A:** Shall contain 10 questions of one mark each. A minimum of two Questions will be given from each unit of the syllabus out of five units.
  - **Part-B:** There shall be two questions from each unit with internal choice. Each question carries 12 marks. Each course shall consist of five units of syllabus.

Laboratory Courses

- **Internal Evaluation**
  - For Laboratory courses there shall be continuous evaluation during the semester for 50 marks and semester end examination for 50

marks. The distribution of continuous evaluation is given in the Table 5:

Table 5: Continuous Evaluation for laboratory courses

S.No.	Criteria	Marks
1	Day to Day work	20
2	Record	10
3	Internal Examination	20
	Total	50

- **External Evaluation**

  - The semester end examination for laboratory courses shall be conducted for three hour duration at the end of semester for 50 marks. The distribution of marks shall be as shown in Table 6.

Table 6: Scheme of Evaluation of laboratory

S.No.	Criteria	Marks
1	Procedure / Algorithm & Program	15
2	Experiment/ Program Execution	15
3	Result Analysis	10
4	Viva-Voce	10
	Total	50

  - Each semester end lab examination shall be evaluated by an external examiner along with an internal examiner. The average of the marks awarded by internal and external examiners shall be taken into consideration.

Term Paper and Mini Project

- **Internal Evaluation**

  For Term Paper / Mini Project there shall be continuous evaluation during the semester for 50 marks and semester end evaluation for 50 marks. The distribution of continuous evaluation is given in the Table 7:

Table 7: Continuous Evaluation

S.No.	Criteria	Marks
1	Day to Day Assessment	20
2	Two Seminars	15+15
	Total	50

- **External Evaluation**

  The distribution of Semester end examination marks for Term Paper and Mini Project is given in the Table 8. The semester end examination shall be evaluated by program coordinator and senior faculty nominated by the chief controller of examinations.

Table 8: Semester end evaluation of Term Paper and Mini Project

S.No.	Criteria	Marks
1	Report	30
2	Seminar/Project Demonstration	20
	Total	50

Major Project Phase-I

- **Internal Evaluation**

  For major Project phase-I there shall be continuous evaluation during the semester for 100 marks. The student has to complete problem formation, literature survey and analysis and design of the project. The continuous evaluation for the Major Project shall be on the basis of two seminars by each student on the topic of his/her project. These seminars are evaluated by project review committee. In addition to this the project guide will evaluate for day to day performance. The project review committee shall consist of Head of Department, program coordinator and one senior faculty member of department. The distribution of marks is given in the Table 9:

Table 9: Continuous Evaluation for major project Phase-I

S.No.	Criteria	Marks
1	Two Seminars	15+15
2	Day to Day Assessment	20
3	Project Review Committee	50
	Total	100

Major Project Phase-II

- **Internal Evaluation**

  For major Project Phase -II there shall be continuous evaluation during the semester for 100 marks and semester end evaluation for 100 marks. The student has to complete software/Hardware implementation, Testing and calibration and final report. The continuous evaluation for the Major Project phase-II shall be on the basis of two seminars by each student on the topic of his/her project. These seminars are evaluated by project review committee. In addition to this the project guide will evaluate for day to day performance. The project review committee shall consist of Head of Department, program coordinator and one senior faculty member of department. The distribution of marks is given in the Table 10

Table 10: Continuous Evaluation for major project

S.No.	Criteria	Marks
1	Two Seminars	30+30
2	Day to Day Assessment	40
	Total	100

- **External Evaluation**
  - The Semester end examination for major project work shall be evaluated for 100 marks by a committee consisting of an external examiner, Head of the Department and project guide. The evaluation of project work shall be conducted at the end of the VIII Semester.
  - The average of the marks awarded by the committee members shall be taken into consideration in case of variation among the members.
  - The evaluation of 100 marks is distributed as given in Table 11:

Table 11: Semester end evaluation of Major Project

S.No.	Criteria	Marks
1	Report	30
2	Presentation	35
3	Project Demonstration/Execution	35
	Total	100

Self-Learning Courses

If none of the program offering program elective or open elective or if few students opt an elective then that subject will be considered as self learning course with the prior approval of the Head of the department and principal.

The semester end examinations for courses under this category are evaluated for 70 marks. The question paper shall be set as described in theory courses by course coordinator and same is to be given to the controller of examinations. The evaluation of the semester end examination will be carried by the course coordinator.

Industry Interaction / Industry offered Courses/ Internships

The candidate shall submit the comprehensive report to the department. The report will be evaluated for 100 marks by the project review committee.

Conditions for Pass

A candidate shall be declared to have passed in individual theory/drawing course if he/she secures a minimum of 40% aggregate marks (Continuous Evaluation and semester end examination marks put together), subject to a minimum of 35% marks in semester end examination.

A candidate shall be declared to have passed in individual lab/project course if he/she secures a minimum of 50% aggregate marks (Continuous Evaluation and semester end examination marks put together), subject to a minimum of 40% marks in semester end examination.

The student has to pass the failed course by appearing the supplementary examination as per the requirement for the award of degree. On passing a course of a program, the student shall earn assigned credits for that Course.

1.10.1 Withholding of Results

If the student has not paid any dues to the college or if any case of malpractice or indiscipline is pending against him, the result of the student will be withheld and he will not be allowed into the next semester. His/her degree will be withheld in such cases.

Criteria to Attend Semester End Examination and Promotion to Higher Semester

Eligibility for Semester End Examinations

- **Attendance**

  Regular course of study means a minimum average attendance of 75% in all the courses computed by totaling the number of periods of lectures, tutorials. Drawing, practical, Personality development courses and project work as the case may be, held in every course as the denominator and the total number of periods attended by the student in all the courses put together as the numerator.

  Condonation of shortage in attendance may be recommended by respective Heads of Departments on genuine medical grounds, provided the student puts in at least 65% attendance as calculated above and provided the Principal is satisfied with the genuineness of the reasons and the conduct of the student. Students, having more than 65% and less than 75% of attendance, shall have to pay requisite fee towards condonation.

Conditions for Promotion

A student shall be eligible for promotion to next Semester of B.Tech program, if he/she satisfies the conditions as stipulated in section 1.11.1

- Eligible candidate who failed to register for the semester-end examinations shall not be permitted to continue the subsequent semester, and has to repeat the semester for which he/she has not registered for semester end examinations.
- Student admitted to 5^{th} sem should clear all the 1^{st} sem subjects
- Student admitted to 6^{th} sem should clear all the 1^{st} & 2^{nd} sem subjects
- Student admitted to 7^{th} sem should clear all the 1^{st}, 2^{nd} & 3^{rd} sem subjects
- Student admitted to 8^{th} sem should clear all the 1^{st}, 2^{nd} , 3^{rd} & 4^{th} sem subjects

Eligibility for award of B.Tech. Degree

The B.Tech. Degree shall be conferred on a candidate who has satisfied the following requirements.

- **Regular Students**
  - A Regular student (4 year program) should

register himself/herself for 160 Credits from the categories 1.6.4 to 1.6.8, and shall secure 160 credits.

- Student shall register for courses categories 1.6.9 and successfully complete as given in 1.9

- **Lateral Entry Students**
  - A lateral entry student (3 year program) should register himself for 122 credits from the categories 1.6.5 to 1.6.9 and shall secure 122 credits.
  - A lateral entry Student shall register for courses categories 1.6.9 and successfully complete as given in 1.9

- **Award of Division**

The criteria for award of division, after completion of program are as shown in Table 12.

Table 12: Criteria for award of division

S.No.	CGPA	Division
1	> = 7.75	First class With Distinction
2	> = 6.5 - <7.75	First Class
3	> = 5.5 - <6.5	Second Class
4	> = 4 -< 5.5.	Pass Class
5	< 4	Fail

For the purpose of awarding First Class with Distinction CGPA obtained

- **Within 4 years –** in case of candidates admitted through EAMCET and Management Quota
- **Within 3 years** – in case of Lateral Entry candidates admitted through ECET
- Detained and break –in study candidates are not eligible for the award of First Class with Distinction.
- 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.

Consolidated Grade Card

A consolidated grade card containing credits and grades obtained by the candidates and the average semester attendance will be issued after completion of the four year B.Tech Program.

Improvement of Cumulative Grade Point Average

A candidate, after becoming eligible for the award of the Degree, may reappear for the semester end Examination in any of the theory courses as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of two academic years after becoming eligible for the award of the Degree.However, this facility shall not be availed of by a candidate who has taken the Provisional Certificate, Candidate shall be permitted to reappear for semester end examinations only for theory courses. Modified Grade Cards and New Consolidated Grade Card will be issued after incorporating new Grades and Credits.

Amendments to Regulations

The Academic Council may, from time to time, revise, amend or change the regulations, schemes of examination and/or syllabi.

DISCIPLINARY ACTION FOR MALPRACTICES/IMPROPER CONDUCT IN EXAMS

S. No.	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
1. (b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered

		against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year.The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated , shall be cancelled in all the subjects of the

		examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the	Expulsion from the examination hall and cancellation of performance in that subject and all the

	examination or answer book or additional sheet, during or after the examination.	other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief	In case of students of the college, they shall

	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	be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with

		forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the

		subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and

		project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

MALPRACTICES

- The Principal shall refer the cases of malpractices in Continuous Evaluation and Semester-End Examinations, to Malpractice Enquiry Committee, constituted by him/her for the purpose. Such committee shall follow the approved scales of punishment. The Principal shall take necessary action, against the erring students based on the recommendations of the committee.
- Any action on the part of student at an examination trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations, valuing

examination papers and preparing/keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

COURSE STRUCTURE AND DETAILED SYLLABUS

for

B.Tech.

Civil Engineering

With Effective from the academic year

2018-2019

Program Outcomes for an Engineering Graduates:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent

responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

I -B.Tech I- Semester Course structure for the Academic Year 2018-2019

Common for ME/CE/EEE

S. No.	Subject Code	Subject title	L	T	P	C
1	18CMEGT1010	Technical English	3	0	0	3
2	18CMMAT1020	Engineering Mathematics-I	3	1	0	4
3	18CMCHT1030	Engineering Chemistry	3	1	0	4
4	18CMEET1040	Basic Electrical Engineering	3	1	0	4
5	18CMEGL1050	English Communication skills lab	0	0	2	1
6	18CMCHL1060	Engineering Chemistry Lab	0	0	3	1.5
7	18CMEEL1070	Basic Electrical Engineering Lab	0	0	3	1.5
8	18CMMSN1080	Constitution of India, professional ethics & human rights (Non - Credit course)	3	0	0	0
Total Credits						**19**

I B.Tech II Semester Course structure for the Academic Year 2018-2019

Common for ME/CE/EEE

S. No.	Subject Code	Subject title	L	T	P	C
1	18CMMAT2010	Engineering Mathematics II	3	1	0	4
2	18EEPHT2020, 18MEPHT2020, 18CEPHT2020	Engineering Physics	3	1	0	4
3	18CMCST2030	Programming for problem solving	3	0	0	3
4	18CMMEL2040	Engineering Graphics	1	0	4	3
5	18EEPHL2050, 18MEPHL2050, 18CEPHL2050	Engineering Physics Lab	0	0	3	1.5
6	18CMCSL2060	Programming for problem solving lab	0	0	4	2
7	18CMMEL2070	Work Shop/ Manufacturing practice	0	0	3	1.5
8	18CMCHN2080	Environmental Science (Non - Credit course)	3	0	0	0
					Total Credits	**19**

<table>
<tr><td colspan="4">TECHNICAL ENGLISH
SEMESTER - I</td></tr>
<tr><td>Subject Code</td><td>18CMEGT1010</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/ Week</td><td>03</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exams Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits -03</td></tr>
<tr><td colspan="4">Course Objectives:
To enable the students to learn and apply fundamental principles in Technical English & Communication by focusing on:
1. Technical English Vocabulary
2. Writing Skills
3. Common Errors in Writing
4. Nature and Style of Sensible Technical Writing
5. Writing Technical Reports and Letters
6. Providing an inspiring reading experience from the biography of a renowned technocrat.</td></tr>
<tr><td colspan="4">Unit I</td></tr>
<tr><td colspan="3">Principles of Scientific Vocabulary
• Principles of Scientific vocabulary: short and simple words-compact substitutes for wordy phrases-redundant words and expressions-Avoid hackneyed and stilted phrases, verbosity and incorrect use of words
• The role of roots in word building,prefixes and suffixes, confusing words and expressions.
Non-detailed text-Karmayogi: 1-4 chapters, Page No 1-53</td><td>10 hours</td></tr>
<tr><td colspan="4">Unit II</td></tr>
<tr><td colspan="3">Writing Skills
• Distinguishing between academic and personal styles of writing</td><td>10 hours</td></tr>
</table>

• Use of clauses in technical phrases and sentences • Techniques of Sentence and paragraph writing • Measuring the clarity of a text through Fog Index or Clarity Index Non-detailed text- Karmayogi: 5-8 chapters, Page No 54-100	
Unit III	
Common Errors in Writing • Subject-verb agreement and concord of nouns, pronouns and possessive adjectives • Common errors in the use of articles, prepositions, adjectives and adverbs • Punctuation • Technical Guidelines for Communication • **Avoiding the pitfalls** Non-detailed text-Karmayogi: 9-12 chapters, Page No101-151	10 hours
Unit IV	
Nature and Style of Sensible Technical Writing • Academic Writing Process • Describing, processes and products • Defining, Classifying • Effective use of charts, graphs, and tables Non-detailed text- Karmayogi: 13-16 chapters, Page No 152-203	10 hours
Unit V	
Report writing and Letter writing • Writing Technical Reports • Précis writing • Letter Writing • Essay writing Non-detailed text- Karmayogi: 13-16 chapters, Page No 204-250	10 Hours

Course Outcomes

On Completion of the course student will acquire

1. Ability to understand Scientific vocabulary and use them confidently
2. Familiarity with the basic principles of writing clear sentences and paragraphs
3. Ability to write error free simple technical passages
4. Knowledge of writing different writing styles
5. Confidence to write letters and technical reports clearly and coherently
6. Get inspired by achievements and values upheld by a renowned technocrat.

Question Paper Pattern

Section –A

1. 10 questions carrying one mark each
2. Five questions each from Units I and III

Section –B

1. 5 questions carrying 12 marks each (one compulsory question from non-detailed text)
2. Each question will have two or three sub questions covering all the units

Text Books

1. Effective Technical Communication by Barun K Mitra, Oxford University Publication

Non-detailed Text

1. Karmayogi: A Biography of E Sreedharan by M S Ashokan

Reference Books

1. *Communication Skills* by Sanjay Kumar &PushpaLatha, OUP
2. Study Writing by Liz Hamp-Lyons and Ben Heasly, Cambridge University Press.
3. Remedial English Grammar by F T Wood, Macmillian 2007
4. *Practical English Usage* by Michael SwanOxford University Press
5. *English Collocations in Use* by Michael McCarthy & Felicity O'Dell

6. *Effective Technical Communication* by Arsahf Rizvi,
7. *Essential English Grammar by Raymond Murphy, CUP, 2017*

Course outcomes to Program outcomes mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	-	-	**2**	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	**2**	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	**2**	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	**2**	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	**2**	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	**2**	-	-	-	-	-

<table>
<tr><td colspan="4">ENGINEERING MATHEMATICS-I
SEMESTER - I</td></tr>
<tr><td>Subject Code</td><td>18CMMAT1020</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>3+ 1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 04</td></tr>
<tr><td colspan="4">Course Objectives:
To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:
1. To solve first order differential equations.
2. To solve linear differential equations with constant coefficients.
3. To find the extrema of a function.
4. To solve partial differential equations
5. To evaluate multiple integrals
6. To verify vector integral theorems</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">First order and first degree Ordinary Differential Equations
Exact, reducible to exact, linear and Bernoulli’s differential equations. Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling. Law of natural growth and decay.</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2</td></tr>
<tr><td colspan="3">Linear differential equations with constant coefficients: Solutions of second and higher order differential equations - inverse differential operator methods, Method of variation of parameters.
Application: LCR Circuits</td><td>Hours – 8</td></tr>
<tr><td colspan="4">Unit – 3</td></tr>
<tr><td colspan="3">Partial derivatives – Definition and Euler’s theorem (without proof), total derivatives, partial differentiation of composite functions. Jacobian - Functional dependence. Taylor’s and Maclaurin’s theorems for function of two</td><td>Hours – 10</td></tr>
</table>

variables (statement only). Maxima and minima-Lagranges method of undetermined multipliers	
Unit – 4	
First order Partial differential equations: Formation of Partial differential equations by elimination of arbitrary constants and arbitrary functions – solutions of first order linear (Lagrange) equation and non linear (standard type) equations **Higher order Partial differential equations:** Solutions of Homogeneous and Non Homogeneous partial differential equations with constant coefficients – Classification of partial differential equations.	**Hours – 10**
Unit – 5	
Double and triple integrals: Evaluation of double and triple integrals. Evaluation of double integrals by changing the order of integration and by changing into polar co-ordinates. Beta and gamma functions and their properties **Vector Calculus** – Gradient – Divergence - Curl - Line integrals-definition and problems, surface and volume integrals definition, Green's theorem in a plane, Stokes and Gauss-divergence theorems (without proof) and problems.	**Hours – 12**
Course outcomes: On completion of this course, students are able to 1. Solve first order differential equations. 2. Solve linear differential equations with constant coefficients. 3. Find the extrema of a function. 4. Solve partial differential equations 5. Evaluate multiple integrals 6. Verify vector integral theorems	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer question carrying 1 mark each. 2. Two questions from each unit should present.	

Section B:
1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. B.S. Grewal, **"Higher Engineering Mathematics"**, Khanna publishers, 44th edition, 2016.
2. Erwin Kreyszig, **"Advanced Engineering Mathematics**, Wiley, 9th edition, 2013.

Reference Books:

1. B.V. Ramana, **"Higher Engineering M athematics"**, Tata Mc Graw-Hill, 2006
2. N.P.Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, latest edition.
3. H.K. Dass and Er. RajnishVerma, **"Higher Engineerig Mathematics"**, S.Chand publishing, 1st edition, 2011.

Course outcomes to Program outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
5	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
6	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Course	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-

ENGINEERING CHEMISTRY
SEMESTER - I

Subject Code	18CMCHT1030	Internal Marks	30
Number of Lecture Hours/Week	3(L) + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 04

COURSE OBJECTIVES:

The objectives of this course, help the students to

1. Rationalize periodic properties like ionization potential, electronegativity and oxidation states.
2. Apply the concepts of electrochemistry.
3. Analyze bulk properties and processes using thermodynamic considerations.
4. List major chemical reactions that are used in the synthesis of molecules.
5. Understand the concepts of atomic and molecular orbitals.
6. Know various spectroscopic techniques.

Unit -1	
PERIODIC PROPERTIES Effective nuclear charge of fluorine and magnesium, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electro negativity, oxidation states, coordination numbers 2 & 3 and geometries, hard soft acids and bases.	**Hours – 10**
Unit -2	
USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA **Thermodynamic functions:** State and Path functions, First and second laws of thermodynamics, Gibbs	**Hours – 10**

Helmholtz Equation, concept of entropy and enthalpy. **Electro chemistry:** Introduction, electrode potential, standard electrodes – Hydrogen and Calomel electrodes, Nernst equation and applications. **Water chemistry:** Surface and subsurface water quality parameters – turbidity, pH, total dissolved salts, chloride content, break point chlorination. **Corrosion:** Wet chemical theory, control methods – proper designing, cathodic protection- Sacrificial anodic and impressed current cathodic protection.	
Unit – 3	
STEREOCHEMISTRY Principles of stereochemistry, representations of 3 dimensional structures of organic compounds, geometrical and stereoisomers, configuration and symmetry, enantiomers. **ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE** Introduction to reactions involving Substitution – SN^1 & SN^2 with mechanism, Addition – Free radical, Elimination – E1 & E2 with examples (mechanism is not involved), Synthesis of aspirin drug molecule.	**Hours – 10**
Unit – 4	
ATOMIC, MOLECULAR STRUCTURE AND ADVANCED MATERIALS Schrodinger equation. Particle in a box solution and their applications for conjugated molecules. **Nanoparticles**: Introduction, preparation methods – Sol-gel method, Chemical reduction method – properties and applications. **Surface properties:** Determination of surface tension and viscosity of liquids. **Ceramics:** Classification, examples and applications.	**Hours – 10**

Crystal field theory and the energy level diagrams for transition metal ions.	
Unit – 5	
SPECTROSCOPIC TECHNIQUES Regions of electromagnetic spectrum - Principles of vibrational and rotational spectroscopy. Vibrational and rotational spectroscopy of diatomic molecules: Rigid diatomic molecules - selection rule - simple Harmonic Oscillator - diatomic vibrating rotator. Nuclear magnetic resonance – Principle and Instrumentation. Principles of chromatography – TLC & Paper.	**Hours – 10**
COURSE OUTCOMES: On completion of the course student will be 1. Able to rationalise periodic properties like ionization potential, electro negativity and oxidation states. 2. Able to know the nature and working of various electrodes. 3. Able to analyze bulk properties and processes using thermodynamic considerations. 4. Able to synthesize organic molecules using different types of chemical reactions. 5. Able to understand the concepts of atomic and molecular orbitals. 6. Able to gain knowledge on spectroscopic techniques and the ranges of the electromagnetic spectrum used for exciting different molecular energy levels.	
QUESTION PAPER PATTERN: **SECTION A:** 1. This section contains ten one answer questions carrying 1 mark each. 2. Two questions from each unit should present. **SECTION B:** 1. This section will have 5 questions with internal choice. 2. Each full question carries 12 marks. 3. Each full question will have sub question covering all topics under a unit.	

TEXT BOOKS:

1. Stereochemistry of Carbon Compounds by Ernest Eliel; McGraw Hill Education.
2. Fundamentals of Molecular Spectroscopy, by C. N. Banwell.
3. Concise Inorganic Chemistry, J.D.Lee, 5th Edition; Wiley India.
4. Engineering Chemistry – Fundamentals and applications by Shikha Agarwal; Cambridge University Press
5. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp
6. Engineering Chemistry by Jain & Jain; Dhanpat Rai Publishing Company

REFERENCE BOOKS:

1. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S.Krishnan.
2. Physical Chemistry, by P. W. Atkins.
3. Physical Chemistry, by Glasstone, S
4. Advanced inorganic chemistry by Wilkinson G and Cotton FA

Course outcomes to Program outcomes mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Course	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-

BASIC ELECTRICAL ENGINEERING
SEMESTER-I

Subject Code	18CMEET1040	Internal Marks	30
Number of Lecture Hours/week	3(L)+1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 04

Course Objectives:

This course will enable student to :

- Describe the basics electrical circuit concepts and how to apply the various theorems for given electrical network
- Describe the representation of sinusoidal waveform and also analysis of single phase ac circuit with various elements
- Describe the principle and operation of ac and dc electrical machines
- Describe the basic operation of different converters circuits
- Describe the necessity of the batteries and importance of the basic switch gear unit

Module -1	
DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenins and Norton Theorems (Simple numerical problems). Time-domain analysis of first-order RL and RC circuits.	**Hours-10**

Module – 2	
AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.	**Hours-10**

Module – 3	
Transformers Magnetic materials, BH characteristics, ideal and practical transformer , equivalent circuit , losses in transformers,OC and SC tests, regulation and efficiency. Auto transformer and three-phase transformer connections.	**Hours-10**
Module – 4	
Electrical Machines: Ac machines- Generation of rotating magnetic fields, construction details and working of three phase induction motor, significance of torque – slip characteristics. Loss components and efficiency, starting and speed control of induction motor. Single phase induction motor. Construction and working of synchronous generators. **DC machines-** Construction, working, torque- speed characteristics and speed control of dc shunt motor.	**Hours-10**
Module – 5	
Power Converters and Electrical Installations DC – DC Buck and boost converters, duty ratio control, PWM techniques, single phase voltage source inverters. Classification of batteries and Low Voltage switch gear.	**Hours-10**
Course outcomes: On completion of the course student will be 1. Able to analyze DC circuits by using KCL, KVL and Network theorems 2. Able to analyze AC circuits 3. Able to explain the operation and compute performance of transformer 4. Able to explain the construction and working of rotating electrical machines 5. Able to describe DC-DC and DC-AC converters 6. Able to explain about types of LV switch gear and types of batteries	

Question paper pattern:

Section A :

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This section will have 10 questions.(Two questions from each unit)
2. Each full question carries 12 marks.
3. Each full question will have sub question covering all topics under unit
4. The student will have to answer 5 full questions selecting one full question from each unit.

Test books.

T1. E. Hughes, *"Electrical and Electronics Technology"*, Pearson, 2010.

T2.D.C. Kulshreshtha, *"Basic Electrical Engineering"*, McGraw Hill, 2009.

T3.D.P. Kothari, I.J. Nagrath, *"Basic Electrical Engineering"*, Tata McGraw Hill, 2010.

T4. J.P. Tewari, *"Basic Electrical Engineering"*, New Age International Publishers, 2003.

References

R1. M.D. Singh, *"Power Electronics"*, 2nd edition.

R2. *"Battery Energy Storage for Smart Grid Applications"*, Eurobat 2013.

R3. L.S. Bobrow, *"Fundamentals of Electrical Engineering"*, Oxford University Press, 1996.

R4. V.D. Toro, *"Electrical Engineering Fundamentals"*, Prentice Hall India, 1989.

R5. R.M. Dell, D.A.J. Rand, *"Understanding Batteries"*, 2001.

R6. Bhavesh Bhalja, R.P., Maheshwari, Nilesh G. Chothani, *"Protection and Switchgear"*, Oxford University Press, 5th impression, 2014.

Course Outcomes to Program Outcomes mapping

COs / POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
1	3	3	3	1	0	0	0	0	0	0	0	0	0	0	0
2	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0
3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0
5	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0
6	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Course	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0

English Language Communication Skills Lab

SEMESTER - I

Subject Code	18CMEGL1050	Internal Marks	50
Number of Practical Hours/Week	02	External Marks	50
Total Number of Practical Hours	32	Exam Hours	03
Credits – 01			

Objectives: To enable the students to learn communication skills of Listening, Speaking, Reading and Writing by focusing on:

- Listening Comprehension
- Pronunciation
- Functional English in formal and Informal Situations
- Interpersonal Communication Skills
- Presentation Skills

List of Experiments

UNIT I

Listening Comprehension

UNIT II

Pronunciation , Stress, Intonation & Rhythm

UNIT III

Common Everyday Situations: Conversations & Dialogues, Communication at Workplace

UNIT IV

Interpersonal Communication Skills- Group discussions and debates

UNIT V

Formal Presentations

Outcomes:

By the end of the course the students will be able to acquire basic Proficiency in English by practicing the following:

- Listening Comprehension
- Pronunciation
- Dialogues
- Interpersonal Communication Skills

- Presentation Skills
- Discussions and Debates

Learning Resources:

- Interact – English Lab Manual for Undergraduate Students by Orient BlackSwan
- Ted Talks, Interviews with Achievers and select movies
- Toastmaster's speeches and table topics
- Book Reviews and movie reviews
- Exercises in Spoken English Parts: I-III, CIEFL, Hyderabad.
- Oxford Guide to Effective Writing and Speaking by John Seely
- https://www.ted.com/talk

Course Outcomes Vs Program Outcomes Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	-	-	-	-	-	-	-	-	-	2	-	-
2	-	-	-	-	-	-	-	-	-	3	-	-
3	-	-	-	-	-	-	-	-	-	3	-	-
4	-	-	-	-	-	-	-	-	-	2	-	-
5	-	-	-	-	-	-	-	-	-	3	-	-
6	-	-	-	-	-	-	-	-	-	2	-	-

ENGINEERING CHEMISTRY LABORATORY
SEMESTER - I

Subject Code	18CMCHL1060	Internal Marks	50
Number of Practice Hours/Week	03	External Marks	50
Total Number of Practice Hours	36	Exam Hours	03

Credits – 1.5

COURSE OBJECTIVES:

The objectives of this course, help the students to

1. Measure molecular properties like surface tension and viscosity
2. Determine chloride content of water of given water sample.
3. Familiarize the synthesis of a simple drug.
4. Determine rate constant as a function of time.
5. Determine the strength of acids using conductivity meter.
6. Determine amount of Fe (II) using potentiometer.

List of Experiments
(Any 10 experiments must be conducted)

1. Determination of surface tension
2. Determination of viscosity of a liquid by Ostwald viscometer
3. Thin layer chromatography
4. Determination of chloride content of water
5. Determination hardness of water by EDTA.
6. Determination of the rate constant of first order reaction (Ester hydrolysis)
7. Determination of strength of strong acid using conductometeric titration.
8. Determination of strength of weak acid using conductometeric titration .
9. Determination of Ferrous iron using potentiometer.
10. Synthesis of a drug – Aspirin
11. Determination of the partition coefficient of a substance

between two immiscible liquids

12. Determination of strength of acetic acid using charcoal adsorption.

Demonstration Experiments:

1. Preparation of lattice structure and determination of atomic packing factor.
2. Chemical oscillations- Iodine clock reaction
3. Synthesis of Phenol formaldehyde resin
4. Saponification of oil

COURSE OUTCOMES:

On completion of the course student will be

1. Able to measure molecular properties like surface tension and viscosity
2. Able to determine chloride content of given water sample.
3. Able to synthesize a drug.
4. Able to determine rate constant as a function of time.
5. Able to determine strength of acids using conductivity meter.
6. Able to determine amount of Fe (II) using potentiometer.

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
1	-	3	-	-	-	-	-	-	-	-	-	-
2	-	3	-	-	-	-	-	-	-	-	-	-
3	-	3	-	-	-	-	-	-	-	-	-	-
4	3	-	-	-	-	-	-	-	-	-	-	-
5	-	3	-	-	-	-	-	-	-	-	-	-
6	-	3	-	-	-	-	-	-	-	-	-	-
Course	2	3	-	-	-	-	-	-	-	-	-	-

BASIC ELECTRICAL ENGINEERING LAB SEMESTER-I			
Subject Code	18CMEEL1070	Internal Marks	50
Number of Practice Hours/Week	3P	External Marks	50
Total Number of Practice Hours	32	Exam Hours	03
Credits – 1.5			

The objectives of this course, help the students to

1. Learn how to find the frequency response and resonance of RL & RC circuits
2. Learn how to verify the given networks using theorems
3. Learn how to measure the power and determination of efficiency of a single phase transformer and how to measure the power in three phase transformer
4. Learn how to determine the Torque-slip characteristics of a dc shunt and induction motors.
5. Learn how to find the regulation of an alternator
6. Learn the operation of different converter circuits and know about the switch gear system

List of Experiments (Any Ten experiments must be conducted)

1. Study of R-L,R-C,R-L-C circuits.
2. Verification of superposition theorem.
3. Verification of Thevenin's and Norton's theorems.
4. Series and Parallel resonance of RL and RC circuits.
5. Open circuit & Short circuit tests on a single phase transformer.
6. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
7. Speed control of DC shunt motor.
8. Torque Speed Characteristic on single phase induction motor
9. Regulation of Alternator.
10. Demonstration of Buck and Book converter
11. Demonstration of Voltage Source Inverter

12. Demonstration of Low Voltage Switch gear.

COURSE OUTCOMES:

On completion of this course, students are

1. Able to determine the time response and resonance of given RL, RC and RLC circuits
2. Able to determine the response using Superposition, Norton and Thevinins.
3. Able to determine the power , efficiency and regulation of ac machines
4. Able to determine the speed torque characteristics of dc and induction motors
5. Able to analyze the operation of Buck and boost converter and voltage source inverter.
6. Able to analyze the operation of LV Switch gear system.

Course outcomes to Program outcomes mapping:

COs / POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
1	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0
2	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0
3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
4	3	3	2	0	0	0	0	0	0	0	0	0	0	0	0
5	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
6	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Course	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0

CONSTITUTION OF INDIA, PROFESSIONAL ETHICS & HUMAN RIGHTS SEMESTER - I			
Subject Code	18CMMSN1080	Internal Marks	30
Number of Lecture Hours/Week	3	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 00			
COURSE OBJECTIVES: The objectives of this course help the students to 1. To provide basic information about Indian constitution. 2. To identify individual role and ethical responsibility towards society. 3. To understand human rights and its implications.			
Unit -1			
Lesson: Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution Fundamental Rights & its limitations.			**Hours – 10**
Unit -2			
Lesson: Directive Principles of State Policy & Relevance of Directive Principles State Policy Fundamental Duties. Union Executives – President, Prime Minister Parliament Supreme Court of India.			**Hours – 10**
Unit – 3			
Lesson: State Executives – Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42nd, 44th, 74th, 76th, 86th &91st Amendments.			**Hours – 10**
Unit – 4			
Lesson: Special Provision for SC & ST Special Provision for Women, Children & Backward Classes			**Hours –10**

Emergency Provisions. Human Rights –Meaning and Definitions, Legislation Specific Themes in Human Rights- Working of National Human Rights Commission in India Powers and functions of Municipalities, Panchyats and Co - Operative Societies.	
Unit – 5	
Lesson: Scope & Aims of Engineering Ethics, Responsibility of Engineers Impediments to Responsibility.Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering.	**Hours – 10**
COURSE OUTCOMES: On completion of the course student will 1. Have general knowledge and legal literacy and thereby to take up competitive examinations. 2. Understand state and central policies, fundamental duties. 3. Understand Electoral Process, special provisions. 4. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies, and 5. Understand Engineering ethics and responsibilities of Engineers 6. Understand Engineering Integrity & Reliability	
QUESTION PAPER PATTERN: **SECTION A:** 1. This section contains ten one answer questions carrying 1 mark each. 2. Two questions from each unit should present. **SECTION B:** 1. This section will have 5 questions with internal choice. 2. Each full question carries 12 marks. 3. Each full question will have sub question covering all topics under a unit.	
TEXT BOOKS: **Text Books:** 1. Durga Das Basu: **“Introduction to the Constitution on India”,** (Students Edn.) Prentice –Hall EEE, 19th / 20th Edn.,	

2001

2. Charles E. Haries, Michael S Pritchard and Michael J. Robins **"Engineering Ethics"** Thompson Asia, 2003-08-05.

REFERENCE BOOKS:

1. M.V.Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002.
2. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, **"Engineering Ethics",** Prentice –Hall of India Pvt. Ltd. New Delhi, 2004
3. Brij Kishore Sharma,**" Introduction to the Constitution of India"**, PHI Learning Pvt. Ltd., New Delhi, 2011.
4. Latest Publications of Indian Institute of Human Rights, New Delhi

Website Resources

1. www.nptel.ac.in
2. www.hnlu.ac.in
3. www.nspe.org
4. www.preservearticles.com

Course outcomes to Program outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
1	-	-	-	-	-	**3**	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	**3**	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	**1**	-		-	-	-	-	-	-	-
4	-	-	-	-	-	**2**	-	-	-	-	-	-	-	-	-
5						**3**									
6	-	-	-	-	-	-	-	**5**	-	-	-	-	-	-	-
Co urse	-	-	-	-	-	**3**	-	**5**	-		-	-	-	-	-

ENGINEERING MATHEMATICS-II

SEMESTER - II

Subject Code	18CMMAT2010	Internal Marks	30
Number of Lecture Hours/Week	3(L)+ 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 04

Course objectives:

To enable students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following

- To solve system of linear equations
- To find eigen values and eigen vectors of a matrix
- To solve initial value problems by using Laplace transforms
- To find the solution of algebraic/ transcendental equations and also interpolate the functions.
- To evaluate numerical integration and to solve ordinary differential equations by using numerical methods.
- To find Fourier series of a periodic function and to determine the Fourier transform of a function

Unit -1	
Linear Algebra: Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method – Jacobi method and Gauss-Seidel method – Eigen values and Eigen vectors, Properties of Eigen values and Eigen vectors - Linear transformation, Diagonalisation of a square matrix. Cayley-Hamilton theorem (without proof) - Reduction of Quadratic form to Canonical form.	**10 Hours**

Unit -2	
Laplace Transforms: Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function Inverse Laplace transforms– Convolution theorem (without proof).	**10 Hours**

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms	
Unit – 3	
Numerical Methods: Numerical solution of algebraic and transcendental equations by Regula- Falsi Method and Newton-Raphson method. Finite differences: Error functions – Forward, backward and central differences, Newton's forward and backward interpolation formulae. Gauss`s forward and backward interpolation formulae - Lagrange's interpolation formula (all formulae without proof)	**10 Hours**
Unit – 4	
Numerical integration: Trapezoidal rule - Simpson's (1/3)rd and (3/8)th rules. Numerical solutions of ordinary differential equations-Taylors series method-Picard's method-Eulers method-Modified Eulers method-Runge-Kutta methods	**8 Hours**
Unit – 5	
Fourier Series: Periodic functions, Dirichlet's condition, Fourier Series of periodic functions with period 2π and with arbitrary period. Fourier series of even and odd functions, Half range Fourier Series. **Fourier Transforms**: Infinite Fourier transforms, Fourier sine and cosine transforms, Inverse Fourier transforms.	**12 Hours**
Course outcomes: On completion of this course, students are able to, 1. Solve system of linear equations 2. Find eigen values and eigen vectors of a matrix 3. Solve initial value problems by using Laplace transforms 4. Find the solution of algebraic/ transcendental equations and also interpolate the functions. 5. Evaluate numerical integration and to solve ordinary differential equations by using numerical methods. 6. Find Fourier series of a periodic function and to determine the Fourier transform of a function	

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. B. S. Grewal," Higher Engineering Mathematics", Khanna publishers, 44^{th} Edition, 2016.
2. Kreyszig, "Advanced Engineering Mathematics " - Wiley, 9^{th} Edition, 2013.

Reference Books:

1. B.V.Ramana "Higher Engineering M athematics" Tata Mc Graw-Hill, 2006
2. N P Bali and Manish Goyal, "A text book of Engineering mathematics", Laxmi publications, 7^{th} edition.
3. H. K Dass and Er. Rajnish Verma ,"Higher Engineerig Mathematics", S. Chand publishing,1st edition, 2011.
4. Dr.K.V.Nageswara Reddy and Dr.B.Rama Bhupal Reddy, “Engineering Mathematics, Volume II” Scitech Publications, 2017.

Course outcomes to Program outcomes mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	2	3	-	-	-	-	-	-	-	-	-	-
2	2	3										
3	2	3	-	-	-	-	-	-	-	-	-	-
4	2	3	-	-	-	-	-	-	-	-	-	-
5	2	3	-	-	-	-	-	-	-	-	-	-
6	2	3	-	-	-	-	-	-	-	-	-	-
Course	2	3	-	-	-	-	-	-	-	-	-	-

ENGINEERING PHYSICS
(Mechanics)
Common to CE and ME
SEMESTER - II

Subject Code	18MEPHT2020, 18CEPHT2020	Internal Marks	30
Number of Lecture Hours/Week	3+1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 04

COURSE OBJECTIVES:

The objectives of this course, help the students

- To impart the knowledge of Newton's law of motion in central force field
- To understand the Motion of rigid body systems in a Non inertial frames of reference
- To describe the Rigid body dynamics

Unit -1

One Dimensional motion Newton's law, Equation of motion in one dimension, Invariance of Newton's equations-under shift of coordinate system rotation of coordinate system, time translation, Time reversal, Mirror reflection, Galileo transformation, Accelerating frames of reference. Simple harmonic motion-Harmonic oscillator; Damped harmonic motion – over-damped, critically damped and lightly-damped oscillators; Forced oscillations and resonance.	**Hours – 10**

Unit -2

Two dimensional motion Two Dimensional motion in the Cartesian coordinate system and in the radial polar coordinate system, Kepler's law, Kepler's problem of planetary motion and its solutions , Classification of Kepler's orbits.	**Hours – 9**

Unit -3	
Three dimensional motion Three dimensional motion in the Cartesian coordinate system –Example of Motion of charged particle, motion in non referential plane- Accelerating reference plane along a straight plane, Reference frame rotating with a constant angular velocity, Earth as a reference frame- study of the effects of earth rotations-Apparent gravitational acceleration, Effect of Coriolis force on terrestrial experiments and freely falling body.	**Hours – 10**
Unit – 4	
Conservative and non conservative force fields: Conservative and non conservative force fields, Gradient of a potential field, Curl of a vector field, Newton equations for variable mass system (rocket), System of particles and centre of mass.	**Hours – 9**
Unit – 5	
Rigid body dynamics Angular momentum of a single particle and system of particle, Definition of a rigid body, Equation of motion of rigid body, Euler's equation describing rigid body motion, Angular velocity, Kinetic energy of rigid body and moment of inertia, Parallel axis theorem.	**Hours – 10**

COURSE OUTCOMES:

On completion of the course student will able to

1. Understand the conditions for invariance and non invariance of Newton's second law.
2. Distinguish the various harmonic motions and resonance.
3. Apply Kepler's laws to understand the planetary motions.
4. Formulate Five-term acceleration formula with consideration of earth rotation effect.
5. Understanding the concept of conservative and non conservative force fields.
6. Describe the rigid body dynamics and moment of inertia.

QUESTION PAPER PATTERN:

SECTION A:

1. This section contains ten one sentence answer questions, each carrying 1 mark.
2. Two questions from each unit should be designed.

SECTION B:

1. This section will have 5 questions with internal choice.
2. Each question carries 12 marks.
3. Each full question comprises sub questions covering all topics under a unit.

TEXT BOOKS:

1. Introduction to Mechanics — MK Verma.
2. An Introduction to Mechanics — D Kleppner & R Kolenkow.

REFERENCE BOOKS:

1. Principles of Mechanics — JL Synge & BA Griffiths.

Course outcomes to Program outcomes mapping:

CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
2	3	2	1	3	-	-	-	-	-	-	-	-	-	-	-
3	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
6	3	2	1	3	-	-	-	-	-	-	-	-	-	-	-
Course	3	2	1	1	-	-	-	-	-	-	-	-	-	-	-

<table>
<tr><td colspan="4" align="center">PROGRAMMING FOR PROBLEM SOLVING
SEMESTER - II</td></tr>
<tr><td>Subject Code:</td><td>18CMCST2030</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>3</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4" align="center">Credits - 03</td></tr>
<tr><td colspan="3">Unit-I: Introduction to computer systems and programming</td><td>Teaching Hours</td></tr>
<tr><td colspan="3">History & Hardware: Computer Hardware, components, Types of Software, Memory units.
Introduction to Problem solving: Algorithm, characteristics of Algorithms, Basic operations of algorithms, Pseudocode, Flowchart, Types of languages, Relation between Data, Information, Input and Output.
Basics of C: History and Features of C, Importance of C, Procedural Language, Compiler versus Interpreter, Structure of C Program, Program development steps, programming errors.</td><td>Hours- 08</td></tr>
<tr><td colspan="4">Unit-II: C Expressions, evaluation and control statements</td></tr>
<tr><td colspan="3">Overview of C: Character Set, C-Tokens, Data Types, Variables, Constants, Operators, Operator precedence and Associativity, converting mathematical expressions to C-expressions, evaluation of C-expressions, Input/output functions.
Conditional Branching: if statement, if...else statement, Nested if...else statement, if…else…if ladder, switch statement.
Unconditional Branching: goto.
Control flow statements: break, continue.
Looping Constructs: do-while statement, while statement, for statement.</td><td>Hours- 12</td></tr>
<tr><td colspan="4">Unit-III: Arrays and Functions</td></tr>
</table>

Arrays: Introduction, 1-D Arrays, Character arrays and string representation, 2-D Arrays (Matrix), Multi-Dimensional Arrays. **Functions**: Basics, necessity and advantages, Types of functions, Parameter passing mechanisms, Recursion, Storage Classes, Command Line Arguments, Conversion from Recursion to Iteration and vice-versa. **Strings:** Working with strings, String Handling Functions (both library and user defined).	**Hours -10**
Unit-IV: Derived and User Defined Data types	
Pointers: Understanding Pointers, Pointer expressions, Pointer and Arrays, Pointers and Strings, Pointers to Functions. **Dynamic Memory Allocation:** Introduction to Dynamic Memory Allocation malloc, calloc, realloc, free. **Structures and Unions:** Defining a Structure, typedef, Advantage of Structure, Nested structures, Arrays of Structures, Structures and Arrays, Structures and Functions, Structures and Pointers, Defining Unions, Union within union, Structure within union, Union within structure, self-referential structures, bitfields, enumerations.	**Hours -12**
Unit-V: Preprocessing and File Handling	
Preprocessing Directives: Macro Substitution, File Inclusion, conditional compilation and other directives **File Management in C:** Introduction to File Management, Modes and Operations on Files, Types of files, Error Handling During I/O Operations.	**Hours -08**

Text Books:

1. Computer Programing ANSI C, E Balagurusamy, Mc Graw Hill Education(Private), Limited (TB1)
2. Programming in C, Reema Thareja, Second Edition, Oxford Higher Education (TB2)

Reference Books:

1. Computer Basics and C Programming, V Raja Raman, Second

Edition, PHI (RB1)

Course Outcomes:
Student can able to

1) formulate algorithms, translate them into programs and correct program errors.
2) choose right control structures suitable for the problem to be solved.
3) decompose reusable code in a program into functions.
4) make use of arrays, pointers, structures and unions effectively.
5) store and retrieve data from permanent storage.
6) learn file operations

Question paper pattern:

Section A:

1. This section contains ten
2. one or two-line answer question carrying 1 mark each.
3. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carries 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Course outcomes to Program outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
1	2	3	1		3									
2	2	3	3		1									
3	3	2	3		1									
4	2	2	3		1									
5	2	2	2											
6	2	2	2		1									
Course	2	2	3		2									

ENGINEERING GRAPHICS
SEMESTER - II

Subject Code	18CMMEL2040	Internal Marks	30
Number of Lecture Hours/Week	1(L)+04(P)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 03

COURSE OBJECTIVES:

1. Students should be able to construct Polygons using general methods, inscribe and describe polygons on circles, draw curves (parabola, ellipse and hyperbola, cycloids, involutes by general methods
2. Students should be able to read, interpret and construct plain scales, diagonal scales and vernier scales
3. Student should be able to draw orthographic projections of points, lines, Planes & Solids inclined to one reference plane. Students are should be able to apply various concepts to solve practical problems related to engineering.
4. Student should be able to draw sections and sectional views of Solids
5. Student should be able to draw isometric view of lines, plane figures and simple solids. Student should be able to convert given isometric views into orthographic views. Students should be able to apply various concepts to solve practical problems related to engineering
6. Student should be able to draw objects using draw and modify toolbars of AutoCAD

Unit -1	
Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections – Ellipse, Parabola, Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;	**Hours– 10**

Unit -2	
Projections of Points and lines inclined to both planes; Projections of planes inclined to one plane	**Hours–08**
Unit – 3	
Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes	**Hours–10**
Unit – 4	
Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone	**Hours–10**
Unit – 5	
Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions **Introduction to AUTOCAD**-The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows	**Hours–12**

COURSE OUTCOMES:

1. Students will be able to construct Polygons using general methods, inscribe and describe polygons on circles, draw curves (parabola, ellipse and hyperbola, cycloids, involutes by general methods
2. Students will be able to read, interpret and construct plain scales, diagonal scales and vernier scales
3. Student will be able to draw orthographic projections of points, lines, Planes & Solids inclined to one reference plane. Students will be able to apply various concepts to solve practical problems related to engineering.
4. Student will be able to draw sections and sectional views of Solids
5. Student will be able to draw isometric view of lines, plane figures and simple solids. Student will be able to convert given isometric views into orthographic views. Students will be able to apply various concepts to solve practical problems related to

engineering
6. Student will be able to draw objects using draw and modify toolbars of AutoCAD

QUESTION PAPER PATTERN:

SECTION A: (14M)

1. This section contains four questions carrying different weightage.

SECTION B: (4x14=56M)

1. This section will have 5 questions with internal choice.
2. Each full question carries 14 marks.
3. Each full question will have sub question covering all topics under a unit.

Text/Reference Books:

1. Engineering Drawing by N.D. Bhatt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
3. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
4. Engineering Graphics for Degree by K.C. John, PHI Publishers

Course outcomes to Program outcomes mapping:

PO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
1	2		3							3		2			
2	2		3							3		2			
3	2		3							3		2			
4	2		3							3		2			
5	2		3							3		2		2	
6	2		3							3		2		2	
Over all	2		3							3		2		2	

ENGINEERING PHYSICS LABORATORY **Common to CE&ME** SEMESTER - II			
Subject Code	18CEPHL2050, 18MEPHL2050	Internal Marks	50
Number of Practice Hours/Week	03	External Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

COURSE OBJECTIVES:

The objectives of this course, help the students

- To apply the theoretical knowledge of Physics through hands on the experimental instruments
- To improve the experimental knowledge in the later studies
- To understand the basic need of experiments.
- To know how to measure the different physical quantities.

List of Experiments

1. To investigate the Motion of Coupled Oscillators
2. To determine the rigidity modulus η of wire-Torsional pendulum.
3. To determine acceleration due to gravity g and radius of gyration K - Compound pendulum.
4. To determine the Frequency of an electrically maintained tuning fork by Melde's Experiment.
5. To determine the velocity of sound in air-Volume resonator.
6. To verify the transverse law of vibrations-Sonometer.
7. To determine the young's modulus and draw load depression graph in uniform bending.
8. To determine the Moment of Inertia of a Flywheel.
9. To verify the parallel axis and perpendicular axis theorems and determine the moment of inertia of a regular rectangular body -Bifilar pendulum.
10. To study of oscillations-Spiral spring.

COURSE OUTCOMES:

On completion of the course student will able to

1. Study the mode of vibrations in Coupled Oscillators
2. Determine the g & η values using the knowledge in simple harmonic motions.
3. Apply the phenomenon of resonance to verify the transverse laws of stretched string.
4. Determine the frequency of vibrating body, velocity of sound in air using resonance.
5. Determine the moment of inertia of a rigid body.
6. Verify the parallel axis and perpendicular theorems of moment of inertia.

Course outcomes to Program outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	**3**	**1**	-	**3**	-	-	-	-	-	-	-	-	-	-	-
2	**3**	**1**	-	**3**	-	-	-	-	-	-	-	-	-	-	-
3	**3**	**1**	-	**3**	-	-	-	-	-	-	-	-	-	-	-
4	**3**	**1**	-	**3**	-	-	-	-	-	-	-	-	-	-	-
5	**3**	**1**	-	**3**	-	-	-	-	-	-	-	-	-	-	-
6	**3**	**1**	-	**3**	-	-	-	-	-	-	-	-	-	-	-
Course	**3**	**1**	-	**3**	-	-	-	-	-	-	-	-	-	-	-

PROGRAMMING FOR PROBLEM SOLVING LAB SEMESTER - II			
Subject Code	18CMCSL2060	Internal Marks	50
Number of Practice Hours/Week	04	External Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits - 02			

Objectives:

- To apply programming for basic mathematical functions
- To design and program mathematical concepts.
- To create and use the functions and library functions
- Able to apply the theoretical knowledge of formatting of documents
- To create and apply user defined types to the real world problems.
- To create files and shapes of the concepts.

List of Experiments

Exercise 1 (Familiarization with programming environment)

a) Familiarization of CODE BLOCKS C++ Editor to edit, compile, execute, test and debugging C programs.
b) Familiarization of RAPTOR Tool to draw flow charts and understand flow of control.
c) Acquittance with basic LINUX commands.

Exercise 2 (Simple computational problems using arithmetic expressions)

a) Write a C Program to display real number with 2 decimal places.
b) Write a C Program to convert Celsius to Fahrenheit and vice versa.
c) Write a C Program to calculate the area of triangle using the formula

$$\text{area} = \sqrt{s(s-a)(s-b)(s-c)} \text{ where } s = \frac{a+b+c}{2}$$

d) Write a C program to find the largest of three numbers using ternary operator.
e) Write a C Program to swap two numbers without using a

temporary variable.

Exercise 3 (Problems involving if-then-else structures)

a) Write a C Program to check whether a given number is even or odd using bitwise operator, shift operator and arithmetic operator.
b) Write a C program to find the roots of a quadratic equation.
c) Write a C Program to display grade based on 6 subject marks using if…else…if ladder.
d) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then
e) prints the result using switch control statement. (Consider the operators +, -, *, /, %)

Exercise 4 (Iterative problems)

a) Write a C Program to count number of 0’s and 1’s in a binary representation of a given number.
b) Write a C program to generate all the prime numbers between two numbers supplied by the user.
c) Write a C Program to print the multiplication table corresponding to number supplied as input.

Exercise 5 (Iterative problems)

a) Write a C Program to Find Whether the Given Number is i) Armstrong Number ii) Palindrome Number
b) Write a C Program to print sum of digits of a given number

Exercise 6 (Series examples)

a) Write a C Program to calculate sum of following series
b) 1+2+3+…. N b)1+1/2+1/3+……+1/n c)$1+x+x^2+x^3 \ldots\ldots +x^n$

Exercise 7 (1D Array manipulation)

a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to search an element in an array (linear search).
c) Write a C Program to print the following pattern using a character array

S
SA
SAS
SASI

Exercise 8 (Matrix problems, String operations)

a) Write a C program to add two matrices.
b) Write a C program to multiply two matrices if they are compatible or print an error message "incompatible matrix sizes" otherwise.
c) Write a C program to check given matrix is symmetric or not.
d) Implement the following string operations with and without library functions.
   i) copy ii) concatenate iii) length iv) compare

Exercise 9 (Simple functions)

a) Write a C Program demonstrating the following function types
   i. With arguments and with return value.
   ii. With arguments and without return value
   iii. Without arguments and without return value.
   iv. Without arguments and with return value.
b) Write a C Program illustrating call by reference

Exercise 10 (Recursive functions)

Write a C Program illustrating the following with Recursion without Recursion

a) Factorial b) GCD c) Power d) Fibonacci

Exercise 11(Pointers and structures)

a) Write a C program to find sum of n elements entered by user. To perform this program,
   allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program,
   allocate memory dynamically using calloc () function.
   Note: Understand the difference between the above two programs.
c) Write a C Program to read and print student details using structures.

Exercise 12 (File operations)

a) Write a C program to open a file and to print it contents on screen.
b) Write a C program to copy files

c) Write a C program merges two files onto a new file.
d) Write a C program to delete a file.

COURSE OUTCOMES:

1. Attain knowledge on using CODE BLOCKS and RAPTOR tools in solving problems.
2. Examine and analyze alternative solutions to a problem.
3. Design an algorithmic solution to a problem using problem decomposition and step-wise refinement.
4. Demonstrate conversion of iterative functions to recursive and vice-versa.
5. Implement the concepts of arrays.
6. Implement the structures, Unions and files.

Course outcomes to Program outcomes mapping:

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
1	3	3	3		3									
2	2	3	3		2									
3	2	3	3		2									
4	2	3	3		2									
5	2	3	3		2									
6	2	3	3		2									
Course	2	3	3		2									

WORKSHOP/MANUFACTURING PRACTICE SEMESTER - II			
Subject Code	18CMMEL2070	Internal Marks	50
Number of Practice Hours/Week	03	External Marks	50
Total Number of Practice Hours	36	Exam Hours	03
Credits – 1.5			

COURSE OBJECTIVES:

1. Students should be able to learn the basic manufacturing processes, study the various tools and equipment used and gain hands-on experience in different trades.
2. Students should be able to learn the engineering and technology involved in carpentry, fitting, black smithy, foundry, welding, machining and plastic moulding.
3. Students should understand the workmanship required, working of machinery or equipment necessary.

i. Lectures & videos: (10 hours)

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods **(3 lectures)**
2. CNC machining, Additive manufacturing **(1 lecture)**
3. Fitting operations & power tools **(1 lecture)**
4. Electrical & Electronics **(1 lecture)**
5. Carpentry **(1 lecture)**
6. Plastic moulding, glass cutting **(1 lecture)**
7. Metal casting **(1 lecture)**
8. Welding (arc welding & gas welding), brazing **(1 lecture)**

ii. Workshop Practice:

Sl. NO.	**Name of Shop floor**	**Exercises**
1.	Blacksmithy	1. S-Hook
		2. Square Rod To Round Rod
2.	Carpentry	1. T-Lap Joint
		2. Cross Lap Joint
3.	Foundry	1. Mould for a Solid
		2. Mould for a Split Pattern.

4.	Fitting	1. Square Fitting
		2. V-Fitting
5.	Welding	1. Butt Joint
		2. Lap Joint
6.	Machine Tools	1. Turning
		2. Knurling
7.	Plastic Moulding	1. Key chain

COURSE OUTCOMES:

1. Students will be able to make use of basic carpentry joints to make furniture.
2. Students will be able to fabricate mechanical engineering assemblies using fitting joints.
3. Students will be able to produce various machine components by using foundry, black smithy, machining and plastic moulding techniques.

Course outcomes to Program outcomes mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3														
2	3														
3	2				1				1						
Course	3				1				1						

ENVIRONMENTAL SCIENCE SEMESTER - II			
Subject Code	18CMCHN2080	Internal Marks	30
Number of Lecture Hours/Week	04	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 00			

COURSE OBJECTIVES:

The objectives of this course, help the students to

1. Know the importance of Environmental studies and the measures to be taken to overcome global environmental challenges.
2. Understand the concept of ecosystem and its diversity.
3. Gain knowledge on natural resources.
4. Understand the concept of biodiversity.
5. Gain knowledge on environmental pollution.
6. Gain knowledge on environmental legislation and global treaties.

Unit -1	
MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES **Environment** - Definition, Introduction - Scope and Importance - Global environmental challenges, global warming & climate change - Acid rains, ozone layer depletion - Carbon credits - Sustainability, Stockholm & Rio Summit - Population growth & explosion - Role of Information Technology in Environment and human health. **Ecosystem** - Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the different	**Hours – 10**

ecosystems	
Unit -2	
NATURAL RESOURCES Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation - Timber extraction – Mining, dams and other effects on forest and tribal people Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.	**Hours – 12**
Unit – 3	
BIODIVERSITY AND ITS CONSERVATION Introduction - Definition: genetic, species and ecosystem diversity. – Biogeographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	**Hours – 6**

Unit – 4	
ENVIRONMENTAL POLLUTION Definition, Cause, effects and control measures of : a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards Solid waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution. - Pollution case studies.	**Hours – 12**
Unit – 5	
SOCIAL ISSUES AND THE ENVIRONMENT Urban problems related to energy -Water conservation, rain water harvesting, watershed management - Resettlement and rehabilitation of people its problems and concerns. Environment Protection Act - Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness. **Field work:** Visit to a local area to document environmental assets River /forest grassland/hill/mountain -Visit to a local polluted site Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds. -Study of simple ecosystems - pond, river, hill slopes, etc.	**Hours – 10**
COURSE OUTCOMES:	

On completion of the course student will be

1. Able to know the importance of Environmental studies and the measures to be taken to overcome global environmental challenges.
2. Able to understand the concept of ecosystem and its diversity.
3. Able to gain knowledge on natural resources.
4. Able to understand the concept of biodiversity.
5. Able to gain knowledge on environmental pollution.
6. Gain knowledge on environmental legislation and global treaties.

QUESTION PAPER PATTERN:

SECTION A:

1. This section contains ten one answer question carrying 1 mark each.
2. Two questions from each unit should present.

SECTION B:

1. This section will have 5 questions with internal choice.
2. Each full question carries 12 marks.
3. Each full question will have sub question covering all topics under a unit.

TEXT BOOKS:

1. E. Bharucha (2003), “Environmental Studies”, University Publishing Company, New Delhi.
2. J.G. Henry and G.W. Heinke (2004), “Environmental Science and Engineering”, Second Edition, Prentice Hall of India, New Delhi
3. G.M. Masters (2004)” Introduction to Environmental Engineering and Science”, Second Edition, Prentice Hall of India, New Delhi

REFERENCE BOOKS:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.

2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada.
3. Environmental Studies, P.N. Paliniswamy, P. Manikandan, A. Geeta and K. Manjula Rani, Pearson Education, Chennai.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	-	-	-	-	-	-	**3**	-	-	-	-	-	-	-	-
2	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-
4	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	**3**	**3**	-	-	-	-	-	-	-	-	-	-	-	-
6	-	**3**		-	-	-	-	-	-	-	-	-	-	-	-
Course	**3**	**3**	**3**	-	-	-	**3**	-	-	-	-	-	-	-	-

Course Structure for

B.Tech. (Civil Engineering)

Semester III (Second year)

S. No	Course Code	Course Title	L	T	P	C
1	18CEMAT3010	Engineering Mathematics-III	3	1	0	4
2	18CMCET3020	Engineering Mechanics	3	1	0	4
3	18CECET3030	Engineering Geology	2	0	0	2
4	18CECET3040	Surveying & Geomatics	3	0	0	3
5	18CECET3050	Building Materials & Concrete Technology	3	0	0	3
6	18CECEL3060	Engineering Geology Lab	0	0	3	1.5
7	18CECEL3070	Surveying Field work lab	0	0	3	1.5
8	18CECEL3080	Computer-aided Civil Engineering Drawing Lab	0	0	3	1.5
9	18CEECN3090	Basic Electronics (MC)	3	-	-	-
					Total Credits	**20.5**

Course Structure for

B.Tech. (Civil Engineering)

Semester IV (Second year)

S. No	Course Code	Course Title	L	T	P	C
1	18CECET4010	Fluid Mechanics	3	0	0	3
2	18CECET4020	Strength of Materials	3	0	0	3
3	18CECET4030	Environmental Engineering	3	0	0	3
4	18CECET4040	Transportation Engineering	3	0	0	3
5	18CMMST4050	Engineering Economics and Financial Management	3	0	0	3
6	18CECEL4060	Strength of Material lab	0	0	3	1.5
7	18CECEL4070	Environmental Engineering Lab	0	0	3	1.5
8	18CECEL4080	Material Testing Lab	0	0	2	1.5
					Total Credits	**19.5**

ENGINEERING MATHEMATICS – III SEMESTER - III			
Subject Code	18CMMAT3010	Internal Marks	30
Number of Lecture Hours/Week	3(L) + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 04			

Course Objectives:

This course will enable students to:

- To find the function of a complex variable
- To evaluate complex integration and expand functions using Taylor & Maclaurin's series
- To evaluate integrals using Residues
- To find the statistical parameters for distributions
- To test the hypothesis

Unit -1	**Hours**
Function of a complex variable Introduction –continuity –differentiability- analyticity – properties – Cauchy –riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.	**10**
Unit -2	
Integration and series expansions Complex integration: Line integral – Cauchy's integral theorem, Cauchy's in integral formula, generalized integral formula (all without proofs) Radius of convergence – expansion in Taylor's series, Maclaurin's series and Laurent series	**10**
Unit – 3	
Singularities and Residue Theorem Zeros of an analytic function, Singularity, Isolated singularity, Removable singularity, Essential singularity, pole of order m, simple pole, Residues, Residue theorem, Calculation of residues, Residue at a pole of order m,	**10**

Evaluation of real definite integrals: Integration around the unit circle**,** Integration around semi circle, Indenting the contours having poles on the real axis.	
Unit – 4	
Discrete Random variables and Distributions: Introduction-Random variables- Discrete Random variable-Distribution function- Expectation. Discrete distributions: Binomial, Poisson and Geometric distributions and their fitting to data. **Continuous Random variable and distributions:** Introduction-Continuous Random variable-Distribution function- Expectation-Continuous distribution: Uniform, Exponential and Normal distributions, Normal approximation to Binomial distribution	**10**
Unit – 5	
Test of Significance: Introduction - Population and samples- Sampling distribution of means (σ-known) t-distribution- Sampling distribution of means(σ-unknown), chi-square and F- test Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors –Level of significance - One tail and two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences - ANOVA for one – way and two – way classified data	**10**
Course outcomes: On completion of this course, students are able to 1. Find the function of a complex variable 2. Evaluate complex integration and expand functions using Taylor & Maclaurin‟s series 3. Evaluate integrals using Residues 4. Find the statistical parameters for discrete distributions 5. Find the statistical parameters for continuous distributions 6. Test the hypothesis	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer question	

carrying 1 mark each.

2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. B.S. Grewal, **"Higher Engineering Mathematics"**, Khanna publishers, 44th edition, 2016.
2. Erwin Kreyszig, **"Advanced Engineering Mathematics**, Wiley, 9th Edition, 2013.

Reference Books:

1. B.V. Ramana, **"Higher Engineering Mathematics"**, Tata Mc Graw-Hill, 2006
2. N.P.Bali and Manish Goyal, **"A text book of Engineering mathematics"**, Laxmi publications, 7th Edition.
3. H.K. Dass and Er. RajnishVerma, **"Higher Engineerig Mathematics"**, S.Chand publishing, 1st edition, 2011.
4. Dr. B.Rama Bhupal Reddy**, "Probability and Statistics for Engineers",** Research India Publications , 2015.

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
1	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
4	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
5	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
6	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Course	**2**	**3**	-	-	-	-	-	-	-	-	-	-	-	-	-

ENGINEERING MECHANICS
SEMESTER - III

Subject Code	18CMCET3020	Internal Marks	30
Number of Lecture Hours/Week	03(L)+1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 04

Course Objectives:
This course will enable students to:

- Gain Knowledge on system of forces and moments
- Describe the various types of friction
- Draw free-body diagrams and solve statics problems
- Acquire knowledge on centre of gravity and moment of inertia for different sections
- Calculate velocity and acceleration of particles having rectilinear or curvilinear motion
- Analyze the problems on work energy method and impulse-momentum method

Unit -1	**Hours**
Introduction to Engg. Mechanics – Basic Concepts. **Systems of Forces:** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. **Friction:** Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient Of friction, cone of friction	**10**
Unit -2	
Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of	**8**

polygon of forces, condition of equilibrium, analysis of plane trusses (Method of joints only)	
Unit – 3	
Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications. **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.	**10**
Unit – 4	
Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis of a Particle and Rigid Body in Translation– Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.	**12**
Unit-5	
Work – Energy Method: Equations for Translation, Work-Energy Application to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.	**10**
Course Outcomes: On completion of the course student will be able to 1. Determine the resultant force and moment for a given system of forces 2. Apply laws of friction to simple mechanisms with consideration of friction 3. Draw free-body diagrams and solve statistics problems 4. Determine centroid and moment of inertia of simple and composite bodies 5. Calculate the motion characteristics of a body subjected to a given force system 6. Solve the problems using work energy method and impulse – momentum method	

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carries 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. Engg. Mechanics - S.Timoshenko&D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engineering Mechanics-Statics and Dynamics by A Nelson, Tata McGraw HillEducation Private Ltd, New Delhi, 2009.
3. A Text book of Engineering Mechanics by S S Bhavikatti, New age international publ., 2012

Reference Books:

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics, Tayal, Umesh publ.
3. Mechanics For Engineers, statics - F.P.Beer&E.R.Johnston – 5th Edn Mc Graw Hill Publ.
4. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston –5th Edn Mc Graw Hill Publ.
5. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best& W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
6. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.

Web Source References:

1. https://nptel.ac.in/cources/nptel_download.php?subjectid=122104015
2. https://myengineeringmechanics/

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
1	3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
2	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
3	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
4	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
5	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
6	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
Course	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

<table>
<tr><td colspan="4">ENGINEERING GEOLOGY
SEMESTER - III</td></tr>
<tr><td>Subject Code</td><td>18CECET3030</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>02</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 02</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Origin, Internal and surface structures of the earth.
Identification of the minerals types of clay minerals their properties and effects on engineering project.
Types of rock (Igneous, Sedimentary, and Metamorphic), Civil engineering importance of rock forming minerals.
Sedimentary processes (Weathering, erosion, deposition), Metamorphism and volcanic eruptions.
rock engineering concept and approaches in the design and construction of underground openings.</td></tr>
<tr><td colspan="3">Unit -1</td><td>Hours</td></tr>
<tr><td colspan="3">Introduction to General Geology: Introduction-Branches of geology useful to civil engineering, scope of geological studies in various civil engineering projects. Ground Water: origin, groundwater table, porosity and permeability. Aquifers, Groundwater Moment and Water, Bearing Properties of Rocks.</td><td>8</td></tr>
<tr><td colspan="4">Unit -2</td></tr>
<tr><td colspan="3">Mineralogy: Mineral definition, physical properties of minerals. Study of important rock forming minerals: Silicate structures, Quartz, Feldspars, Pyroxenes, Amphiboles, Micas and Clays.
Petrology: Petrology-Rock forming processes. Specific gravity of rocks. Ternary diagram. Igneous petrology-Volcanic Phenomenon and different materials ejected by volcanoes. Chemical and Mineralogical Composition.</td><td>12</td></tr>
</table>

Texture and its types. Various forms of rocks Classification of Igneous rocks on the basis of Chemical composition. Detailed study of Acidic Igneous rocks like Granite, Rhyolite or Tuff, Felsite, Pegmatite, etc. Engineering aspect to granite. Basic Igneous rocks Like Gabbro, Dolerite, and Basalt. Engineering aspect to Basalt. Sedimentary petrology- Detailed study of Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone. Metamorphic petrology- Important Distinguishing features of rocks as Rock cleavage, Schistosity, Foliation. Classification. Detailed study of Gneiss, Schist, Slate with engineering consideration	
Unit – 3	
Physical Geology& Structural Geology: **Physical Geology**- Weathering. Erosion and Denudation. Factors affecting Weathering and product of weathering. Engineering consideration. Superficial deposits and its geotechnical importance: Water fall and Gorges, River meandering, Alluvium, Laterite (engineering aspects), Desert Landform, Residual deposits of Clay with flints, Mudflows, Coastal deposits. **Structural Geology:** Strength Behavior of Rocks- Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Dip and Strike. Outcrop and width of outcrop Fold- Types and Criteria for their recognition in field. Faults: Classification, recognition in field, effects on outcrops. Joints & Unconformity; Types, Stresses responsible and importance. Importance of structural elements in engineering operations.	**10**
Unit – 4	
Geological Hazards & Geophysical Methods: **Geological Hazards**-. Types of landslide. Classification of earth movements, causes, effects and preventive measures. Earthquake: Magnitude and intensity of earthquake. Consequences of failure as Earthquake and Subsidence. **Geophysical Methods:** Principles of Geophysical	**10**

Methods, Electrical, Seismic, Gravity and Magnetic. Principle of Resistivity method and configurations. Applications of Resistivity Method: Soil Profile, Hard rock and Ground Water Table. Principles of Seismic refraction and reflections methods and their applications to Civil Engineering problems.	
Unit – 5	
Geological Investigations: Geological investigation for dam and reservoir, Tunnels, bridges and multi-storeyed structures, highways and railway lines site- Required geological consideration for selecting site. Favourable & unfavourable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions, significance of discontinuities on the site and treatment giving to such structures.	**10**

Course outcomes:

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

1. Identify and classify the geological minerals.
2. Identify and classify the various rocks engineering properties.
3. Classify and measure the earthquake prone areas to practice the hazardzonation.
4. Classify, monitor and measure the geological hazards.
5. Prepares, analyse and interpret the Engineering Geologic maps.
6. Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc…

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. Engineering and General Geology by Parbin Singh – Katson Publishing House
2. Engineering Geology by N.Chennakesavulu, Mc-Millan, India Ltd. 2009
3. Engineering Geology by Subinoy Gangopadhyay,oxford university press - 2013

Reference Books:

1. Engineering Geology by K.M.Bangar.
2. Fundamentals of Engineering Geology by F.G. Bell, Button Wortus Lando
3. Engineering Geology by D.Venkat Reddy, Vikas Publications
4. Principles of Engineering Geology by K.V.G.K Gokhale, B S Publications

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
1	3	-	-	1	-	-	3	-	-	-	-	-	2	-	-
2	3	-	-	2	-	-	-	-	-	-	-	-	2	-	-
3	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
4	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-
5	2	2	-	1	-	-	-	-	-	-	-	-	2	-	-
6	3	2	-	1	-	-	-	-	-	-	-	-	2	-	-
Cou rse	3	2	-	1	-	-	3	-	-	-	-	-	2	-	-

SURVEYING AND GIOMATICS
SEMESTER - III

Subject Code	18CECET3040	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 03

Course Objectives:
This course will enable students to:

- Describe the function of surveying in civil engineering construction
- Operate an automatic level to perform differential and profile levelling; properly record notes; mathematically reduce and check levelling measurements
- Effectively communicate with team members during field activities; identify appropriate safety procedures for personal protection; properly handle and use measurement instruments.
- Calculate, design and layout horizontal and vertical curves, Understand, interpret, and prepare plan, profile, and cross-section drawings, Work with cross-sections
- Operate a total station to measure distance, angles, and to calculate differences in elevation. Reduce data for application in a geographic information system.

Unit -1 Introduction to Surveying	**Hours**
Introduction-definition- objectives of surveying Over view of plane surveying Principles of surveying Classifications Errors in surveying **Chain & Tape:** Introduction to chain and tape surveying and their types-Field work with chain -Basic problems in chain surveying-Obstacles in chain and ranging **Compass**: Introduction of compass Types of compass-Types of bearing -Designations of bearing,- Method of measuring angles Errors in compass surveying	**8**

.Elimination of errors in compass surveying **Plane Table Surveying:** Introduction to plane table surveying Advantages and disadvantages of plane table surveying	
Unit -2 Modern Instruments	
Theodolite Surveying : Definitions and terms - Measurements of horizontal and vertical angles Principles& construction of electronic theodolite **Trigonometric levelling :** Basics of Trigonometric Levelling Base of the object accessible Base of the object inaccessible **Tachometric Surveying:** Stadia and tangential methods of tacheometry -Distance and elevation formulas for staff held vertical position	**12**
Unit – 3 Applications	
Levelling : Concept of levelling and terminology, Adjustments of levelling Methods in levelling **Contouring:** Introduction Characteristics and uses of contours Method of conducting contour surveying Uses of contour map	**10**
Unit – 4 Curves	
Curves: Introduction to curves Design and setting out simple and compound curves Types vertical curves **Measurement of areas and volumes:** Introduction to areas and volumes general methods of determining areas and volumes	**10**
Unit – 5 Modern Field Survey Systems	
Total Station: Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey **Global Positioning:** Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations, fundamentals in VPS	**10**
Course outcomes: On completion of the course student will be able to	

1. Calculate angles, distances
2. Finding of reduced Level Identify data collection methods and prepare field notes
3. Understand the working principles of survey instruments applications errors
4. Estimate measurement errors and apply corrections and will give proposed plane
5. Operation& application of advance equipment
6. Understand the application of GIS knowledge in field

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Surveying I & II, Laxmi Publications, 2005.
2. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
3. Chandra A. M., Higher Surveying, New Age International Publishers, 2007.

Reference Books:

1. Text book of Surveying, S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Fundamentals of surveying, S.K. Roy – PHI learning ltd.
3. Surveying and Levelling (Oxford Higher Education) by R. Subramanian

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
1	3	1	-	-	1	-	-	-	-	-	-	-	3	-	-
2	2	1	-	-	3	-	-	-	-	-	-	-	3	-	-
3	2	1	-	2	-	-	-	-	-	-	-	-	3	-	-
4	3	2	-	2	3	-	-	-	-	-	-	-	3	-	-
5	3	2	-	3	3	-	-	-	-	-	-	-	3	-	-
6	2	2	-	3	3	-	-	-	-	-	-	-	3	-	-
Course	**2**	**2**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

<table>
<tr><td colspan="4">BUILDING MATERIALS AND CONCRETE TECHNOLOGY
SEMESTER - III</td></tr>
<tr><td>Subject Code</td><td>18CECET3050</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
</table>

Course Objectives:

This course will enable students to:

- learn the concepts of Concrete production and its behaviour in various environments.
- learn the test procedures for the determination of properties of concrete.
- understand durability properties of concrete in various environments.

<table>
<tr><td>Unit -1 Introduction to Building Materials</td><td>Hours</td></tr>
<tr><td>Wood: Wood Based Products: cross section details of trees, their general properties, various types of defects, Methods of seasoning and their importance, various Mechanical Properties of timber, preservation methods, common Indian trees and their uses. Wood based Products: Veneers, Plywood and its types.
Finishing's Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Properties-methods- preparation of stones, bricks, tiles and aggregates, Glass –Types-Preparation Methods</td><td>10</td></tr>
<tr><td colspan="2">Unit -2 Concrete Materials</td></tr>
<tr><td>Aggregates – Coarse and fine aggregates-particle shape and texture–Bond and Strength of aggregate –Specific gravity–Bulk Density, porosity and absorption –Moisture content of Aggregate- Bulking of sand– Sieve analysis and sizes
Cement: Portland cement-Chemical Composition –</td><td>10</td></tr>
</table>

Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance–various tests for cement as per IS code. Storing of cement in the field and godowns.	
Unit – 3 Properties of Concrete	
Concrete: Properties of fresh concrete-Workability, Measurement of workability by different tests, Segregation & bleeding –Water / Cement ratio, Strength in tension & compression, Relation between compression & tensile strength–Testing of Hardened Concrete – Compression tests – Tension tests –Flexure tests –Splitting tests. **Admixtures** – Chemical Admixtures – accelerators, Retarders, air entrainers, plasticizers, Super plasticizers, Mineral Admixtures - Fly ash and silica fume	**10**
Unit – 4 Concrete Mix Design	
Factors in the choice of mix proportions –Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts Proportioning of concrete mixes by various methods – BIS method of mix design. Elasticity of concrete, Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –Types of shrinkage.	**10**
Unit – 5 Concrete & Special Concretes:	
Special Concretes - Ready mixed concrete, Shotcrete - Light weight aggregate concrete – Cellular concrete – No-fines concrete, High-density concrete, Fibre reinforced concrete – Different types of fibers – Factors affecting properties of F.R.C, Polymer concrete – Types of Polymer concrete– Properties of polymer concrete, High performance concrete – Self consolidating concrete, SIFCON, Self healing concrete.	**10**
Course Outcomes: On completion of the course student will able to 1. understand the properties of various building materials.	

2. discriminate the elastic properties of concrete
3. apply concept of admixtures in manufacturing of concrete.
4. Design the concrete mix by BIS method.
5. Test the fresh concrete properties and the hardened concrete properties.
6. analyse the importance and effect of special Concrete in construction field

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. Building Construction by B.C.Punmia, Laxmi Publications(p) ltd.
2. Building Materials by B.C. Punmia, Laxmi Publications private ltd.
3. Concrete technology By M.S.Shetty., S.CHAND Publications.
4. Building Construction by S.S. Bhavikatti, Vices publications House private ltd.

Reference Books:

1. Building Materials by S.K.Duggal, New Age International Publications.
2. Building Materials by P.C.Verghese, PHI learning(P) ltd.
3. Concrete technology by A.R.Santha Kumar, OXFORD Publications.
4. Properties of Concrete by A.M.Neville, PEARSON Publications.

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
1	3	-	-	-	-	-	2	-	-	-	-	-	3	-	-
2	3	2	-	-	-	-	2	-	-	-	-	-	3	-	-
3	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
4	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
5	2	2	-	-	2	-	-	-	-	-	-	-	3	-	-
6	2	2	-	-	2	-	-	-	-	-	-	-	3	-	-
Course	**3**	**2**	**-**	**-**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

<table>
<tr><td colspan="4">ENGINEERING GEOLOGY LAB
SEMESTER – III</td></tr>
<tr><td>Subject Code</td><td>18CECEL3060</td><td>Internal Marks</td><td>50</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>External Marks</td><td>50</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>36</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 1.5</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
• identify the formation of minerals
• understand the mega-scopic identification of rocks and minerals
• understand the importance of geophysical methodologies
• understand the geological maps.</td></tr>
<tr><td colspan="3">1. Study of physical properties and identification of rock minerals.
2. Study of physical properties and identification of ore minerals.
3. Identification of igneous rocks and their Engineering properties
4. Identification of sedimentary rocks and their Engineering properties
5. Identification of metamorphic rocks and their Engineering properties
6. Description and Identification of Geomorphologic models
7. Interpretation and drawing of section for geological maps
8. Description and Identification of Structural models
9. Simple Structural Geology problems
10. Bore hole data problems
11. Geophysical methods – Electrical Resistivity & Seismic Methods
12. Field work and report submitted.</td><td>36 Hours</td></tr>
</table>

Course outcomes:

On completion of the course, student will be able to

1. Elucidate the mega-scopic identification of rocks
2. Categorize the rocks according to mega-scopic description
3. Interpret geological maps
4. Estimate the types of subsurface formation by using geophysical methods

Question paper pattern:

1. Description and identification of SIX minerals
2. Description and identification of SIX rocks (Igneous, Sedimentary and Metamorphic rocks)
3. Description and identification of ONE geomorphologic models.
4. Description and identification of TWO structural geology models.
5. Problem on Strike and Dip.
6. Problem on Bore hole data.
7. Field report submission.

Hardware/Software Requirements:

1. Minerals and Rock samples
2. Geomorphological models
3. Geological models
4. Geological maps

SURVEYING FIELD WORK LAB
SEMESTER – III

Subject Code	18CECEL3070	Internal Marks	50
Number of Lecture Hours/Week	03	External Marks	50
Total Number of Lecture Hours	36	Exam Hours	03

Credits – 1.5

Course Objectives:
This course will enable students to:
- familiar with various plane surveying instruments and determining areas by Chains and tapes
- understand the concept of bearing and angles in various traverses by using Compass and the odolite
- determine Reduced level by using dumping level, Auto level and setting out Curves
- become familiar with modern Surveying Equipments like Total Station

List of Experiments	Hours
1. Determination of Area by Chain Triangulation and Cross Staff Survey 2. Determination of Inaccessible Distance between 2 points by Chain & Compass 3. Determination of Bearing ,Angles and Area in a Closed Traverse 4. Finding the Area of a given boundary by the method Radiation and Intersection 5. Location of exact Station Point by Two Point and Three Point Problem Using Plane Table Surveying 6. Determination of Reduced Level by Height of Instrument Method 7. Determination of Reduced Level by Rise & Fall Method 8. Determining the horizontal and vertical angle by	**36**

the method of repetition and Method of Reiteration 9. Determination of Height of the Object by Trigonometric Leveling 10. Determination Of Distance and Elevation By Tachometer 11. Setting out Curve by Two Theodolite Method and Offsets from Long Chord 12. Plotting Out a building and determine its area, height, distance between any two Inaccessible Points and Contour Maps By Total Station 13. Demonstration on application of GPS in civil Engineering	
Course Outcomes: On completion of the course student will be able to 1. Find the area of Plot by using Various method employed in Chain Survey 2. Determine Bearings and Angles in Closed Traverse 3. Find out Distance between two points which are not accessible directly 4. Determine Height of the building, vertical and horizontal angles by using Theodolite 5. Locate Exact position of point by 2 point and 3 Point Problems 6. Set out Curves on Roads, area by Total Station	
Question paper pattern: Ten questions will be given and student should choose one question (blind option) carries 50 marks intotal. (a) 15 Marks will be allotted for experimental procedure (b) 15 Marks will be allotted for experimental setup & conduction (c) 10 Marks will be allotted for calculations, results & graphs (d) 10 marks will be allotted for vivavoce.	

<table>
<tr><td colspan="4">COMPUTER-AIDED CIVIL ENGINEERING DRAWING LAB
SEMESTER – III</td></tr>
<tr><td>Subject Code</td><td>18CECEL3080</td><td>Internal Marks</td><td>50</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>External Marks</td><td>50</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>36</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 1.5</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
• Develop Parametric design and the conventions of formal engineering drawing
• Produce and interpret 2D & 3D drawings
• Communicate a design idea/concept graphically/ visually
• Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.
• Get a Detailed study of an engineering artifact</td></tr>
<tr><td colspan="3">Module 1: Building Byelaws and Regulations Introduction- terminology- objectives of building byelaws- floor area ratio- floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements.
Module2: Residential Buildings Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types of residential buildings and relationship between plan, elevation and forms and functions
Module 3: MASONRY BONDS: English Bond and Flemish Bond – Corner wall and Cross walls - One brick wall and one and half brick wall
Module 4: Building Drawing: Terms, Elements of planning building drawing, Methods of making line</td><td>16 Hours</td></tr>
</table>

drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan. Roof drainage plans. Depicting joinery, standard fittings & fixtures, finishes. Use of Notes to improve clarity	
1. Buildings with load bearing walls including details of doors and windows. 2. RCC framed structures 3. Planning of single roomed residential building 4. Planning of two-roomed residential building 5. Planning of any two types in public buildings	**30 Hours**
Course outcomes: On completion of the course, student will be able to 1. Develop Parametric design and the conventions of formal engineering drawing 2. Produce and interpret 2D & 3D drawings 3. Communicate a design idea/concept graphically/ visually 4. Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.	
Question paper pattern: Ten questions will be given and student should choose one question (blind option) carries 50 marks intotal. (a) 20 Marks will be allotted for experimental procedure (b) 20 Marks will be allotted for execution and results (c) 10 marks will be allotted for vivavoce.	
Hardware/Software Requirements: 1. AutoCAD or any other equivalent software 2. Computer lab with required configuration	

BASIC ELECTRONICS
(Mandatory Course)
SEMESTER – III

Subject Code	18CEECN3090	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Pre-requisite	----	Credits – Nil	

Course Objectives:

This course will enable students to:

- Understand the characteristics and applications of Electronic Devices
- Describe different types of transistor amplifiers
- Determine the functionality of Operational Amplifiers

Unit -1	**Hours**
Diodes and Applications: Semiconductor Diode - Ideal versus Practical, Resistance Levels, Diode Equivalent Circuits, Load Line Analysis; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications; Silicon Controlled Rectifier (SCR) – Operation, Construction, Characteristics, Ratings, Applications;	**12**
Unit -2	
Transistor Characteristics: Bipolar Junction Transistor (BJT)-Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Voltage Divider Bias Configuration; Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Depletion and Enhancement type Metal Oxide Semiconductor (MOS) FETs, Introduction to CMOS circuits	**7**

Unit – 3	
Transistor Amplifiers: Classification, Small Signal Amplifiers – Basic Features, Common Emitter Amplifier, Coupling and Bypass Capacitors, Distortion, AC Equivalent Circuit	**7**
Unit – 4	
Feedback Amplifiers: Principle, Advantages of Negative Feedback, Topologies, Current Series and Voltage Series Feedback Amplifiers; Oscillators – Classification, RC Phase Shift, Wien Bridge, High Frequency LC and Non-Sinusoidal type Oscillators;	**12**
Unit – 5	
Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal OpAmp, Concept of Virtual Ground.	**12**
Course outcomes: On completion of the course, student will be able to: 1. Understand the characteristics of Diodes. 2. Understand the characteristics of transistors. 3. Describe different types of transistor amplifiers. 4. Interpret different types of feedback amplifiers. 5. Summarize different types of Oscillators. 6. Determine the functioning of OP-AMP.	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer question carrying 1 mark each. 2. Two questions from each unit should present. **Section B:** 1. This Section will have 10 questions, 2 from each unit 2. Each full question carries 12 marks. 3. Each full question will have sub question covering all topics under a unit. 4. The student will have to answer 5 full questions selecting	

one full question from each unit

Text Books:

1. Integrated Electronics - Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-Graw Hill, 2009.
2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd.

Reference Books:

1. Electronic Devices & Theory - Robert L Boyelstad, Louis Nashelsky, 10^{th} edition
2. Electronic Devices and Circuits- J. Millman, C. Halkias, 3^{rd} Edition, Mc-Graw Hill.
3. Electronic Devices and Circuits – K Venkata Rao ,K Rama Sudha, Tata Mc-Graw Hill.
4. Electronic Devices and Circuits - Salivahanan, Kumar, Vallavaraj, 2^{nd} Edition, Tata Mc-Graw Hill.

Web References:

1. https://nptel.ac.in/courses/117101106/
2. https://nptel.ac.in/courses/108102095/

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
1	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
2	3	1		-	-	-	-	-	-	-	-	-	-	-	-
3	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
5	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
6	3	1	1	-	-	-	-	-	-	-	-	-	-	-	-
Course	**3**	**2**	**1**	-	-	-	-	-	-	-	-	-	-	-	-

S.No.	Unit Name	Text Book/Reference	Chapter No.
1	Diodes and Applications	T1	2,3,4
		R4	4 & 5
2	Transistor Characteristics	T1	5 & 10
		R4	6 & 7
3	Transistor Amplifiers	T1	8
		R4	10
4	Feedback Amplifiers	T1	13 & 14
		R3	9 & 10
5	Operational Amplifiers and Applications	T2	2, 3 & 4
		R3	14 & 15

<table>
<tr><td colspan="4">FLUID MECHANICS
SEMESTER - IV</td></tr>
<tr><td>Subject Code</td><td>18CECET4010</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
</table>

Course Objectives:

This course will enable students to:

- To understand the properties of fluids and fluid statics
- To derive the equation of conservation of mass and its application
- To solve kinematic problems such as finding particle paths and stream lines
- To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems
- To analyze laminar and turbulent flows
- To understand the various flow measuring devices& Boundary layer theory

Unit -1 Introduction	**Hours**
Basic Concepts and Definitions – Dimensions and units; Distinction between a fluid and a solid; Physical properties of fluids – density, specific gravity, viscosity, surface tension, bulk modulus of elasticity, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law -atmospheric, gauge and vacuum pressures measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.	**9**
Unit -2 Hydrostatics	
Fluid Statics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure.	**11**

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak line and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, Buoyancy and stability of floating bodies(No analytical question).	
Unit – 3 Fluid Dynamics	
Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Momentum principle; Forces exerted by fluid flow on pipe bend	**09**
Unit – 4 Laminar Flow And Turbulent Flows	
Reynold's experiment – Characteristics of Laminar & Turbulent flows, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow through circular pipe, Flow between parallel plates; hydrodynamically smooth and rough flows. **Closed Conduit Flow:** Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart, Pipe network problems, Hazen-Williams formula, HardCross Method.	**11**
Unit – 5 Measurement of Flow	
Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular, trapezoidal and Stepped notches - –Broad crested weirs. **Boundary layer:** Basic concepts-Definitions; Energy thickness, momentum thicknes and displacement thickness.	**10**
Course Outcomes: On completion of the course student will be able to 1. Understand definitions of the basic terms used in fluid	

mechanics and various properties of fluids and can solve manometer problems
2. Calculate the forces that act on submerged planes and curves; and solve Fluid kinematic problems
3. Apply the continuity, momentum and energy principles to solve simple problems identify various types of fluid flows
4. Apply appropriate equations and principles to analyze a variety of pipe flow problems
5. Apply the concepts of measurement of flows

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. Hydraulics and Fluid Mechanics, P N Modi and S M Seth, Standard Book House
2. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill

Reference Books:

1. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
2. A text of Fluid mechanics and hydraulic machines, R. K. Bansal - Laxmi Publications (P) ltd., New Delhi
3. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
1	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
2	2	3	-	-	-	-	-	-	-	-	-	1	-	-	-
3	1	2	-	2	-	-	-	-	-	-	-	-	-	3	-
4	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	3	1	1	-	-	-	-	-	-	-	-	-	3	-
6	1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
Course	2	3	1	1	1	-	-	-	-	-	-	1	-	3	-

<table>
<tr><td colspan="4">STRENGTH OF MATERIALS
SEMESTER - IV</td></tr>
<tr><td>Subject Code</td><td>18CECET4020</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Basic concepts of Strength of Materials, Principles of Elasticity, and Plasticity Stress strain behaviour of materials and their governing laws.
Concepts of stresses developed in the cross section due to bending and shear forces.
The concepts above will be utilized in measuring deflections in beams under various loading and support conditions.
Classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.</td></tr>
</table>

Unit -1: Simple Stresses And Strains	Hours
Concept of Statically determinacy and indeterminacy ,Elasticity and plasticity, Types of stresses and strains, Hooke's law, stress – strain diagram for mild steel, Working stress, Factor of safety, Lateral strain, Poisson's ratio and volumetric strain, Elastic Moduli and the relationship between them, Bars of varying section, composite bars, Temperature stresses.	**10**
Unit -2:Shear Force And Bending Moment	
Concept of shear force and bending moment, S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads, Point of Contra flexure, Relation between S.F., B.M and, rate of loading at	**10**

a section of a beam, Principles of Superposition.	
Unit – 3:Bending Theory	
Theory of simple bending, Assumptions, Derivation of bending equation: M/I = f/y = E/R, Neutral axis, Determination of bending stresses for I, T, Angle and Channel sections, Design of simple beam sections. **Shear Stresses:** Derivation of formula, Shear stress distribution across various beam Sections, built up beams.	**10**
Unit – 4: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.	**10**
Unit – 5:Direct and Bending Stresses	
Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis. Stresses in beams subjected to unsymmetrical bending	**10**
Course outcomes: On completion of the course, student will be able to 1. Understand the principles, theory of elasticity including strain/displacement and Hooke's law relationships. 2. Determination of shear force and bending moment in the beams due to various loading conditions 3. Determination of stresses developed in the beams due to various loading conditions. 4. Evaluate the slope and deflection at any point on a beam subjected to a various loads 5. Determination of direct stresses developed in the beams	

due to various loading conditions.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. StrengthofMaterials",S.S. Rattan, TataMcGraw Hill Education Pvt.,Ltd.,
2. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.
3. S.B.Junarkar and H.J.Shah, Mechanics of Structures, Charotar Publishers, Anand, 1998

Reference Books:

1. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004
2. Beer and Johnston, Mechanics of Materials, McGraw Hill International Edition, 1995.
3. "Strength of materials" R.K. Rajput, S.Chand & Co, New Delhi, 2012.

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
1	3	2	-	-	-	-	-	-	-	-	-	-	-	2	-
2	3	2	-	2	-	-	-	-	-	-	-	-	-	2	-
3	3	2	-	2	-	-	-	-	-	-	-	-	-	2	-
4	3	2	-	2	-	-	-	-	-	-	-	-	-	2	-
5	3	2	-	2	-	-	-	-	-	-	-	-	-	2	-
6	3	2	-	2	-	-	-	-	-	-	-	-	-	2	-
Course	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**

ENVIRONMENTAL ENGINEERING
SEMESTER - IV

Subject Code	18CECET4030	Internal Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Course Objectives:
This course will enable students to:

- Outline planning and the design of water supply systems for a community/town/city
- Provide knowledge of water quality requirement for domestic usage and other usage
- Impart understanding of importance of protection of water source quality
- Selection of valves and fixture in water distribution systems for water supply system.
- Impart knowledge on design of water distribution network

Unit -1 Introduction	**Hours**
Water:- Water Supply systems, Need for planned water supply schemes, Sources of Water, Water demand and Potable, industrial and agricultural water requirements. Role of Environmental Engineer.	**8**
Unit -2 Importance and Necessity of Protected Water Supply systems	
Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Agency activities Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting.	**12**

Unit – 3 Treatment of Water:	
Treatment of Water: Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration. Disinfection: Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odours - Iron and manganese removal – Adsorption-fluoridation and deflouridation–aeration–Reverse Osmosis-Iron exchange–Ultra filtration	**10**
Unit – 4 Sewage	
Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, recycling of sewage – quality requirements for various purposes.	**10**
Unit – 5 Building Plumbing	
Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used. Government authorities and their roles in water supply, sewerage disposal. Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts	**10**

Course outcomes:

On completion of the course, student will be able to

1. Plan and design the water and distribution networks and sewerage systems
2. Identify the water source and select proper intake structure
3. Characterization of water

4. Select the appropriate appurtenances in the water supply
5. Selection of suitable treatment flow for raw water treatments
6. Analyze the suitability of water distribution methods in various regions.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson / Brooks/Cole; Second Edition 2008
2. Introduction to Environmental Engineering, Vesilind, PWS Publishing Company 2000

Reference Books:

1. Water Supply and Sewerage, E.W. Steel
2. CPHEEO Manual on Water Supply & Treatment
3. Manual on Water Supply and Treatment, (latest Ed.), Ministry of Works & Housing, New Delhi.
4. Plumbing Engineering. Theory, design and Practice, S.M. Patil, 1999
5. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
6. Environmental Engineering by H.S.Peavy, D.R. Rowe, G.Tchobanoglous; 1991, Tata-McGraw

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
1	2	-	-	-	-	-	3	-	-	-	-	-	3	-	-
2	-	2	-	-	2	-	3	-	-	-	-	-	3	-	-
3	-	2	-	-	2	-	3	-	-	-	-	-	3	-	-
4	-	2	-	-	2	-	3	-	-	-	-	-	3	-	-
5	-	2	-	-	2	-	3	-	-	-	-	-	3	-	-
6	-	2	-	-	2	-	3	-	-	-	-	-	3	-	-
Course	**-**	**2**	**-**	**-**	**2**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

TRANSPORTATION ENGINEERING SEMESTER - IV			
Subject Code	18CECET4040	Internal Marks	30
Number of Lecture Hours/Week	03	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Course Objectives:
This course will enable students to:

- impart different concepts in the field of Highway Engineering.
- acquire design principles of Highway Geometrics and Pavements
- learn various highway construction and maintenance procedures.

Unit -1 Highway Planning & Alignment	**Hours**
Highway Network Planning: Different modes of transportation, role of highway transportation, classification, network patterns, planning surveys, preparation of plans, final report, master plan, 20 year road development plans, salient features. **Highway Alignment:** Principles of highway alignment, requirements, controlling factors, engineering surveys, Drawings and Reports	**08**
Unit -2 Highway Geometric Design	
Importance of geometric design, design controls and criteria, cross section elements, pavement surface characteristics, Sight distance, Considerations, Design of horizontal alignment, Design of vertical alignment.	**08**
Unit – 3 Traffic Engineering	
Basic Parameters of Traffic-Volume, Speed and Density-Traffic Volume Studies, Speed studies – spot speed and speed & delay studies; Parking Studies; Road Accidents - Causes and Preventive measures-Condition Diagram and Collision Diagrams; PCU Factors, Capacity of High ways–	**12**

Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals–Webster Method–IRC Method	
Unit – 4 Pavement Materials & Pavement Design	
Pavement Materials and Mix Design: Sub grade soil properties, CBR test, aggregates, desirable properties, tests, bituminous materials, bitumen and tar, tests. Bituminous mixes, requirements, design, Marshall Method. Design of Pavements: Types of pavement structures, functions of pavement components, design factors. Design of flexible pavements, methods, GI method, CBR method, IRC method, Burmister's method. Design of rigid pavements, design considerations, wheel load stresses, temperature stresses, frictional stresses, design of joints, IRC method of rigid pavement design.	**12**
Unit – 5 Highway Construction & Maintenance	
Highway Construction: Types of highway construction, construction of earth roads, gravel roads, WBM roads. Bituminous pavements, Cement concrete pavements. Highway Maintenance: Pavement failures, causes. Maintenance of highways, routine maintenance, periodic maintenance, special repairs. Strengthening of existing pavements, evaluation, overlay design. Highway drainage, surface and sub-surface drainage.	**10**
Course outcomes: On completion of this course, students will be able to 1. Plan highway networks 2. Design highway geometrics 3. Design intersections and prepare traffic management plans 4. Analyse quality of pavement material 5. Design flexible and rigid pavements 6. Understand the principle of construction and maintenance of highway pavements	

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

TEXT BOOKS:

1. Khanna, S.K. and C.E.G. Justo Highway Engineering, Nem Chand and Bros, Roorkee, India, 2001.
2. Kadiyali L.R. Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi, India, 1997.
3. Kadiyali L.R. and Dr.N.B.Lal Principles and practice of Highway Engineering, Khanna Publishers, New Delhi

REFERENCE BOOKS:

1. Highway Engineering by Srinivasa Kumar R, Universities Press, Hyderabad.
2. Principles of Transportation Engineering by Partha Chakroborthy and Animesh Das, PHI Learning Private Ltd

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
1	2	3	-	-	-	3	-	-	-	-	-	-	-	3	-
2	-	3	-	3	-	3	-	-	-	-	-	-	-	3	-
3	-	3	-	3	1	2	-	-	-	-	-	-	-	3	-
4	2	-	2	3	-	-	-	-	-	-	-	-	-	3	-
5	2	-	2	3	3	-	-	-	-	-	-	-	-	3	-
6	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-
Course	2	3	-	3	2	2	-	-	-	-	-	-	-	3	-

ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT
SEMESTER IV

Subject Code	18CMMST4050	Internal Marks	30
Number of Lecture Hours/ Week	03	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 03

Course objectives:
This course will enable the students to
- Understand the concept and nature of Managerial Economics and Concept of Demand and Demand forecasting.
- Analyse the Cost Concepts, Cost-Volume-Profit Analysis and Market structures.
- Learn different Accounting Systems, preparation of Financial Statements and Capital Budgeting proposals by using different methods.

Unit -I	Hours
Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concept of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement- Demand forecasting and its Methods.	**10**
Unit –II	
Production and Cost Analysis: Production function-Isoquants and Isocost-Law of Variable proportions- Cobb-Douglas Production function-Economics of Sale-Cost Concepts- Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs	**10**

Implicit Costs- Cost Volume Profit analysis- Determination of Break-Even Point	
Unit-III	
Introduction To Markets, Pricing Policies & forms Organizations and Business Cycles: Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price Output Determination – Methods of Pricing: Market Skimming Pricing, And Internet Pricing: Flat Rate Pricing. Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle	**12**
Unit –IV	
Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements- Analysis and Interpretation of Financial Statements-Ratio Analysis (Simple Problems)	**10**
Unit-V	
Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.	**08**
Course outcomes: On completion of the course student will be able to: 1. Equipped with the knowledge of managerial economics and estimating demand for a product. 2. Examine the Production Concept and familiar with the concepts of iso-quants, iso-cost lines and MRTS 3. Predict the cost of production and its relevance to managerial decision making 4. Differentiate various the Markets and Pricing methods along with Business Cycles.	

5. Prepare Financial Statements along with Analysis
6. Analyse and interpret various investment project proposals with the help of Capital Budgeting techniques.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions, 2 from each unit
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit

Text Books:

1. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.
2. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.

Reference Books:

1. Dr. P. Vijaya Kumar & Dr. N. Apparao Management Science Cengage, Delhi, 2012.
2. S. A. Siddiqui & A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
3. Vanitha Agarwal : Managerial Economics, Pearson Publications 2011.

Web References:

1. https://www.iare.ac.in/sites/default/files/lecture_notes/IARE_MEFA_LECTURE_NOTES_1.pdf
2. https://www.edx.org/course/introduction-to-managerial-economics

Course Outcomes to Program Outcomes mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Course	-	-	-	-	-	1	1	-	-	-	3	-	-	-	-

S.No.	Unit Name	Text Book /Reference	Chapter No.
1	Introduction to Managerial Economics and demand Analysis	T1	1,2,3 & 4
		T2	1,2,3 & 4
2	Production and Cost Analysis	T1	4,5,6 & 7
		T2	5,6,7,8 & 9
3	Introduction To Markets, Pricing Policies & forms Organizations and Business Cycles	T1	8 & 9
		T2	10,11,12,13 & 14
4	Introduction to Accounting & Financing Analysis	T1	13 & 14
		T2	16 &17
5	Capital and Capital Budgeting	T1	11&12
		T2	18

<table>
<tr><td colspan="4">STRENGTH OF MATERIALS LAB
SEMESTER – IV</td></tr>
<tr><td>Subject Code</td><td>18CECEL4060</td><td>Internal Marks</td><td>50</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>External Marks</td><td>50</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>36</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 1.5</td></tr>
<tr><td colspan="4">Course Objective:
Students learn about the procedures to determine the properties of solid materials such as mild steel, tor steel and wood etc.</td></tr>
<tr><td colspan="3">1. To study the stress -strain characteristics of (a) Mild Steel and (b) Tor steel by conducting tension test on U.T.M.
2. To find the Compressive strength of wood and concrete
3. To find the Brinnel's and Rockwell's hardness numbers of (a) Steel (b) Brass (c) Aluminum (d) Copper by conducting hardness test.
4. To determine the Modulus of rigidity by conducting Torsion test on a Solid shafts
5. To find the Modulus of rigidity of the material of a spring by conducting Compression test.
6. To find the Energy absorbed by material by conducting Izod and Charpy impact test.
7. Shear & Punching Shear test on Mild Steel rods, Thin Plates.
8. Verification of Maxwell's Reciprocal theorem on beams.
9. To determine the Young's modulus of the material by conducting deflection test on a simply supported beam.
10. To determine the Modulus of elasticity of the material by conducting deflection test on a</td><td>36 Hours</td></tr>
</table>

Cantilever beam. 11. To determine the Modulus of elasticity of the material by conducting deflection test on a continuous beam 12. Use of Electrical resistance strain gauges	

Course outcomes:

After studying this course, students will be able to:

1. Find the basic parameters of Mild steel and Tor steel such strength parameters and etc.,
2. Determine strength parameters of spring, wood and concrete
3. determine flexural and torsion values & elastic constants of Solid material
4. Determine hardness of metals

Question paper pattern:

Ten questions will be given and student should choose one question (blind option) carries 50 marks intotal.

(a) 15 Marks will be allotted for experimental procedure
(b) 15 Marks will be allotted for experimental setup & conduction
(c) 10 Marks will be allotted for calculations, results & graphs
(d) 10 marks will be allotted for vivavoce.

Hardware/Software Requirements:

1. UTM for conducting tension test on rods
2. Compression testing machine
3. Brinnel's / Rock well's hardness testing machine
4. Torsion testing machine
5. spring testing machine
6. Izod Impact machine
7. Shear testing machine
8. Beam setup for Maxwell's theorem verification.
9. simply supported wooden beam setup
10. Cantilever steel beam setup
11. Continuous beam setup
12. Electrical Resistance gauges.

<table>
<tr><th colspan="4">ENVIRONMENTAL ENGINEERING LAB
SEMESTER – IV</th></tr>
<tr><td>Subject Code</td><td>18CECEL4070</td><td>Internal Marks</td><td>50</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>External Marks</td><td>50</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>36</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 1.5</td></tr>
<tr><td colspan="4">Course objectives:
• Estimation some important characteristics of water and wastewater in the laboratory
• It also gives the significance of the characteristics of the water and wastewater</td></tr>
<tr><td colspan="3">1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil
5. Determination and Estimation of total solids, organic solids and inorganic solids and settleable solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter & Wrinklers Method and B.O.D.
8. Determination of N, P, K values in waste water
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.</td><td>36 Hours</td></tr>
</table>

Course outcomes:

After studying this course, students will be able to:

1. Estimation some important characteristics of water and wastewater in the laboratory
2. Draw some conclusion and decide whether the water is potable or not.
3. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments
4. Estimation of the strength of the sewage in terms of BOD and COD

Question paper pattern:

Ten questions will be given and student should choose one question (blind option) carries 50 marks intotal.

(a) 15 Marks will be allotted for experimental procedure
(b) 15 Marks will be allotted for experimental setup & conduction
(c) 10 Marks will be allotted for calculations, results & graphs
(d) 10 marks will be allotted for vivavoce.

Hardware/Software Requirements:

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

MATERIAL TESTING LAB SEMESTER – IV			
Subject Code	18CECEL4080	Internal Marks	50
Number of Lecture Hours/Week	03	External Marks	50
Total Number of Lecture Hours	36	Exam Hours	03
Credits – 1.5			

Course objectives:

Students learn about the basic properties ingredients of concrete, fresh and hardened concrete properties.

List of Experiments	**Hours**
1. Tests on Aggregate(Fine Aggregate & Coarse Aggregate) i. Shape test ii. Fineness modulus iii. Crushing strength iv. Impact Strength v. Abrasion & attrition vi. Specific gravity & water adsorption 2. Tests on Binding Material Cement: i. Specific Gravity & Soundness ii. Normal consistency & Setting Time iii. Compressive Strength of Cement Bitumen i. Viscosity ii. Ductility iii. Flesh &Fire Point iv. Softening Point v. Penetration Point 3. Tests on Mix i. Workability of Concrete-Slump, Compaction factor& Vee-bee Consist value	**36**

ii. Strength Characteristics of Herded Concrete-Compressive strength, Split tensile Strength & Flexural strength iii. Marshal Mix Stability analysis	

After studying this course, students will be able to:

1. Determine the basic properties of cement such Fineness Index, Normal consistency, setting time & compressive strength of cement.
2. Determine the workability of cement concrete by slump cone, compaction factor and Vee–Bee tests
3. Determine the specific gravity & Fineness modulus of coarse aggregate and f i n e aggregate by Sieve analysis.
4. Determine the strength Characteristics of Aggregate
5. Determine the basic properties of Binding material used in pavement construction
6. Determine the strength characteristics of concrete

Question paper pattern:

Ten questions will be given and student should choose one question (blind option) carries 50 marks intotal.

a) 15 Marks will be allotted for experimental procedure
b) 15 Marks will be allotted for experimental setup & conduction
c) 10 Marks will be allotted for calculations, results & graphs
d) 10 marks will be allotted for viva voce.

Hardware/Software Requirements:

1. Standard set of sieves for coarse aggregate and fine aggregate
2. Vicat's apparatus
3. Specific gravity bottle.
4. Lechatlier's apparatus.
5. Slump Test Apparatus.
6. Compaction Factor Test Apparatus.
7. Vee- Bee test apparatus
8. Universal testing Machine (UTM)/Compression Testing Machine
9. Crushing Value Testing Equipment

10. Impact Testing Mould
11. Pycnometer
12. Density Basket
13. Elongation and Flakiness Plates
14. Los Angles Testing Equipment
15. Deval’s Equipment
16. Penetration Testing Equipment and mould
17. Ring and Ball Equipment & Viscometer
18. Ductility Testing Equipment
19. Marshal Stability Equipment

Course Structure for B.Tech. (Civil Engineering)

Semester V (Third year)

S. No	Subject Code	Subject Title	L	T	P	C
1	18CMBIT5010	Biology for Engineers	2	1	0	3
2	18CECET5020	Theory of Structures-I	3	0	0	3
3	18CECET5030	Geo-Technical Engineering	2	0	0	2
4	18CECET5040	Hydrology and Water Resources Engineering	3	0	0	3
5	18CECET5050	Hydraulic Engineering	3	0	0	3
6	18CE--O5061	**OPEN ELECTIVE-I**	3	0	0	3
	a	Civil Engineering - Societal & Global Impact				
	b	Introduction to Civil Engineering				
7	18CECEL5070	Survey Field Camp	0	0	3	1.5
8	18CECEL5080	Geo-Technical Engineering Lab	0	0	3	1.5
9	18CECEL5090	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1.5
					Total Credits	**21.5**

Course Structure for B.Tech. (Civil Engineering)

Semester VI (Third year)

S. No	Subject Code	Subject Title	L	T	P	C
1	18CMEGT6010	Personality Development & professional Communication	2	0	0	2
2	18CECET6020	Theory of Structures-II	3	0	0	3
3	18CECET6030	Reinforced Concrete Structures	3	0	0	3
4	18CE--O6042	**OPEN ELECTIVE-II**	3	0	0	3
	a	Disaster Management				
	b	Environmental Pollution and Control				
5	18CECET6051	**ELECTIVE-I**	3	0	0	3
	a	Foundation Engineering				
	b	Architecture & Town Planning				
	c	Structural Analysis by Matrix Methods				
	d	Remote Sensing & GIS Applications				
6	18CECEL6060	Irrigation Engineering & Drawing Lab	0	0	3	1.5
7	18CECEL6070	Software Applications in Civil Engineering	0	0	3	1.5
8	18CECEC6080	Term Paper with Seminar	0	2	0	2
9	18CECEN6090	Advanced Methods in Structural Analysis	-	-	-	-
Total Credits						**19**

Biology for Engineers (Proposed syllabus for the academic year 2018 -2019) SEMESTER - III/I			
Subject Code	**18CMBIT5010**	IA Marks	30
Number of Lecture Hours/Week	2+1(T)	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
			Credits – 03

Course Objectives:

- To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry
- To convey that classification per se is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted.
- To convey that "Genetics is to biology what Newton's laws are to Physical Sciences"
- To convey that all forms of life has the same building blocks and yet the manifestations are as diverse as one can imagine
- To convey that without catalysis life would not have existed on earth
- The molecular basis of coding and decoding genetic information is universal
- How to analyses biological processes at the reductionistic level
- The fundamental principles of energy transactions are the same in physical and biological world.

Unit -1 Introduction	
Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor. These examples will highlight the fundamental importance of	**Hours – 10**

observations in any scientific inquiry	
Unit -2 Classification	
Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultra structure- prokaryotes or eucaryotes. (c) energy and Carbon utilization -Autotrophs, heterotrophy, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitata- acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E.coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. Musculus	**Hours – 10**
Unit – 3 Genetics & Bio molecules	
Mendel's laws, Concept of segregation and independent assortment. Concept of allele. Gene mapping, Gene interaction, Epistasis. Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring. Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes. Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics. **Molecules of life:** In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins. Nucleotides and DNA/RNA. Two carbon units and lipids.	**Hours – 10**
Unit – 4 Enzymes & Information Transfer Purpose	
Enzymology: How to monitor enzyme catalyzed reactions. How does an enzyme catalyze reactions? Enzyme classification. Mechanism of enzyme action. Discuss at least two examples. Enzyme kinetics and kinetic parameters. Why should we know these parameters to understand biology? RNA catalysis. Information Transfer Purpose: The molecular basis of coding and decoding genetic information is universal	**Hours – 10**

Molecular basis of information transfer. DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosides. Concept of genetic code. Universality and degeneracy of genetic code. Define gene in terms of complementation and recombination	
Unit – 5 Microbiology & Metabolism	
Macromolecular analysis Purpose: How to analyses biological processes at the reductionistic level Proteins- structure and function. Hierarch in protein structure. Primary secondary, tertiary and quaternary structure. Proteins as enzymes, transporters, receptors and structural elements. Thermodynamics as applied to biological systems. Exothermic and endothermic versus endergonic and exergoinc reactions. Concept of Keq and its relation to standard free energy. Spontaneity. ATP as an energy currency. This should include the breakdown of glucose to CO_2 + H_2O (Glycolysis and Krebs cycle) and synthesis of glucose from CO_2 and H_2O (Photosynthesis). Energy yielding and energy consuming reactions. Concept of Energy charge **Concept of single celled organisms**. Concept of species and strains. Identification and classification of microorganisms. Microscopy. Ecological aspects of single celled organisms. Sterilization and media compositions. Growth kinetics	**Hours – 10**
Course outcomes: On completion of this course, students are able to 1. Describe how biological observations of 18th Century that lead to major discoveries. 2. Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological 3. Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring 4. Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine 5. Classify enzymes and distinguish between different	

mechanisms of enzyme action.

(Note: Detailed Syllabus will be finalised after discussing with the Subject experts)

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.

The student will have to answer 5 full questions selecting one full question from each unit.

TEXT BOOKS

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons

REFERENCES

1. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
2. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

THEORY OF STRUCTURES-I

(Proposed syllabus for the academic year 2018 -2019)

SEMESTER - III/I

Subject Code	18CECET5020	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

- To give concepts of Principal stresses and strains developed in cross section of the beams on the cross section and stresses on any inclined plane. To impart concepts of failures in the material considering different theories
- To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.
- To classify columns and calculation of load carrying capacity and to assess stresses due to axial and lateral loads for different edge conditions and to calculate combined effect of direct and bending stresses on different engineering structures
- Impart concepts for determination of Forces in members of plane pin-jointed perfect trusses by different methods

Unit -1 Analysis of Pin jointed Trusses	
Determination of Forces in members of plane pin-jointed perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections.	**Hours – 10**
Unit -2 Principal Stresses, Strains And Theories Of Failures:	
Introduction -Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses –	**Hours – 10**

Principal stresses and strains – Analytical and graphical solutions, Theories of failures. Strain Energy – Resilience, Gradual, sudden, impact and shock loadings, simple Applications.	
Unit – 3 Torsion Of Circular Shafts And Springs:	
Theory of pure torsion Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure. Springs: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs	**Hours – 10**
Unit – 4 Thin and Thick Cylinders:	
Thin seamless cylindrical shells, Derivation of formula for longitudinal and circumferential stresses, hoop, longitudinal and Volumetric strains, changes in diameter, 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.	**Hours – 10**
Unit – 5 Columns & Struts	
Introduction – Types of 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 – slenderness ratio – Euler's critical stress – Rankine – Gordon formula – Long columns subjected to eccentric loading – Empirical formulae – Laterally loaded struts – subjected to uniformly distributed and concentrated loads –Maximum B.M. and stress due to transverse and lateral loading.	**Hours – 10**
Course outcomes: On completion of this course, students are able to 1. To assess stresses across section of the thin cylinders to	

arrive at optimum sections to withstand the internal pressure.

2. To assess stresses across section of the thick cylinders to arrive at optimum sections to withstand the internal pressure
3. Analyse the portal frames by using general methods
4. Analyze the crippling load carries by columns in various end conditions
5. Determination of torsional resistance offered by various members

Question paper pattern:

Section A:

3. This section contains ten one or two line answer question carrying 1 mark each.
4. Two questions from each unit should present.

Section B:

4. This Section will have 10 questions.
5. Each full question carry 12 marks.
6. Each full question will have sub question covering all topics under a unit.

The student will have to answer 5 full questions selecting one full question from each unit.

TEXT BOOKS

1. Theory of Structures by R.S. Kurmi , S.Chand and Co.
2. Theory of Structures by Bhavakatti , Vikas Publishing House
3. Strength of materials by R. K Rajput, S.Chand and Co.

REFERENCES

1. Strength of Materials by R. Subramanian, Oxford Publications
2. Mechanics of Materials by B.C Punmia, Jain and Jain.
3. Strength of materials by R. K. Bansal, Lakshmi Publications
4. Theory of Structures by S.ramamrutham ,Dhanapat Rai Publishing Co

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

co	po1	po2	po3	po4	po5	po6	po7	po8	po9	po10	po11	po12	pso1	pso2	pso3
1	2	3		**2**										**3**	
2	2	3		**2**										**3**	
3		2		2										**3**	
4	2			2										**3**	
5		3		2										**3**	
Course	2	3		2										**3**	

<table>
<tr><td colspan="4" align="center">GEO-TECHNICAL ENGINEERING
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER - III/I</td></tr>
<tr><td>Subject Code</td><td>18CECET5030</td><td>IA Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>Exam Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4" align="right">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
1. To enable the student to find out the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the seepage discharge.
3. To enable the students to differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.
4. To enable the student to understand the concept of shear strength of soils, assessment of the shear parameters of sands and clays and the areas of their application.</td></tr>
<tr><td colspan="3">Unit -1 Introduction</td><td></td></tr>
<tr><td colspan="3">Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density , Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.
Index Properties Of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2 Permeability:</td></tr>
<tr><td colspan="3">Soil water – capillary rise – One dimensioned flow of water through soils – Darcy’s law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses –quick sand condition – 2-D flow and Laplace’s equation - Seepage through soils.</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit – 3 Consolidation:</td></tr>
</table>

Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (cv) - Over consolidated and normally consolidated clays	**Hours – 10**
Unit – 4 Shear Strength & Stress Distribution In Soils	
Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method. **Shear Strength of Soils:** Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behaviour of Sands - Critical Void Ratio – Stress-Strain behaviour of clays – Shear Strength determination-various drainage conditions	**Hours – 10**
Unit – 5 Stability of Slopes	
Introduction, types of slopes and their failure mechanisms, factor of safety, analysis of finite and infinite slopes, wedge failure Swedish circle method, friction circle method, stability numbers and charts.	**Hours – 10**
Course outcomes: Upon the successful completion of this course, the students will be able to: 1. Evaluate factor of safety of infinite slopes based on different ground conditions 2. Understand the significance of shear strength parameters in various geotechnical analyses 3. Determine various consolidation parameters of soil through laboratory test 4. Differentiate among various field methods of compaction and their usage based on the type of soil. 5. Understand the effect of capillary action and seepage flow direction on the effective stress at a point in the soil mass 6. Analytically calculate the effective permeability of anisotropic soil mass	
Question paper pattern:	

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

3. This Section will have 10 questions.
4. Each full question carry 12 marks.
5. Each full question will have sub question covering all topics under a unit.
6. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Basic and Applied Soil Mechanics, Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers

Reference Books:

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.
2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.
3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3			1			3						2		
2	3			2									2		
3	2	2											2		
4	3	2		2									2		
5	2	2		1									2		
6	3	2		1									2		
Course	3	2		1			3						2		

<table>
<tr><td colspan="4">HYDROLOGY AND WATER RESOURCES ENGINEERING
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER - III/I</td></tr>
<tr><td>Subject Code:</td><td>18CECET5040</td><td>IA Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>03</td><td>Exam Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4" align="right">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
1. Understand the concept of the hydrological cycle and Run off
2. Learn about hydrograph analysis and measurement of flood
3. Understand the measurement of ground water & irrigation system.
4. Learn about canal structures and diversion head works.
5. Learn about different types of dams and reservoirs and its site locations.
6. Understand the concept of spillways, its types and its components.</td></tr>
<tr><td colspan="3">Unit -1 Introduction</td><td></td></tr>
<tr><td colspan="3">Introduction to Hydrology and Hydrological cycle. Precipitation, Evaporation Transpiration, Evapotranspiration, Infiltration. Rain gauge network, Depth Area curves, Probable Maximum Precipitation.
Runoff: Factors affecting runoff, Stream gauging, flow mass curve and flow duration curve.</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2 Hydrograph analysis & flood routing</td></tr>
<tr><td colspan="3">Hydrograph analysis: Components of hydrograph, Unit hydrograph, S-Hydrograph, Synthetic unit hydrograph.
Floods and flood routing: Reservoir capacity and channel routing, Gumbel’s And Log Pearson type-III Distribution methods. Muskingum & Puls methods of routing. Applications of Darcy’s law.</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit – 3 Water withdrawals and uses</td></tr>
<tr><td colspan="3">Ground Water: forms of subsurface water, saturated formation, aquifer properties, geologic formations of</td><td>Hours – 10</td></tr>
</table>

aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests **Irrigation:** Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.	
Unit – 4 Distribution systems	
Canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Kennedy's and Lacey's theory of regime channels. Canal outlets: non-modular, semi-modular and modular outlets. Water logging: causes, effects and remedial measures. Lining of canals, types of lining. Drainage of irrigated lands: necessity, methods.	**Hours – 10**
Unit – 5 Dams and spillways	
Dams: Types of dams, selection of type of Dam, selection of site for a dam. Gravity dams, Causes and failures. Forces acting on a gravity dam. Types of Earth dams, causes of failures. Yield and storage capacity of a reservoir, Reservoir sedimentation theory. **Spillways:** Classifications of Spillways, Components of spillways. Types of gates for spillway crests.	**Hours – 10**
Course Outcomes: after completion of this course students will able to. **1.** **Remember** the hydrological cycle and its relevance to civil engineering. Make the student understand physical process in hydrology and components of hydrologic cycle, **Remember** [B.T.L-1] **2.** **Understand** theory for physical process and interaction. **Understand** [B.T.L-2] **3.** **Applications** of hydrologic cycle Unit hydrograph. **Application**[B.T.L-3] **4.** Understand flood frequency analysis, **analysis** of design flood, flood routing [B.T.L-4]	

5. **Applications** of ground water movement and well hydraulics. **Applications** [B.T.L-3]
6. **Analysis** of dams, reservoirs and components of spillways. **Analysis** [B.T.L-4]

Question paper pattern:

Section A:

7. This section contains ten one or two line answer question carrying 1 mark each.
8. Two questions from each unit should present.

Section B:

9. This Section will have 10 questions.
10. Each full question carry 12 marks.
11. Each full question will have sub question covering all topics under a unit.
12. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Engineering Hydrology, Jayarami Reddy, P., Laxmi Publications Pvt. Ltd., (2013), New Delhi
2. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain and Arun Kumar Jain, Lakshmi Publications (P) Ltd

Reference Books:

1. Irrigation Engineering and Hydraulic Structure, Santosh Kumar Garg, Khanna Publishers.
2. Applied hydrology, Chow V. T., D. R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi.
3. Water Resources Engineering, Mays L.W, Wiley India Pvt. Ltd, (2013)

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3			1			3						2		
2	3			2									2		
3	2	2											2		
4	3	2		2									2		
5	2	2		1									2		
6	3	2		1									2		
Course	3	2		1			3						2		

HYDRAULIC ENGINEERING
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER - III/I

Subject Code	18CECET5050	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
			Credits – 03

Course Objectives: To enable the students to apply the knowledge of Hydraulic Engineering in Civil engineering field by making them to learn the following:

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

Unit -1	
Introduction to open channel flow: Types of channels –Types of flows - Velocity distribution **Uniform Flow:** Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow; Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient 'n'. Most economical section of channel. Computation of Normal and critical depth.	**Hours – 10**
Unit -2	
Non uniform flow: Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by direct Step method; Hydraulic Jump-Theory of hydraulic jump, length and height of jump, location of jump; Energy dissipation.	**Hours – 10**
Unit – 3	
Hydraulic similitude: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of	**Hours – 10**

Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers. Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat , inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency.	
Unit – 4	
Hydraulic turbines : Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines-Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks-unit and specific quantities, selection of turbines, performance characteristics-cavitation.	**Hours – 10**
Unit – 5	
Centrifugal-pumps: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps-characteristic curves NPSH-Cavitation. Reciprocating pumps: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.	**Hours – 10**
Course outcomes: On completion of this course, students are able to • Solve uniform open channel flow problems. • Solve non-uniform open channel flow problems. • Compute flow profiles in channel transitions and analyze hydraulic transients. • Apply the principals of dimensional analysis and similitude in hydraulic model testing. • Understand the working principles of various hydraulic turbines. • Understand the working principles of various pumps.	
Question paper pattern:	

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.

The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House
2. A text of Fluid mechanics and hydraulic machines, R.K.Bansal - Laxmi Publications (P) ltd., New Delhi

Reference Books:

1. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
2. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill
3. Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher Education.

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	1											3	

2	2	3	2		3									3	
3	3	3												3	
4	2	3			3									3	
5	2	3	1											3	
6	2	3			3									3	
Course	2	3	1		3									3	

Open Electives offered by Civil Departments

<table>
<tr><td colspan="4">Civil Engineering - Societal & Global Impact
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER - III/I</td></tr>
<tr><td>Subject Code</td><td></td><td>IA Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>3</td><td>Exam Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – Nil</td></tr>
<tr><td colspan="4">Course Objectives:
1. Awareness of the importance of Civil Engineering and the impact it has on the Society and at global levels
2. Awareness of the impact of Civil Engineering for the various specific fields of human endeavour
3. Need to think innovatively to ensure Sustainability</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Understanding the importance of Civil Engineering in shaping and impacting the world; The ancient and modern Marvels and Wonders in the field of Civil Engineering; Future Vision for Civil Engineering</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2</td></tr>
<tr><td colspan="3">Infrastructure - Habitats, Megacities, Smart Cities, futuristic visions; Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy)</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit – 3</td></tr>
<tr><td colspan="3">Environment- Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water</td><td>Hours – 10</td></tr>
</table>

projects, Atmospheric pollution; Global warming phenomena and Pollution Mitigation measures, Stationary and non- stationary; Environmental Metrics & Monitoring; Other Sustainability measures; Innovations and methodologies for ensuring Sustainability.	
Unit – 4	
Built environment – Facilities management, Climate control; Intelligent/ Smart Buildings; Aesthetics of built environment, Role of Urban Arts Commissions; Conservation, Repairs & Rehabilitation of Structures	**Hours – 10**
Unit-5	
Civil Engineering Projects – Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Project	**Hours – 10**
Course outcomes: On completion of this course, students are able to: 1. Understand the role of Civil Engineering in Modern World 2. Understand various constructional Infrastructure and their importance in present environment 3.Interpret modern transportation systems and their advantages 4. Effect of global Warming and mitigation measures 5. Understand the importance of Sustainability and Reduction of Green House Gas Emissions	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer question carrying 1 mark each. 2. Two questions from each unit should present. **Section B:**	

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.

The student will have to answer 5 full questions selecting one full question from each unit.

TEXT BOOKS

1. Žiga Turk (2014), Global Challenges and the Role of Civil Engineering, Chapter 3 in: Fischinger M. (eds) Performance-Based Seismic Engineering: Vision for an Earthquake Resilient Society. Geotechnical, Geological and Earthquake Engineering, Vol. 32. Springer, Dordrecht
2. Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economical and Working Environment, 120th ASEE Annual Conference and Exposition
3. NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.

REFERENCES

1. Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.
2. Ashley R., Stovin V., Moore S., Hurley L., Lewis L., Saul A. (2010). London Tideway Tunnels Programme – Thames Tunnel Project Needs Report – Potential source control and SUDS applications: Land use and retrofit options
3. http://www.thamestunnelconsultation.co.uk/consultation-

documents.aspx

4. Ashley R M., Nowell R., Gersonius B., Walker L. (2011). Surface Water Management and Urban Green Infrastructure. Review of Current Knowledge. Foundation for Water Research FR/R0014

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3				**3**								**2**		
2	3					**2**								2	
3	2	3			**2**								**3**		
4	3	2							**1**					1	
5	2	3			**1**		**2**					**1**		1	
Course	3	2			**2**	**1**	**1**		**1**			**1**	**2**	1	

Introduction to Civil Engineering (Proposed syllabus for the academic year 2018 -2019) SEMESTER - III/I			
Subject Code		IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70

<table>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4" align="right">Credits – Nil</td></tr>
<tr><td colspan="4">Course Objectives:
1. To give an understanding to the students of the vast breadth and numerous areas of engagement available in the overall field of Civil Engineering
2. To motivate the student to pursue a career in one of the many areas of Civil Engineering with deep interest and keenness.
3. To expose the students to the various avenues available for doing creative and
4. Innovative work in this field by showcasing the many monuments and inspiring projects of public utility.</td></tr>
<tr><td colspan="3">Unit -1 History of Civil engineering</td><td></td></tr>
<tr><td colspan="3">Early constructions and developments over time; Ancient monuments & Modern marvels; Development of various materials of construction and methods of construction; Works of Eminent civil engineers</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2 Fundamentals of Building Materials</td></tr>
<tr><td colspan="3">Stones, bricks, mortars, Plain, Reinforced & Prestressed Concrete, Admixture; Structural Steel, High Tensile Steel, Recycling of Construction & Demolition wastes,Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit – 3 Basics of Construction Management & Contracts Management</td></tr>
<tr><td colspan="3">Temporary Structures in Construction; Construction Methods for various types of Structures; Major Construction equipment; Modern Project management Systems; Advent of Lean Construction; Importance of Contracts Management-Terms in Contract-contract Types</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit – 4 Surveying & Geomatics</td></tr>
<tr><td colspan="3">Surveying & Geomatics: Overview of Surveying,</td><td>Hours –</td></tr>
</table>

Traditional surveying techniques- , Total Stations; GPS & GIS Applications	**10**
Unit-5 Geotechnical Engineering	
Basics of soil mechanics, rock mechanics and geology; various types of foundations; basics of rock mechanics & tunnelling	**Hours – 10**
Course outcomes: On completion of this course, students are able to: 1. Understand the role of Civil Engineering in Modern World 2. Know the details and working of various building materials 3. Understand the concept of various construction management Techniques 4. Know basic surveying methods and their applications 5. Understand the importance of soil mechanics and rock mechanics in various structural designs	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer question carrying 1 mark each. 2. Two questions from each unit should present. **Section B:** 1. This Section will have 10 questions. 2. Each full question carry 12 marks. 3. Each full question will have sub question covering all topics under a unit. The student will have to answer 5 full questions selecting one full question from each unit.	
TEXT BOOKS 1. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset	
REFERENCES	

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1
1	3	2				**1**				**1**
2	2					**1**			**1**	
3	2	1					**1**			
4	3	3				**1**				**2**
5	3	2				**1**				**1**
Course	3	2				**1**	**1**		**1**	**1**

<table>
<tr><td colspan="4" align="center">SURVEY FILED
CAMP
SEMESTER – III/I</td></tr>
<tr><td>Subject Code</td><td>18CECEL5070</td><td>Internal Marks</td><td>50</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>0
3</td><td>External Marks</td><td>50</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>3
6</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4" align="center">Credits – 1.5</td></tr>
<tr><td colspan="4">Course objectives:</td></tr>
<tr><td colspan="3"></td><td>36 Hour
s</td></tr>
<tr><td colspan="4">Course outcomes: After studying this course, students will be able to:</td></tr>
<tr><td colspan="4">Question paper pattern:</td></tr>
</table>

Hardware/Software Requirements:

GEO-TECHNICAL ENGINEERING LAB SEMESTER – III/I			
Subject Code	18CECEL5080	**Internal Marks**	50
Number of Lecture Hours/Week	03	**External Marks**	50
Total Number of Lecture Hours	36	**Exam Hours**	03
Credits – 1.5			

Course objectives:

1. To impart knowledge of determination of index properties required for classification of soils
2. To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
3. To teach how to determine shear parameters of soil through different laboratory tests

1. Specific gravity, G 2. Atterberg's Limits. 3. Field density-Core cutter and Sand replacement methods 4. Grain size analysis by sieving 5. Hydrometer Analysis Test 6. Permeability of soil - Constant and Variable head tests 7. Compaction test 8. Consolidation test (to be demonstrated) 9. Direct Shear test 10. Triaxial Compression test (UU Test) 11. Unconfined Compression test 12. Vane Shear test 13. Differential free swell (DFS) 14. CBR Test	**36 Hours**

Course outcomes: After studying this course, students will be able to:

1. Determine index properties of soil and classify them.
2. Determine permeability of soils.
3. Determine Compaction, Consolidation and shear strength characteristics

Question paper pattern:

1. Ten questions will be given and student should choose one question (blind option) carries 50 marks in total.
    - (a) 15 Marks will be allotted for experimental procedure
    - (b) 15 Marks will be allotted for experimental setup & conduction
    - (c) 10 Marks will be allotted for calculations, results & graphs
    - (d) 10 marks will be allotted for viva voce.

Hardware/Software Requirements:

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

15. Hot air ovens (range of temperature 500 - 1500C

FLUID MECHANICS & HYDRAULIC MECHINERY LAB SEMESTER – III/I			
Subject Code	18CECEL5090	**Internal Marks**	50
Number of Lecture Hours/Week	0 3	**External Marks**	50
Total Number of Lecture Hours	3 6	**Exam Hours**	03
Credits – 1.5			

Course objectives:

Learn about the

1. Determination of flow of fluids
2. Determination of coefficient of discharge and loss of head in flow
3. Determination of the efficiency of various turbines and pumps

1. Calibration of Venturimeter & Orifice meter 2. Determination of Coefficient of discharge for a small orifice by a constant head method. 3. Determination of Coefficient of discharge for an external mouth piece by variable head method. 4. Calibration of contracted Rectangular Notch and /or Triangular Notch 5. Determination of Coefficient of loss of head in a sudden contraction and friction factor. 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. Efficiency test on centrifugal pump. 12. Efficiency test on reciprocating pump	**36 Hours**
Course outcomes: After studying this course, students will be able to: 1. Determine rate of flow in fluids 2. Determine coefficient of discharge and loss of head in flow 3. Determine the efficiency of various turbines and pumps	
Question paper pattern: 1. Ten questions will be given and student should choose one question (blind option) carries 50 marks in total. (a) 15 Marks will be allotted for experimental procedure (b) 15 Marks will be allotted for experimental setup & conduction (c) 10 Marks will be allotted for calculations, results & graphs (d) 10 marks will be allotted for viva voce.	

Hardware/Software Requirements:

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

Syllabus- B.Tech VI Semester (Civil Engineering) For the Autonomous Batch starting from A.Y. 2018-19

PERSONALITY DEVELOPMENT & PROFRSSIONAL COMMUNICATION Effective from the academic year 2018-2019			
Subject Code	18CEEGT6010	**IA Marks**	30
Number of Lecture Hours/Week	02	**Exam Marks**	70
Total Number of	32	**Exam**	03

<table>
<tr><td>Lecture Hours</td><td></td><td>Hours</td><td></td></tr>
<tr><td colspan="4">Credits – 02</td></tr>
<tr><td colspan="4">Aim of the Course:
Personality Development and Soft Skills course aims at equipping students with required skills such as personality development, interpersonal communication skills, career and employability skills, problem solving and professional communication skills to succeed in their personal and professional life as well to build a bright career with a clear understanding of their career values through experiential learning and performing several professional tasks.
Objectives: By the end of the course students will be able to acquire the following skills:
● Understand the process of Personality Development and learn effective methods of developing personality
● Emotional Intelligence, and Intrapersonal skills
● Career skills and Interview skills
● Problem Solving skills
● Professional Communication skills</td></tr>
<tr><td colspan="3">Training Methodology:
The training methodology is designed to bring about changes in attitudes through experience-based learning. Activities in simulated environments such as role plays, group discussions, micro presentations, audio-video clippings, case studies, psychometric tests etc., will provide students insights into their strengths and areas for development. There will be a project work with problem analysis and presentation of the same.</td><td>Teaching Hours

32</td></tr>
</table>

Course Contents: **UNIT –I** 1.**Personality Development** a) Personal Effectiveness- being proactive- principles of personal vision, b) Intrapersonal communication- emotional intelligence- beginning with the end in mind- c) Time management: understanding priorities- first things first- time – personal effectiveness	**5 hours**
UNIT –II **2. Emotional Intelligence and Intrapersonal Communication** a) Principles of Emotional Intelligence – b)Intrapersonal Communication- c) Principles of creative cooperation-organization skills-Think win-win d) Principles of balanced self-renewal- Lifelong learning	**5 hours**
UNIT –III **3. Career and Employability Skills** a) Understanding Career values- values grid-career thinking- what is a career? b) Skills vs strengths- spotting skills- reflecting on skills- setting goals for developing skills- c) Meeting the expectations of the employer-understanding job description- -Skills Grid exercises-matching the skills with requirements d) Preparing Resume and Preparing for interviews-Structuring interview questions- CAR- Context, Action and Results-	**6 hours**

UNIT –IV **4. Problem Solving Skills** a) Understanding the complexity at workplace- b) defining the problem- identifying the reasons- c) finding possible solutions- planning actions- analysing results-feedback d) redefining the problem- the problem solving cycle	**6 hours**
UNIT –V **5. Professional Communication** a) Active listening skills- note taking- b) Professional presentation skills- understanding the context- expectations of the people- putting across the message effectively- answering questions- c) Technical writing skills- practical steps for writing- report writing and writing a report free from plagiarism.	**10 hours**
Course outcomes: After studying this course, students will be able to: 1. Understand Personality development process and learn to implement effective techniques. 2. Understand how people behave and regulate self behaviours and learn to work in a team. 3. Know their career values, indentify their skills, set goals for enhancing their career skills and prepare for interviews 4. Understand and learn how to deal with problems and practice problem solving skills. 5. Learn the principles of professional communication & application of the same	
Question paper pattern: **Section A (20 marks)** 1. Ten questions carrying two mark each- 20 marks **Section B (50 marks)** 1. Five questions each carrying 10 marks	

Text Book

2. Dr. S.P. Dhanvel, English and Soft Skills, Orient Blackswan, 2011

Reference Books:

1. Seven Habits of Highly Effective People by Stephen R Covey
3. Professional Communication by Aruna Koneru, Mc Graw Hill
3. Personality Development and Soft Skills by Barun K Mitra OUP
4 Enhance Your Employability Skills-by David Winter and Laura Brammar, published by University of London -Open Courseware https://www.mooc-list.com/course/enhance-your-career and-employability-skills-coursera
5. R.S.Agarwal, Verbal & Non-verbal Reasoning, S. Chand& Co. Latest ed.,2003
6. Stay Hungry and Stay Foolish speech by Steve Jobs You Tube video

THEORY OF STRUCTURES-II
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER - III/II

Subject Code	18CECET6020	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
			Credits – 03

Course Objectives:

1. To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed

beams and continuous beams due to various loading conditions. **2.** To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions **3.** The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports. **4.** The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section	
Unit -1 Introduction to statically indeterminate beams	
Types of structures, Indeterminacy-external ,internal, frames, trusses **Propped Cantilevers** Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers. **Fixed Beams** : Analysis of Fixed beams with U. D. load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - shear force and Bending moment diagrams-Deflection of fixed beams including effect of sinking of support, effect of rotation of a support	**Hours – 10**
Unit -2 Slope Deflection Method and Clapeyron's Methods	
Slope Deflection Equations Derivation, application to continuous beams with and without settlement of supports. Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams	**Hours – 10**
Unit – 3 Moment Distribution and Kani's Method	
Moment Distribution: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycle.	**Hours – 10**

Kani's Method :Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway	
Unit – 4 Energy Theorems:	
Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.	**Hours – 10**
Unit – 5 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. INFLUENCE LINES: 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 sections, single point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.	**Hours – 10**
Course outcomes: On completion of this course, students are able to 1. Distinguish between the determinate and indeterminate structures. 2. Identify the behaviour of structures due to the expected loads, including the moving loads, acting on the structure. 3. Estimate the bending moment and shear forces in beams for different fixity conditions. 4. Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems. 5. Draw the influence line diagrams for various types of moving loads on beams/bridges. 6. Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss.	

Question paper pattern:

Section A:

5. This section contains ten one or two line answer question carrying 1 mark each.
6. Two questions from each unit should present.

Section B:

5. This Section will have 10 questions.
6. Each full question carry 12 marks.
7. Each full question will have sub question covering all topics under a unit.

The student will have to answer 5 full questions selecting one full question from each unit.

TEXT BOOKS

1. Basic Structural Analysis, C. S. Reddy Tata Mc.Graw-Hill, New Delhi.

2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi

3. Analysis of Structures- Vol. I and II, V. N. Vazirani and M. M. Ratwani, Khanna Publishers, New Delhi

REFERENCES

1. Theory of Structures, B. C Punmia, A. K Jain & Arun K. Jain, Lakshmi Publications
2. Theory of Structures, R.S. Khurmi, S. Chand Publishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi.
4. Structural Analysis-I, Hemanth Patel, Yogesh Patel, Synergy Knowledgeware, Mumbai
5. Structural Analysis I Analysis of Statically Determinate

	Structures, P. N. Chandramouli, Yesdee Publishing Pvt Limited, Chennai

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1
1	2	3		**2**						
2	2	3		**2**						
3		2		2						
4	2			2						
5		3		2						
6		3		2						
Course	2	3		2						

REINFORCED CONCRETE STRUCTURES
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER - III/II

Subject Code	18CECET6030	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
			Credits – 03

Course Objectives:

1. Familiarize Students with different types of design philosophies
2. Equip student with concepts of design of flexural members
3. Understand Concepts of shear, bond and torsion
4. Familiarize students with different types of compressions

members and Design 5. Understand different types of Slab and their design	
Unit -1 Introduction	
Introduction: Working stress method Design codes and handbooks, loading standards – Dead, live, wind and earthquake loads, elastic theory, design constants, modular ratio, neutral axis depth and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly and doubly reinforced beams. Limit State Design: Concepts of limit state design – Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters	**Hours – 10**
Unit -2 Design for Flexure	
Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T and L) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel-Design of Flanged Sections (T&L)- Effective width of flange Behaviour- Analysis and Design.	**Hours – 12**
Unit – 3 Design for Shear, Torsion and Bond	
Design for Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing. Limit state design for serviceability: Deflection, cracking and code provision, Design of formwork for beams and slabs.	**Hours – 8**
Unit – 4 Slabs	
Slabs: Classification of slabs, design of one - way slabs, two - way slabs, and continuous slabs using IS	**Hours – 10**

Coefficients (conventional), design of waist slab staircase	
Unit – 5 Design of Compression members	
Design of Compression members: Effective length of a column, Design of short and long columns – under axial loads, uni-axial bending and biaxial bending – Braced and un-braced columns – I S Code provisions	**Hours – 10**
Course Outcomes: upon successful completion of the Course students will be able to, 1. Work on different types of design philosophies [B.T.L-2] **understand** 2. Carryout analysis and design of flexural members and detailing [B.T.L-4] **Analysis** 3. Design structures subjected to shear, bond and torsion [B.T.L-6] **Design.** 4. Design different type of slabs [B.T.L-6] **Design** 5. Design different type of compression members [B.T.L-6] **Design** 6. Workout on design of Flexural members by using Working stress method [B.T.L-6]	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer question carrying 1 mark each. 2. Two questions from each unit should present. **Section B:** 3. This Section will have 10 questions. 4. Each full question carry 12 marks. 5. Each full question will have sub question covering all topics under a unit. 6. The student will have to answer 5 full questions selecting one full question from each unit.	
Text Books:	

1. Limit State Design, A. K. Jain
2. Design of Reinforced concrete Structures, N. Subrahmanyian
3. Reinforced Concrete Structures, S. Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.

Reference Books:

1. R C C Design, B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications
2. Reinforced Concrete Structures, N. Krishna Raju & R. N. Pranesh, New Age Publications.

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3		1									2	3		
2		3	2										2		
3	2	3	3										1		
4		3	3										3		
5		3	3										3		
6		3	3										3		
Course	3	3	3									2	3		

Professional Elective-I

FOUNDATION ENGINEERING (Proposed syllabus for the academic year 2018 -2019) SEMESTER - III/II			
Subject Code	18CECEP6051-A	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
			Credits – 03

Course Objectives:

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

foundations and determine their load carrying capacity.	
Unit -1 Soil Exploration	
Need- Methods of Soil exploration -Sampling methods – Field tests –Penetration Tests – Pressure meter –planning of Programme and preparation of soil investigation report.	**Hours – 10**
Unit -2 Earth And Earth-Retaining Structures:	
Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes - Stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils	**Hours – 10**
Unit – 3 Shallow Foundations –	
Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory - IS Methods. **Settlement Criteria:** Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures	**Hours – 10**
Unit – 4 Pile Foundation:	
Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays	**Hours – 10**
Unit – 5 Well Foundations:	
Types – Different shapes of well – Components of well – functions – forces acting on well foundations - Design Criteria – Determination of steining thickness and plug - construction and Sinking of wells – Tilt and shift.	**Hours – 10**
Course Outcomes: upon successful completion of the Course students will be able to,	

1. Understand the various types of shallow foundations and decide on their location based on soil characteristics.
2. Compute the magnitude of foundation settlement and decide on the size of the foundation accordingly.
3. Use the field test data and arrive at the bearing capacity
4. Compute Stability of slopes of dams and embankments at different conditions
5. Apply the principles of bearing capacity of piles and design them accordingly.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

3. This Section will have 10 questions.
4. Each full question carry 12 marks.
5. Each full question will have sub question covering all topics under a unit.
6. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Principles of Foundation Engineering' by Das, B.M., - (2011) –6th edition (Indian edition) Cengage learning
2. Basic and Applied Soil Mechanics' by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).

Reference Books:

1. Foundation Analysis and Design' by Bowles, J.E., (1988) – 4th Edition, McGraw-Hill Publishing Company, Newyork.
2. Theory and Practice of Foundation Design' by N.N.SOM & S.C.DAS PHI Learning Private limited

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3			1			3						2		
2	3			2									2		
3	2	2											2		
4	3	2		2									2		
5	2	2		1									2		
Course	3	2		1			3						2		

ARCHITECTURE & TOWN PLANNING

(Proposed syllabus for the academic year 2018 -2019)

SEMESTER - III/II

Subject Code	18CECEP6051-B	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 03

Course Objectives:

1. Initiating the students to different architectures of the world. The distinctions between the eastern and western architecture styles are focused.
2. The salient features of Egyptian, Greek, Roman, Indian Vedic, Indus valley civilization, Buddhist, Hindu and Indo-Sarsanic Architecture are introduced.
3. Architectural design concepts, principles of planning and composition are imparted.
4. To enable the student to understand town planning from ancient times to modern times.
5. To impart the concepts of town planning standards, land scaping and expansion of towns.

Unit -1 Introduction	
History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures- Orders. Indian Architecture: Vedic age, Indus valley civilization– Buddhist period: Stambas, Stupa, Toranas, Chaityas, Viharas Hindu temples: Dravidian and Indo Aryan Styles-Madurai, Bhuvaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace - Fort - Tomb.	**Hours – 10**

Unit -2 Design for Flexure	
Architectural Design: Principles of designing – Composition of Plan – relationship between plan and	**Hours – 10**

elevation- building elements, form, surface texture, mass, line, color, tone- Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character, expression	
Unit – 3 Design for Shear, Torsion and Bond	
Principles of Planning: Principles of planninga residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors. **Post-classic Architecture:** Introduction of post-classic architecture- contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wrigt, Walter Groping	**Hours – 10**
Unit – 4 Slabs	
Historical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjo-Daro, Pataliputra	**Hours – 10**
Unit – 5 Design of Compression members	
Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning-Neighbourhood Planning. **Standards of Town planning:** Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation-planning regulations and limitations.	**Hours – 10**
Course Outcomes: upon successful completion of the Course students will be able to, 1. Distinguish architectural styles of eastern and western world. 2. Understand the importance of Orders of architecture. 3. Understand the principals of Composition 4. Should be able to compose spaces of buildings using design concepts, planning principles. 5. Should understand the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities.	

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

3. This Section will have 10 questions.
4. Each full question carry 12 marks.
5. Each full question will have sub question covering all topics under a unit.
6. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. The great ages of World Architecture' by G.K. Hiraskar.
2. Planning and Design of Buildings by Section of Architecture' by Y.S. Sane
3. Indian Architecture – Vol. I & II' by Percy Brown, Taraporevala Publications, Bombay.
4. Fundamentals of Town Planning'by G.K. Haraskar

Reference Books:

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

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

C	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS	PS	PS

O	1	2	3	4	5	6	7	8	9	10	11	12	O1	O2	O3
1	3			2				3					3		
2	2			2				3					3		
3	3			2				3					3		
4	3			2				3					3		
5	3			2				3					3		
Course	3			2				3					3		

STRUCTURAL ANALYSIS BY MATRIX METHODS (Proposed syllabus for the academic year 2018 -2019) SEMESTER - III/II			
Subject Code	18CECEP6051-C	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
			Credits – 03

Course Objectives:

1. Learn the fundamental concepts of matrix structural mechanics, such as the stiffness method.
2. The concepts of structural analysis learnt in mechanics of solids and structures course.
3. Understanding the analysis of statically determinate and indeterminate structures such as trusses, beams, frames and plane stress problems.
4. Learn the concepts of the stiffness method and apply it to a variety of structural problems involving trusses, beams, frames, and plane stress

Unit -1 Introduction	
Introduction to Matrix methods of analysis – properties of Matrices, singular matrix, Rank of a Matrix and Rank deficiency- Static indeterminacy and Kinematic indeterminacy – Degree of freedom – Structure idealization- stiffness and flexibility methods – Suitability	**Hours – 10**
Unit -2 Application of Stiffness method & Flexibility Matrix on Trusses	
Generation Element stiffness matrix for truss element, beam element and torsional element- Element force displacement equations	**Hours – 10**
Unit – 3 Application of Stiffness & Flexibility method for beam Elements	
Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of continuous beams.	**Hours – 10**

<table>
<tr><td colspan="2">Unit – 4 Stiffness method for plane trusses and Grid elements</td></tr>
<tr><td>Development of stiffness matrix – coordinate transformation. Examples of pin jointed trusses and simple grid problems.</td><td>Hours – 10</td></tr>
<tr><td colspan="2">Unit – 5 Space trusses and frames</td></tr>
<tr><td>Member stiffness for space truss and space frame–Transformation matrix from Local to Global – Analysis of simple trusses, beams and frames.

Additional topics in stiffness methods – Discussion of band width – semi band width – static condensation – sub structuring –Loads between joints-Support displacements</td><td>Hours – 10</td></tr>
<tr><td colspan="2">Course Outcomes: upon successful completion of the Course students will be able to,
1. Perform the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent deformations, force and equilibrium methods.
2. Perform structural analysis using the stiffness method.
3. Solve multiple degree of freedom two dimensional problems involving trusses, beams, frames and plane stress.
4. Perform structural analysis using the Flexibility method
5. Perform Sub Structuring, Joint Analysis and Support Displacements</td></tr>
<tr><td colspan="2">Question paper pattern:
Section A:
1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.
Section B:
3. This Section will have 10 questions.
4. Each full question carry 12 marks.</td></tr>
</table>

5. Each full question will have sub question covering all topics under a unit.
6. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Matrix Methods of Structural Analysis' by Pundit and Gupta
2. Matrix Methods of Structural Analysis'by Weaver and Gere, CBS Publishers.

Reference Books:

1. Matrix analysis of structures' by Robert E Sennet-Prentice Hall- Englewood cliffs-New Jercy.
2. Advanced structural analysis' by Dr. P. Dayaratnam-Tata Mc Graw hill publishing company limited

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	2	3		**2**										**3**	
2	2	3		**2**										**3**	
3		2		2										**3**	
4	2			2										**3**	
5		3		2										**3**	
Course	2	3		2										**3**	

REMOTE SENSING & GIS APPLICATIONS
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER - III/II

Subject Code	18CECEP6051-D	IA Marks	30
Number of Lecture Hours/Week	03	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
			Credits – 03

Objectives

1. Introduce the basic principles of Remote Sensing and GIS techniques and Learn various types of sensors and platforms
2. Learn visual image interpretation & processing of digital image
3. Understand the concept of GIS and Understand different types of spatial data
4. Understand the principles of spatial analysis
5. Appreciate application of RS and GIS to Civil engineering
6. Appreciate application of RS and GIS to water management

Unit -1 Introduction	
Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems. **Sensors and platforms:** Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.	**Hours – 10**
Unit -2 Image analysis:	
Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification unsupervised classification	
Unit – 3 Geographic Information System:	
Geographic Information System: Introduction,	**Hours**

key components, application areas of GIS, map projections. **Data entry and preparation**: spatial data input, raster data models, vector data models.	**– 10**
Unit – 4 Spatial data analysis:	
Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing	**Hours – 10**
Unit – 5 RS and GIS applications	
RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications. **Application to Hydrology and Water Resources: F**lood zoning and mapping, groundwater prospects and potential recharge zones, watershed management	**Hours – 10**

Course Outcomes

1. An idea about basic process of Remote sensing and Be familiar with ground, air and satellite based sensor platforms(B.T.L-1)
2. Interpret the aerial photographs and satellite imageries(B.T.L-1)
3. GIS as an emerging tool for several civil engineering applications and Raster and Vector formats of data and their usage in GIS(B.T.L-3)
4. Create and input spatial data for GIS application(B.T.L-2)
5. Apply RS and GIS concepts in land use and land cover operations(B.T.L-3)
6. Apply RS and GIS concepts in water resources engineering(B.T.L-3)

Question paper pattern:

Section A:

1. This section contains ten one or two line answer question

carrying 1 mark each.

2. Two questions from each unit should present.

Section B:

3. This Section will have 10 questions.
4. Each full question carry 12 marks.
5. Each full question will have sub question covering all topics under a unit.
6. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
3. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
4. Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.

Reference Books:

1. Remote Sensing and its Applications' by Narayan LRA, Universities Press, 2012.
2. Concepts and Techniques of Geographical Information System' by Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. Introduction to Geographic Information Systems' by Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. Basics of Remote sensing & GIS' by Kumar S, Laxmi Publications, New Delhi, 2005.

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

1	1			3									3		
2	1				3								3		
3	2		1	3									3		
4	2		1										3		
5	2		2										3		
6		2											3		
Course	2	2	1	3	3								3		

IRRIGATION ENGINEERING DRAWING LAB

SEMESTER – III/II

Subject Code	18CECEL6060	**Internal Marks**	50
Number of Lecture Hours/Week	03	**External Marks**	50
Total Number of Lecture Hours	36	**Exam Hours**	03

Credits – 1.5

Course objectives: To understand design principle of various irrigation structures

Falls: Types and location, design principles of Sarda type fall and straight glacis fall. **Regulators:** Head and cross regulators, design principles **Cross Drainage Works:** Types, selection, design principles of aqueduct, siphon aqueduct and super passage. **Diversion Head Works:** Types of diversion head works, weirs and barrages, layout of diversion head works, components	**12 Hours**
1. Surplus weir 2. Tank sluice with a tower head 3. Canal drop-Notch type 4. Canal regulator 5. Under tunnel 6. Syphon aqueduct type III	**24 Hours**

Course outcomes: After studying this course, students will be able to To design various irrigation structures.

Question paper pattern:

Any two question of the above six designs may be asked out of which the candidate has to answer one question.

Hardware/Software Requirements:

1. Mini drafter
2. Drawing Tools

SOFTWARE APPLICATIONS IN CIVIL ENGINEERING LAB SEMESTER – III/II			
Subject Code	18CECEL6070	**Internal Marks**	50
Number of Lecture Hours/Week	03	**External Marks**	50
Total Number of Lecture Hours	36	**Exam Hours**	03
Credits – 1.5			

Course objectives:

1. Introduce image processing and GIS software
2. familiarize structural analysis software

<table>
<tr><td colspan="2">3. learn to analyze 2 D and 3D frame steel tubular truss using structural analysis software</td></tr>
<tr><td>GIS SOFTWARES:
1. Arc GIS 9.0
2. ERDAS 8.7
3. MapInfo 6.5
4. QCAD
Any one or Equivalent.

EXCERCISES IN GIS:
1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering.
COMPUTER AIDED DESIGN AND DRAWING:
SOFTWARE:
1. STAAD PRO / Equivalent/
2. STRAAP
3. STUDDS

EXCERCISIES:
1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple Tower Analysis and Design</td><td>36 Hours</td></tr>
<tr><td colspan="2">Course outcomes: After studying this course, students will be able to:
1. Work comfortably on GIS software
2. Digitize and create thematic map and extract important features
3. Develop digital elevation model
4. Use structural analysis software to analyze and design 2D and 3D frames
5. Design and analyze retaining wall and simple towers using</td></tr>
</table>

CADD software.
Question paper pattern: 1. Ten questions will be given and student should choose one question (blind option) carries 50 marks in total. (a) 20 Marks will be allotted for experimental procedure (b) 20 Marks will be allotted for execution and results (c) 10 marks will be allotted for viva voce.
Hardware/Software Requirements: Computer lab with all required facilities

TERM PAPER WITH SEMINER SEMESTER – III/II			
Subject Code	18CECEC6080	**Internal Marks**	50
Number of Lecture Hours/Week	02	**External Marks**	--
Total Number of Lecture Hours	30	**Exam Hours**	--
Credits – 2.0			
Course objectives:			

Course outcomes: After studying this course, students will be able to:

ADVANCED METHODS IN STRUCTURAL ANALYSIS (Proposed syllabus for the academic year 2018 -2019) SEMESTER – III/II			
Subject Code	18CECEN6090	IA Marks	30
Number of Lecture Hours/Week	3	Exam Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
			Credits – Nil

Course Objectives:

1. Familiarize Students with Different types of Structures
2. Equip student with concepts of Arches
3. Understand Concepts of lateral Load analysis
4. Familiarize Cables and Suspension Bridges
5. Introduce the concept of unsymmetrical bending in beams Location of neutral axis Deflection of beams under unsymmetrical bending

Unit -1 Arches	
Classification-Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear, Rib shortening and temperature stresses, tied arches – fixed arches	**Hours – 12**
Unit -2 Cable Structures And Suspension Bridges	

Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.	**Hours – 12**
Unit – 3 Approximate Method of Analysis	
Lateral Load Analysis Using Approximate Methods: Application tobuilding frames. (i) Portalmethod (ii) Cantilever method .	**Hours – 12**
Unit – 4 Introduction to Matrix Analysis	
Introduction to Matrix methods of analysis – properties of Matrices, singular matrix, Rank of a Matrix and Rank deficiency- Static indeterminacy and Kinematic indeterminacy – Degree of freedom – Structure idealization- stiffness and flexibility methods – Suitability.	**Hours – 12**
Unit-5 Unsymmetrical 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 axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.	**Hours – 12**
Course outcomes: On completion of this course, students are able to 1. Differentiate Determinate and Indeterminate Structures 2. Carryout lateral Load analysis of structures 3. Analyze Cable and Suspension Bridge structures 4. Analyze the Arches and study the effect of change in temperature 5. Understand the concept of unsymmetrical bending in beams Location of neutral axis Deflection of beams under unsymmetrical bending	
Question paper pattern: **Section A:**	

7. This section contains ten one or two line answer question carrying 1 mark each.
8. Two questions from each unit should present.

Section B:

8. This Section will have 10 questions.
9. Each full question carry 12 marks.
10. Each full question will have sub question covering all topics under a unit.

The student will have to answer 5 full questions selecting one full question from each unit.

TEXT BOOKS

1. Structural Analysis, T. S. Thandavamoorthy, Oxford university press, India.
2. Structural Analysis, R.C. Hibbeler, Pearson Education, India
3. Theory of Structures – II, B. C. Punmia, Jain & Jain, Laxmi Publications, India.
4. Structural Analysis, C.S. Reddy, Tata Mc-Graw hill, New Delhi.

REFERENCES

1. Intermediate Structural Analysis, C. K. Wang, Tata McGraw Hill, India
2. Theory of structures, Ramamuratam, Dhanpatrai Publications.
3. Analysis of structures, Vazrani & Ratwani – Khanna Publications.
4. Comprehensive Structural Analysis-Vol. I & 2, R.

	Vaidyanathan & P. Perumal- Laxmi Publications Pvt. Ltd., New Delhi

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
1	2	3		3										3	
2	2	3		3										3	
3		2		3										3	
4	2			3										3	
5		3		3										3	
Course	2	3		3										3	

B.Tech. (Civil Engineering)

Semester VII (Fourth Year)

S.No.	Course Code	Course Title	L	T	P	C
1	18CECET7010	Contracts, Specifications & Project Management	3	0	0	3
2	18CECET7020	Design of Steel Structures	3	0	0	3
3	18CE--o7033	Open Elective-III	3	0	0	3
4	18CECEP7042	Elective-II	3	0	0	3
5	18CECEP7053	Elective-III	3	0	0	3
6	18CECEL7060	Structural design and drawing Lab	0	0	3	1.5
7	18CECER7070	Project phase-I	0	0	8	04
8	18CECEC7080	Internship with seminar	0	0	0	2
Total Credits						22.5

Semester VIII (Fourth Year)

S.No.	Course Code	Course Title	L	T	P	C
1	18CECEP8014	Elective-IV	3	0	0	3
2	18CECEP8025	Elective –V	3	0	0	3
3	18CECEP8036	ElectiveVI	3	0	0	3
4	18CECEP8047	ElectiveVII	3	0	0	3
5	18CECER8050	Project phase-II	0	0	12	07
6	18CECER8060	Co Curricular and Extra Curricular Activity (Mandatory Course)	3	0	0	0
Total Credits						19

Program Elective Course:

Elective	Title of the Subject
PEC-I	Foundation Engineering
	Architecture & town Planning
	Structural Analysis by Matrix Methods
	Remote Sensing & GIS Applications
PEC-II	Transport of water and Waste Water
	Advanced Concrete Technology
	Surface Hydrology
	Offshore Engineering
PEC-III	Advanced Structural Analysis
	Advanced Transportation Engineering
	Earth Retaining Structures
	Rural Water Supply And Onsite Sanitation Systems
PEC-IV	Intelligent Transportation system
	Ground Improvement Techniques
	Environmental Impact Assessment And Environment Management Planning
	Engineering with Geo-Synthetics
	Advanced Structural Design
PEC-V	Pre-Stressed Concrete
	Advanced Foundation Engineering
	Ground water development& Management
	Solid and hazardous waste management
PEC-VI	Air and Noise pollution and control
	Soil dynamics and machine foundations
	Bridge engineering
	Contracts management
PEC-VII	Repairs and rehabilitation of structures
	Wood Structures
	Transportation Economics

	Sustainable Construction Methods

Number of credits for each semester

SEMESTER	CREDITS
I	17.5
II	20.5
II	21.5
IV	18.5
V	21.5
VI	19
VII	22.5
VIII	19
TOTAL	160

CONTRACTS, SPECIFICATIONS AND PROJECT MANAGEMENT (Proposed syllabus for the academic year 2018-19) SEMESTER – IV/I			
Subject Code	18CECET7010	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Understand the Basics of Contracts
- Understand Technical specifications for various works
- Estimate the total quantity and rates of materials required for the Construction
- Analyze various units and rates of quantities utilized as a part of estimation
- Plan the construction activities with different techniques.
- Understand the network structure of scheduling at different stages.

Unit -1	
Detailed Estimation of Buildings;using individual wall method and centerline method, Valuation of buildings. Estimation of R.C.C elements, Detailed bar bending schedule, Estimation of cost of	**Hours – 10**

materials, concepts and statistical measurements of the factors involved in direct costs, over head costs . .	
Unit -2	
Rate Analysis – Working out data for various items of work over head and contingent charges. – Standard Schedule of Rates – Rate analysis for different items of work.	
Unit – 3	
Contracts: Introduction, Types of contracts as per Indian Contract Act 1872., Contract specifications, Contract documents, Conditions of contracts, E.P.C, L.S, International Contracts, FIDIC contract regulations specifications for different items of Building Construction. PPP Mode.	**Hours – 10**
Unit – 4	
Project Management and Safety: Definition of Projects; Stages of project planning: pretender planning, pre -construction planning, detailed construction planning, role of client and contractor, level of detail. concept of productivities, estimating durations, Sequence of activities, activity utility data; Techniques of planning- **Safety equipment , Safety management in laying of** in laying of RCC, earthwork, Case Study (Polavaram Project).	**Hours – 10**
Unit – 5	
Work Break down Structure: Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation. PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack	**Hours – 10**

computations, calculation of probability of completion.	
Course Outcomes: On successful completion of this course, students will be able to 1. Illustrate about contract and tender documents 2. Understand technical specifications for various works 3. Identify various units utilized as a part of estimation 4. Compute the quantity of the different material plan details sheet. 5. Analyze the cost of the different material plan details sheet 6. Plan, control and minor construction projects with respect to time and cost.	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer questions carrying 1 mark each. 2. Two questions from each unit should present. **Section B:** 1. This Section will have 10 questions. 2. Each full question carry 12 marks. 3. Each full question will have sub question covering all topics under a unit. 4. The student will have to answer 5 full questions selecting one full question from each unit.	

Text Books:

1. Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016
2. Estimating and Costing by G.S. Birdie Dhanpat Rai Publishing Company
3. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.
4. Project Management by K.N.Jha
5. Construction Project Management by Chytkara.

Reference Books:

1. A Textbook of Estimating and Costing by R.C.Kohli, S Chand
2. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	2	1	2	-	-	-	-	-	-
4	2	-	3	-	-	-	-	-	-
5	2	2	2	-	-	-	-	-	-
6	1	2	2	-	-	-	-	-	-
Course	2	1	1	-	-	-	-	-	-

<table>
<tr><td colspan="4">DESIGN OF STEEL STRUCTURES
(Proposed syllabus for the academic year 2018-19)
SEMESTER – IV/I</td></tr>
<tr><td>Subject Code</td><td>18CECET7020</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>4 + 1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 02</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Familiarize Students with different types of Connections and relevant IS codes
Equip student with concepts of design of flexural members
Understand Design Concepts of tension and compression members in trusses
Familiarize students with different types of columns and column bases and their Design
Familiarize students with Plate girder and Gantry Girder and their Design</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Properties of materials; loads and stresses, Optimization Design of Industrial Structures; Connections ,Welded and Riveted Built-up sections Design of tension members subjected to axial tension and bending, splicing of tension members</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2</td></tr>
<tr><td colspan="3">Design of compression members, Design of columns accounting to Lateral Buckling</td><td>Hours – 10</td></tr>
</table>

Unit – 3	
Design of Column Splices and built up Columns with lacing and battening. Design of column base: Slab base and Gusseted base, Design of Eccentric Connections	**Hours – 10**
Unit – 4	
Design of Beams: Laterally supported and laterally unsupported beams - Bending Strength of Beams, check for shear and deflection, web buckling and web crippling, Modes of Failures.	**Hours – 10**
Unit – 5	
Design of Plate Girder and Gantry Girder.	**Hours – 10**

Course Outcomes:

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

1. Design with different types of connections.
2. Design of columns with and without lateral buckling
3. Design of column bases.
4. Design the beams.
5. Design the plate girder.
6. Design the gantry Girder

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.

2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

TEXT BOOKS

1. Steel Structures Design and Practice, N. Subramanian, Oxford University Press-2008
2. Design of steel structures, S. K. Duggal, Tata McGraw Hill, New Delhi- 2017
3. Design of Steel Structures S. S. Bhavikatti, I. K International Publishing House Pvt. Ltd-2009.

REFERENCES

1. Structural Design in Steel, Sarwar AlamRaz, New Age International Publishers, New
1. Delhi
2. Design of Steel Structures, M. Raghupathi, Tata Mc. Graw-Hill
3. Structural Design and Drawing, N. Krishna Raju; University Press,

IS Codes:

1. Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2. IS: 800- 2007, IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.
3. Steel Tables.

These codes and steel tables are permitted to use in the examinations.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	2	0	0	0	0	0	0	0	0
2	0	1	3	0	0	0	0	0	0
3	0	1	3	0	0	0	0	0	0
4	0	0	3	1	0	0	0	0	0
5	0	0	3	1	0	0	0	0	0
6	1	1	3	1	0	0	0	0	0
Course	1	1	3	1	0	0	0	0	0

URBAN HYDROLOGY (Proposed syllabus for the academic year 2018 -2019) SEMESTER – IV/I			
Subject Code	18CECEP7042-a	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- appreciate the impact of urbanization on catchment hydrology
- understand the importance of short duration rainfall runoff data for urban hydrology studies.
- learn the techniques for peak flow estimation for storm water drainage system design.
- understand the concepts in design of various components of urban drainage systems
- learn some of the best management practices in urban drainage.
- understand the concepts of preparation master urban drainage system

Unit -1	
Introduction: Urbanisation and its effect on water cycle – urban hydrologic cycle – trends in urbanisation – Effect of urbanisation on hydrology **Precipitation Analysis:** Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration -Frequency (IDF)curves, design storms for urban drainage systems.	**Hours – 10**
Unit -2	
Approaches to urban drainage: Time of concentration, peak flow estimation approaches , rational method, NRCS curve number approach, runoff quantity and quality, wastewater and stormwater reuse , major and minor systems.	**Hours – 10**
Unit – 3	
Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, **source control**	**Hours – 10**
Unit – 4	
Analysis and Management: Storm water drainage structures, design of storm water network- Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for storm water management	**Hours – 10**
Unit – 5	
Master drainage plans: Issues to be concentrated upon – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning , use of models in planning	**Hours – 10**
Course outcomes:	

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

- develop intensity duration frequency curves for urban drainage systems
- develop design storms to size the various components of drainage systems.
- apply best management practices to manage urban flooding.
- prepare master drainage plan for an urbanized area.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1.. GeigerW.F.,JMarsalek,W.J.RawlsandF.

C. Zuidema, (1987 - 2 volumes), UNESCO, ManualonDrainageinUrbanisedarea

2. Hall M J (1984), Elsevier Applied SciencePublisher.Urban Hydrology

3. Wanielista M P and Eaglin (1997), Wiley andSons,Hydrology – Quantity and Quality Analysis,

4. Akan A.O and R.L. Houghtalen (2006), WileyInternational,Urban Hydrology, Hydraulics and Stormwater Quality: Engineering Applications and Computer Modelling,

Reference Books:

1. Stormwater Detention for Drainage, Stahre P and Urbonas B (1990), Water Quality and CSO Management, PrenticeHall.
2. Urban water cycle processes and interactions, Marsalek et. al. (2006), Publication No. 78, UNESCO,Paris(http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)
3. Frontiers in Urban Water Management – Deadlock or Hope, by Maksimovic C and J A Tejada-Guibert (2001),

IWAPublishing

.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	2	1	2	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	-	1	2	-	-	-	1	-	-
4	-	-	-	-	-	-	2	-	-
5	2	2	2	-	-	-	1	-	-
Course	2	2	2	-	-	-	2	-	-

ADVANCED CONCRETE TECHNOLOGY
(Proposed syllabus for the academic year 2018-19)
SEMESTER – IV/I

Subject Code	18CECEP7042-b	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Identify the aggregate and cement properties
- Understand the behavior of fresh and hardened concrete.
- Make aware the recent developments in concrete technology
- Understand factors affecting the strength, workability and durability of concrete
- Impart the methods of proportioning of concrete mixtures.

Unit -1	
Aggregates: Geology aspects, Review of types; sampling and testing; effects on properties of concrete, production of artificial aggregates. Introduction ASR. Special Cements: Review of types of cements, chemical composition; properties and tests, chemical and physical process of hydration,	Hours – 10
Unit -2	
Mineral Admixtures: Chemical Admixtures,	Hours

Flyash, ground granulated blast furnace slag, metakaolin, rice-husk ash and silica fume; chemical composition; physical characteristics; effects on properties of concrete; advantages and disadvantages; proportioning of concrete mixtures: Factors considered in the design of mix; BIS Method, ACI method, Durability aspects.	– 10
Unit – 3	
Durability of concrete: Durability concept; factors affecting, reinforcement corrosion; fire resistance; frost damage; sulphate attack; alkali silica reaction; concrete in sea water, statistical quality control, acceptance criteria as per BIS code	Hours – 10
Unit – 4	
Non-destructive testing of concrete: Surface Hardness, Ultrasonic, Penetration resistance, Pull-out test, chemical testing for chloride and carbonation- core cutting - measuring reinforcement cover. Basics on Thermal studies.	Hours – 10
Unit – 5	
Special concretes- Special processes and technology for particular types of structure - Roller compacted concrete – Ready mix concrete, Sprayed concrete; underwater concrete, mass concrete; slip form construction, Prefabrication technology, Viscosity and air entrained agents.	Hours – 10
Course outcomes: On successful completion of this course, students will be able to 1.Understand the testing of concrete materials as per IS code 2. Know the procedure to determine the properties of fresh and hardened of concrete 3. Design the concrete mix using ACI and IS code	

methods 4. Select and Design special concretes depending on their specific applications 5. Acquaint with non-destructive testing of concrete
Question paper pattern: Section A: 1. This section contains ten one or two line answer questions carrying 1 mark each. 2. Two questions from each unit should present. Section B: 1. This Section will have 10 questions. 2. Each full question carry 12 marks. 3. Each full question will have sub question covering all topics under a unit. 4. The student will have to answer 5 full questions selecting one full question from each unit.
Text Books: 1. Neville A.M.,"Properties of Concrete", Trans-Atlantic Publications, Inc.; 5e, 2012 2. Job Thomas., " Concrete Technology", Cengage learning, 3. R. Santhakumar ,, Concrete Technology", Oxford Universities Press, 2006 4. Shetty M. S., Concrete Technology", S. Chand & Co., 2006 5. All relavent IS Codes in each Material.
Reference Books:

1. Mehta and Monteiro, "Concrete-Micro structure, Properties and Materials", McGraw Hill Professional
2. Neville A. M. and Brooks J. J., Concrete Technology, Pearson Education, 2010
3. Lea, "Chemistry of Cement and Concrete", Butterworth-Heinemann Ltd, 5e, 2017
4. Bungey, Millard, Grantham – Testing of Concrete in Structures- Taylor and Francis, 2006

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO
1	-	1	-	-	-	-	-		-	
2	1	1	1	-	-	-	-	-	-	
3	2	1	2	-	-	-	-	-	-	
4	2	2	-	-	-	-	-	-	-	
5	1	2	2	-	-	-	-	-	-	
6	-	1	2	-	-	-	-	-	-	
Course	2	1	2	-	-	-	-	-	-	

<table>
<tr><td colspan="4">SURFACE WATER HYDROLOGY
(Proposed syllabus for the academic year 2018-19)
SEMESTER - IV/I</td></tr>
<tr><td>Subject Code</td><td>18CECEP7042-c</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>4 + 1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
<tr><td colspan="4">Course Learning Objectives:
This course will enable students to:
• Gain knowledge on hydrological (rainfall and runoff) cycle
• Know the concept of measurements in watersheds
• Understand the estimation of various hydrological parameters
• Predict volume and rates of runoff with tools like hydrographs and unit hydrographs,
• Understand concept of watershed management.</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Introduction- Description of Hydrologic Cycle, Overview of application of hydrology in engineering. Basic concepts of weather systems, characteristics of precipitation in India.</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2</td></tr>
<tr><td colspan="3">Determination of net effective rainfall infiltration indices- ø &W Runoff-definition-components - direct runoff and base flow, overload flow and interflows, pictorial representation Runoff Introduction-components,. Factors affecting run</td><td>Hours – 10</td></tr>
</table>

off.. Runoff characteristics of streams – perennial, intermittent and ephemeral streams, Measurement of stream flows.	
Unit – 3	
Measurement of stage and velocities, staff gauge, wire gauge, automatic stage recorders, current meters , discharge measurement by area- velocity method, ,moving boat method ,calibration (V= a Ns + b). Rainfall-Runoff relations (R=a P + b), curve fitting and determination of 'a' and 'b' and (correlation coefficient), Stage-discharge relationship, Estimation of peak runoff and design peak runoff rate, rational method and curve number techniques.	**Hours – 10**
Unit – 4	
Snyder's synthetic unit hydrograph, IUH, SCS Triangular Hydrograph. The conversion of unit hydrograph duration, methods for unit hydrographs of different durations.	**Hours – 10**
Unit – 5	
Application of Hydrology - Flood control and Regulation, Flood mitigation, Flood plain mapping, Retards. Applications of Hydrology in land and water management, watershed management.	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to • Acquire the knowledge of hydrological cycle(rainfall and runoff) • Workout the measurements in watersheds • Determine various hydrological parameters with	

appropriate techniques

- Calculate volume and rates of runoff with tools like hydrographs and unit hydrographs,
- Apply appropriate measures for watershed management.

Question paper pattern:

Section A:

3. This section contains ten one or two line answer questions carrying 1 mark each.
4. Two questions from each unit should present.

Section B:

5. This Section will have 10 questions.
6. Each full question carry 12 marks.
7. Each full question will have sub question covering all topics under a unit.

The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Engineering Hydrology. Raghunath H.M. 1986. Willey Eastern Limited, New Delhi.
2. Watershed Hydrology, Suresh R. 1997. Standard Publisher and Distriburs, New Delhi.
3. A.Text Book of Hydrology by Dr.P.Jayarami Reddy, 3rd edition.
4.

References:

1. Engineering Hydrology. Subramanyam K. 1984. Tata Mc. Graw – Hill Publishing Co., Limited, New Delhi.

2.Hydrology for Engineers Linsley R.K. Kholer A. & Paul Hus J.L.H. 1988, Mc-Graw Hill Book Co. New Delhi.
3.Watershed Management. Dhruvanarayana, VV. 1990. ICAR Publication, New Delhi.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO
1	3	-	-	-	-	-	-		-	-	
2	2	2	1	-	-	-	-	-	-	-	
3	2	1	2	-	-	-	-	-	-	-	
4	2	-	3	-	-	-	-	-	-	-	
5	2	2	2	-	-	-	-	-	-	-	
6	1	2	2	-	-	-	-	-	-	-	
Course	2	1	1	-	-	-	-	-	-	-	

OFFSHORE ENGINEERING (Proposed syllabus for the academic year 2018-19) SEMESTER – IV/I			
Subject Code	18CECEP7042-d	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Learning Objectives:

This course will enable students to:

- Understand underwater construction practice
- Study Marine Hydrodynamics
- Analyze marine engine systems on board the ships such as pumps, and pumping systems
- Understand structure and properties of materials, their possible corrosion responses, and then show you how to apply this knowledge specific applications.
- Analyze various loads which the offshore structure is subjected , types of offshore structures and various equipments on the offshore structure loading mechanisms, mooring hardware components etc.
- Understand ships machinery, lubrication systems, engine dynamics, relationship of engine the

propeller	
Unit -1	
Offshore Engineering: Introduction to offshore structures, codes of practice, offshore project management, deep water, offshore site investigations, geophysical methods; offshore sediment.	**Hours – 10**
Unit -2	
Loads on offshore structures Wind Loads; Wave and Current Loads; Calculation based on Maximum base Shear and Overturning Moments; Design Wave heights and Spectral Hydrodynamic Application floating and submerged bodies, Hydrodynamic damping.	**Hours – 10**
Unit – 3	
Marine Hydrodynamics : Fluid pressure and centre of pressure – estimation of weight and centre of gravity – conditions of equilibrium – definition of meta-centre – hydrostatic particulars – stability at small angles of inclinations – problems of heel and trim-free surface effect.	**Hours – 10**
Unit – 4	
Blast Mitigation-Blast walls; Collision of Boats and energy absorption; Platform survival capacity and Plastic design methods.	**Hours – 10**
Unit – 5	
Soil mechanics of seabed: Geotechnical studies of sea floor sediments –Stability – Bearing capacity features of foundation of gravity structures –Bearing capacity and settlement under dynamic loads – Immediate and long term behaviour liquefaction under cyclic loads.	**Hours – 10**

Course outcomes:

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

1. Understand offshore construction
2. Understand offshore structures and various equipments.
3. Analyze offshore structure loading mechanisms.
4. Design mooring hardware components.
5. Appraise Marine Hydrodynamics.
6. Understand behaviour of Floating Structures.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. BC Grewick, Jr. Construction of marine and offshore structure, CRC Press, 2000.
2. RD Blevins, Flow induced vibrations, Van Nostrand

Reinhold, 1990.

3. N Barltrop, Floating structures: A Guide for design and analysis, OPL, 1998.

References:

1. EE Allimendinger, Submersible vehicle systems design. SNAME, 1990.
2. HO Bordeaux, Buoy engineering, John Wiley, 1975.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	2	1	2	-	-	-	-	-	-
4	2	-	3	-	-	-	-	-	-
5	2	2	2	-	-	-	-	-	-
6	1	2	2	-	-	-	-	-	-
Course	2	1	1	-	-	-	-	-	-

ADVANCED STRUCTURAL ANALYSIS (Proposed syllabus for the academic year 2018-19) SEMESTER – IV/I			
Subject Code	18CECEP7053-a	Internal	30

		Marks	
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Understand the basics of plain stress and plain strain.
- Derive the equation of Bending of Simple and Cantilever beams
- Analyses direct and indirect Model analysis.
- Introduction to Finite element method for structural analysis
- Understand the Application of finite element methods

Unit -1	
Elasticity: Introduction, components of stress and strain, Hook's law plain stress and plain strain, equations of equilibrium, compatibility, boundary conditions. Direct and Indirect methods, problem solving.	**Hours – 10**
Unit -2	
Two dimensional problems in rectangular and polar coordinates, Bending of simple and cantilever beams	**Hours – 10**
Unit – 3	
Model Analysis: Structural similitude, Direct and indirect model analysis, Model material and model making, Measurement for forces and deformations-strain gauges	**Hours – 10**
Unit – 4	
Introduction Finite element method for structural	**Hours**

analysis; Review of principle of virtual work, Ritz method, Discretization of domain, Basic element shape, Discretization process	**– 10**
Unit – 5	
Application of finite element method to one and two dimensional plane stress strain elements.	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to 1. Understand the basics of structural Analysis 2. Derive the equation for Bending of Simple and Cantilever beams 3. Analyse Model material and model making 4. Understand Finite element method for structural analysis 5. Understand the Application of finite element method to one dimensional and two dimensional elements.	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer questions carrying 1 mark each. 2. Two questions from each unit should present. **Section B:** 1. This Section will have 10 questions. 2. Each full question carry 12 marks. 3. Each full question will have sub question covering all topics under a unit. 4. The student will have to answer 5 full questions	

selecting one full question from each unit.

Text Books

1. A first course in the Finite Element Method, Daryl L. Logan, Thomson Publications.
2. Introduction to Finite Elements in Engineering, Tirupati R. Chandrupatla, Ashok D.Belgundu, PHI publications.
3. Introduction to Finite Element Method, Desai & Abel CBS Publications
4. Mechanics of Solids by Aravind kumar Singh
5. Advanced Mechanics of Solids, L.Srinath, Mc Graw Hil, 3rd Edition
6. Theory of Elasticity by Timoshenko and Goodier

Reference Books:

1. Concepts and applications of Finite Element Analysis, Robert D. Cook, Michael E Plesha,John Wiley & sons Publication
2. Theory of elasticity by K.Sadhu singh

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	2	1	2	-	-	-	-	-	-
4	2	-	3	-	-	-	-	-	-
5	2	2	2	-	-	-	-	-	-
6	1	2	2	-	-	-	-	-	-

Course	2	1	1	-	-	-	-	-	-	

<table>
<tr><td colspan="4" align="center">ADVANCED TRANSPORTATION ENGINEERING
(Proposed syllabus for the academic year 2018-19)
SEMESTER - IV/I</td></tr>
<tr><td>Subject Code</td><td>18CECEP705 3-b</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>3+ 1</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4" align="right">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Know various components and their functions in a Railway Track
Know the construction and maintenance of a Railway Track including Signaling
Know the construction and maintenance of harbors and docks.
Acquire strong base in planning principles of airport geometrics and pavements
Acquire strong base in design principles of airport geometrics and pavements</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Permanent way: Functions and requirements of permanent way - components - typical cross sections - gauges - functions and requirements of components of permanent way - sleeper density - coning of wheels creep and wear in rails - rail fasteners - defects, failures and joints in rails - Geometric design of railway track - horizontal curves - super elevation - cant deficiency -</td><td>Hours – 10</td></tr>
</table>

negative super elevation	
Unit -2	
Signaling and interlocking:- Signal control systems - points and crossings - track junctions – track circuiting - track alignment **Railway Track construction and maintenance:-** Construction of railway track- earth work plate laying and packing-maintenance of track - alignment - gauge-renewal of component parts-drainage - modern methods of track maintenance.	**Hours – 10**
Unit – 3	
Airport Planning and Characteristics: Airport classification based on ICAO, airport components, Aero plane components; Air–craft characteristics; Selection of site for airport; Surveys for site selection **Airport Obstructions:** Zoning laws, Imaginary surfaces, Approach zone, turning zone, **Run Ways:** . orientation- cross wind component, wind rose diagram, types of wind rose; Basic runway length; Corrections for elevation, Temperature and gradient	**Hours – 10**
Unit – 4	
Runway Design: Principles of Runway design. **Structural Design of Pavement Flexible Pavement:** Various design factors, Design methods for flexible airfield Pavement-CBR Method, Mcleod Method and Burmister's Method. **Structural Designof Rigid Pavement:** Rigid pavement Design- PCA Method; LCN Method of pavement design.	**Hours – 10**
Unit – 5	
Elements of harbor - ports - various design considerations of a harbour - classifications - site	**Hours – 10**

selection factors - wet and dry docks - lock and lock gates - site selection, configuration and types of breakwaters - details of quays, piers, fenders, dolphins, slipways - transit shed and warehouse - navigational aids	

Course outcomes:

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

1. Design Geometrics of a Railway Track
2. Understands the concepts of Signaling and Railway track Maintenance.
3. Design the flexible and rigid runways.
4. Construct and Maintain Docks and Harbor
5. Understand & Evaluate airport & aircraft characteristics

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions

selecting one full question from each unit.
Text Books: 1. Railway Engineering by Satish Chandra and Agarwal M New Delhi 2. Airport Engineering by Khanna & Arora – Nemchand E 3. Docks and Harbour Engineering by Bindra S.P – Dhanp
Reference Books: 1. Railway Engineering by Saxena & Arora – Dhanpat Rai Publishers, New Delhi 2. Airport Engineering by Virendra Kumar, – Dhanpat Rai Publishers, New Delhi 3. Transportation Engineering by Srinivasa Kumar R, University Press, Hyderabad 4. Relevant Indian Standard Codes

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	2	1	3	-	-	-	-	-	-
2	2	2	1	-	-	-	-	-	-
3	3	1	1	-	-	-	-	-	-
4	2	2	1	-	-	-	-	-	-
5	3	2	3	-	-	-	-	-	-
Course	3	2	2						

EARTH RETAINING STRUCTURES (Proposed syllabus for the academic year 2018 -2019) SEMESTER – IV/I			
Subject Code	18CECEP7053-c	Internal Marks	30
Number of Lecture Hours/Week	4+ 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Impart knowledge about the various earth pressure concepts
- Analyses the stability of rigid retaining structures.
- Design the flexible retaining structures
- Learn about the free and fixed earth supports.
- Understand types of underground structures.

Unit -1	
Backfill features – soil type, surface inclination, loads on surface, soil layers, water level, Coulomb's theory, Effects due wall friction and wall inclination	**Hours – 10**
Unit -2	
Rigid Retaining Structures: Rigid Retaining Structures, Types, Empirical methods and Stability analysis.	**Hours – 10**
Unit – 3	
Flexible Retaining Structures: Flexible Retaining Structures, Types, Material, Cantilever sheet piles, Anchored bulkheads, classifications –	**Hours – 10**

<table>
<tr><td>specifications, Design specifications and pressure distribution variations, Introduction to Geotextites</td><td></td></tr>
<tr><td colspan="2">Unit – 4</td></tr>
<tr><td>Braced Excavation Types, Construction methods, Pressure distribution in sands and clays. Cohesive Soils - Materials Used for Sheet Piles – Free Earth and Fixed earth Support Methods</td><td>Hours – 10</td></tr>
<tr><td colspan="2">Unit – 5</td></tr>
<tr><td>Underground structures in soils: Underground structures in soils such as pipes, conduits and trenches, Soil Pressures on Braced Walls and their Design
Coffer Dams, types.</td><td>Hours – 10</td></tr>
<tr><td colspan="2">Course outcomes:
On successful completion of this course, students will be able to
1. Estimate the various earth pressures.
2. Analyze the stability of rigid retaining structures.
3. Design flexible retaining Structures
4. Describe about free earth and fixed earth supports.
5. Understand the different underground structures like pipes and braced walls.</td></tr>
<tr><td colspan="2">Question paper pattern:
Section A:
1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.
Section B:
1. This Section will have 10 questions.
2. Each full question carry 12 marks.</td></tr>
</table>

3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Clayn, C.R.I., Woods, R.I., Bond, A.J., Milititsky, J. – Earth Pressure and Earth-retaining structures, CRC Press, Taylor and Francis group, 2013.
2. Budhu, M. – Foundations and Earth retaining structures, John Wiley & Sons, Inc., 2008.

Reference Books:

1. Bowles, J.E. – Foundation Analysis and Design, 5th Edition, BBS Publisher, 2009.
2. Donald P Codu – Foundation Design Principles and Practices, 2nd edition, Pearson, Indian edition, 2012

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	2	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	-	1	2	-	-	-	-	-	-
4	2	-	3	-	-	-	-	-	-
5	2	2	2	-	-	-	-	-	-
6	1	2	2	-	-	-	-	-	-
Course	-	1	1	-	-	-	-	-	-

<table>
<tr><td colspan="4">RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEM
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER – IV/I</td></tr>
<tr><td>Subject Code</td><td>18CECEP705-d</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>4 + 1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Learn the concept of sanitation in rural areas.
Understand the water treatment methods.
Use important concepts of water supply systems and apply the same to problems
Understand the aspect of sanitary engineering.
Understand the various public sanitation systems.</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Concept of Environmental and scope of sanitation in rural areas. Magnitude of problem of water Supply and sanitation – population to be covered and difficulties National policy. Various approaches for planning of water supply systems in rural areas.</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2</td></tr>
<tr><td colspan="3">Specific problem in rural water supply and treatment e.g. iron, manganese, fluorides etc. Low cost treatment, appropriate technology for water supply and sanitation. Improvised method and compact system of treatment of surface and ground</td><td>Hours – 10</td></tr>
</table>

waters. Water supply through spot sources, hand pumps, open dug–well.	
Unit – 3	
Planning of distribution system in rural areas; Water supply during fairs, festivals and emergencies. Treatment and disposal of wastewater/sewage. Various methods of collection and disposal of night soil-Pipe design by .EPA Net software.	**Hours – 10**
Unit – 4	
On site sanitation system and community latrines. Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits etc.	**Hours – 10**
Unit – 5	
Industrial Hygiene and Sanitation: Occupational Hazards- Schools- Public Buildings- Hospitals- Eating establishments- Swimming pools – cleanliness and maintenance and comfort- Industrial plant sanitation	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to 1. Understand definitions of the basic concept of sanitary engineering. 2. Apply suitable methods of water treatment for rural areas. 3. Understand the importance of water supply in rural areas. 4. Apply the sanitary engineering concept and principals. 5. Apply the different public sanitation methods in rural areas.	
Question paper pattern:	

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Low cost on site sanitation option, Hoffman & Heijno Occasional Nov.1981 paper No.21, P.O. Box 5500 2280
2. HM Rijswijk, the Netherlands offices, J.C. Mokeniaan, 5

Reference Books:

1. Rijswijk (the Haque). Wagner, E.G. and Lanoik, J.N. water supply for rural areas and smallCommunities, Geneva: W.H.O.1959.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	1	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-

3	-	1	2	-	-	-	2	-	-	
4	2	-	-	-	-	-	2	-	-	
5	1	2	2	-	-	-	-	-	-	
Course	2	2	2	-	-	-	2	-	-	

STRUCTURAL DESIGN AND DRAWING LAB

(Proposed syllabus for the academic year 2018 -2019

SEMESTER – IV/I

oject Code	18CECEL7060	**Internal Marks**	50
mber of Lecture Hours/Week	03	**External Marks**	50
tal Number of Lecture Hours	36	**Exam Hours**	03
Credits – 1.5			

rse objectives: To understand design principles and drawing of various concrete structures and tures

ndations: Footings, Columns **ms:** Types, design principles of Singly and doubly reinforced beams **s**: Types, design principles of One way and two way slabs **l Built-up Columns**: Types and design principles of built-up columns with lacing battens. **l Column Bases:** Types and design principles (slab base and gusseted base). **e Girders:** Types and design of plate girder.	**12 Hou**
Foundation: Footings Columns Singly and Doubly reinforced beam One way slab Two way slab Staircase Built up steel column with lacing and battening Slab base, Gusseted base Plate girder	**24 Hour**

rse outcomes: On successful completion of this course, students will be able to

estion paper pattern:

Any two question of the above six designs may be asked out of which the candidate has ans

question carries 50 marks in Total.

(a) 20 Marks will be allotted for Design procedure
(b) 20 Marks will be allotted for Drawing
(c) 10 marks will be allotted for viva voce.

rdware/Software Requirements:

Mini drafter

Drawing tools

INTELLIGENT TRANSPORTATION SYSTEMS
(Proposed syllabus for the academic year 2018-19)
SEMESTER - IV/II

Subject Code	18CECEP8014-a	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:
This course will enable students to:

- Learn the fundamentals of ITS
- Understand and manage traffic through telecommunication
- Study the ITS functional areas
- Study the implementation of ITS
- Learn the implantation of ITS in developing countries

Unit -1	
Introduction to Intelligent Transportation Systems (ITS) – Definition of ITS and Identification of ITS Objectives, Historical Background, Benefits of ITS - ITS Data collection techniques –Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Geographic Information Systems (GIS), video data collection.	**Hours – 10**
Unit -2	
Telecommunications in ITS – Importance of telecommunications in the ITS system, Information Management, Traffic Management Centres (TMC).	**Hours – 10**

Vehicle – Road side communication – Vehicle Positioning System	
Unit – 3	
ITS functional areas – Advanced Traffic Management Systems (ATMS), Advanced Traveler Information Systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control Systems (AVCS), Advanced Public Transportation Systems (APTS), Advanced Rural Transportation Systems (ARTS).	**Hours – 10**
Unit – 4	
ITS User Needs and Services – Travel and Traffic management, Public Transportation Management, Electronic Payment, Commercial Vehicle Operations, Emergency Management, Advanced Vehicle safety systems, Information Management.	**Hours – 10**
Unit – 5	
Automated Highway Systems - Vehicles in Platoons – Integration of Automated Highway Systems; ITS Programs in the World – Overview of ITS implementations in developed countries, ITS in developing countries, Case studies.	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to 1. Understand the Historical background of communication techniques 2. Apply the various ITS methodologies 3. Design and implement ITS components 4. Define the significance of ITS under Indian conditions 5. Define the significance of ITS other than Indian conditions	
Question paper pattern:	

Section A: 1. This section contains ten one or two line answer questions carrying 1 mark each. 2. Two questions from each unit should present. **Section B:** 1. This Section will have 10 questions. 2. Each full question carry 12 marks. 3. Each full question will have sub question covering all topics under a unit. 4. The student will have to answer 5 full questions selecting one full question from each unit.
Text Books: 1. Chowdhary, M.A. and A Sadek, Fundamentals of Intelligent Transportation systems planning. Artech House Inc., US, 2003. 2. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles. 3. Sussman, J. M., Perspective on ITS, Artech House Publishers, 2005.
Reference Books: 1. National ITS Architecture Documentation, US Department of Transportation, 2007 (CDROM). 2. Williams, B., Intelligent transportation systems standards. Artech House, London, 2008.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	1	1	1	-	-	1	-	-	-
2	1	2	2	-	1	-	-	-	-
3	2	2	3	-	1	-	-	-	-
4	1	3	1	-	1	-	-	-	-
5	1	3	1	-	-	-	-	-	-
Course	1	2	2		1	1			

GROUND IMPROVEMENT TECHNIQUES (Proposed syllabus for the academic year 2018-19) SEMESTER – IV/II			
Subject Code	18CECEP8014-b	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Know the need of ground improvement and feasibility of different techniques
- Adopt different Ground Modification Techniques for improving the properties of remolded and in-situ soils by adopting different techniques
- Learn the concepts, purpose and effects of grouting.
- Understand the how chemical admixtures are useful in stabilization.
- Understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
- Know how geo textiles and geo synthetics can be used to improve the engineering performance of soils.

Unit -1	
Need and objectives of Ground Improvement, Classification of Ground Modification Techniques – suitability and feasibility; Mechanical Modification , In situ densification methods- in situ densification	**Hours – 10**

of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.	
Unit -2	
Hydraulic Modification : Methods of dewatering, sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis	**Hours – 10**
Unit – 3	
Physical and chemical modification: Stabilisation with admixtures like cement, lime, calcium chloride, fly ash, GGBS, polymer and bitumen. Grouting – materials and methods, Stabilization with Deep soil mixing, and stone columns.	**Hours – 10**
Unit – 4	
Reinforced Earth Technology: Concept of soil reinforcement, Reinforcing materials, Backfill criteria, Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.	**Hours – 10**
Unit – 5	
Geotextiles: Overview on Geosynthetics – Geotextiles, Functions, properties and applications – geogrids , geomembranes and gabions - properties and applications.	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to 1. Possess the knowledge of various methods of ground improvement 2. Check the suitability of various methods to different	

field hydraulic situations.
3. Choose different grouting methods.
4. Acquire knowledge to suggest suitable admixtures to stabilize the ground.
5. Design a reinforced earth embankment and to check its stability.
6. Apply various functions of Geosynthetics in Civil Engineering practice.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Ground Improvement Techniques, Purushotham Raj, Laxmi Publications, New Delhi.
2. Ground Improvement Techniques, Nihar Ranjan Patro, Vikas Publishing House (p) limited , New Delhi.
3. An introduction to Soil Reinforcement and

Geosynthetics, G. L. Siva Kumar Babu, Universities Press.
Reference Books: 1. Ground Improvement, M.P. Moseley, Blackie Academic and Professional, USA 2. Designing with Geosynethetics, R. M Koerner, Prentice Hall

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	2	-	-	1	-	-	-	-	-
2	2	-	-	1	-	-	-	-	-
3	2	-	-	3	-	-	-	-	-
4	2	-	-	3	1	-	-	-	-
5	2	-	-	2	2	-	-	-	-
6	2	-	-	1	2	-	-	-	-
Course	2	-	-	3	2	-	-	-	-

ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENT MANAGEMENT PLANNING (Proposed syllabus for the academic year 2018 -2019) SEMESTER – IV/II			
Subject Code	18CECEP8014-c	Internal Marks	30
Number of Lecture Hours/Week	3 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Impart knowledge on different concepts of Environmental Impact Assessment.
- Know the procedures of risk assessment.
- Learn the EIA methodologies and the criterion for the selection of EIA methods.
- Learn the pre requisites for ISO certification.
- Learn the procedures for Environmental clearance and audit.
- Appreciate the importance of stake holders participation in EIA

Unit -1	
Basic Concepts of EIA: Elements of EIA, Factors affecting EIA, Factors affecting EIA, Classification of Environmental parameters, Role of stake holders in the EIA preparation, stages in EIA- preparation of EIA base map.	**Hours – 10**
Unit -2	
EIA-Methodologies: Introduction, Criteria for the	**Hours**

selection of the EIA methodology, EIA methods-Ad-hoc method, Matrix method, Network method, Environmental Media Quality Index method, Overlay method, Cost/Benefit Analysis-EIS & EMP.	**– 10**
Unit – 3	
Impact of Development activities and Land use change: Introduction and methodology for assessment of soil and water-Delineation of study area, identification of activities- Application of Remote sensing and GIS for EIA	**Hours – 10**
Unit – 4	
EIA with reference surface water, air and biological environment, methodology for assessment of impacts surface water environment, generalized approach for the assessment of air pollution impact, Assessment of impact development activities on vegetation and wild life, Environmental impact of deforestation.	**Hours – 10**
Unit – 5	
Environmental Risk Assessment and Risk Management in EIA: Key stages in Environmental risk assessment, Advantages of Environmental Risk Assessment, EIA Notification by Ministry of Environment and Forest (Govt. of India), Procedure for Environmental Clearance, Procedure for conducting Environmental impact assessment, evaluation of EIA report; Environmental legislation, objectives, preparation of audit report, post audit activities, Concept of ISO and IS0 14000.	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to 1. Prepare EMP, EIS and EIA reports.	

2. Identify the risks and impact of the project.
3. Select an appropriate EIA methodology.
4. Conduct and Evaluate the EIA report.
5. Estimate the cost benefit/ratio of the project.
6. Know the audit procedures in the in the impact assessment.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Environmental Impact Assessment, Canter Larry W.,McGraw-Hill Education Edi (1966)
2. Environmental Impact Assessment Methodologies, Anjaneyulu , B.S Publications, Sultan Bazar, Hyderabad.

Reference Books:

1. Environmental Science and Engineering, by J.Glynn and GarryW. Hein Ke- Prentice Hall Publishers.
2. Environmental Science and Engineering , by Suresh S.K.Dhameja-S.K.Katania & Sons Publications, New Delhi.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	1	-	-	-	-	2	-		-
2	1	2	-	-	-	2	-	-	-
3	1	1	-	-	2	2	-	-	-
4	1	-	-	-	2	2	-	-	-
5	-	2	-	-	-	-	-	-	-
6	-	2	-	-	-	2	-	-	-
Course	1	2	-	-	2	2	-	-	-

<table>
<tr><td colspan="4">ENGINEERING WITH GEOSYNTHETICS
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER – IV/II</td></tr>
<tr><td>Subject Code</td><td>18CECEP8014-d</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>4 + 1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Impart the basic knowledge of Geosynthetics.
Learn about design with Geosynthetics for various Geotechnical problems.
Learn the different construction methods with Geotextiles and Geogrids for various Geotechnical problems.
Understand the concepts of designing Geosynthetics for various drainage problems.
Additional advantages of various natural Geotextiles.
Application of Geosynthetics in infrastructural facilities.</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Geosynthetics- Introduction to Geosynthetics- Basic description- Polymeric materials- Uses and Applications- Properties of Geotextiles- Geogrids- Geomembranes- Geocomposites</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2</td></tr>
<tr><td colspan="3">Geotextiles & Geogrids- Design criteria for Separation- Reinforcement- Stabilization- Filtration- Drainage and Moisture barriers-</td><td>Hours – 10</td></tr>
</table>

<table>
<tr><td>Designing for Reinforcement- Stabilization- Designing Gabions- Construction methods</td><td></td></tr>
<tr><td colspan="2">Unit – 3</td></tr>
<tr><td>Geomembranes & Geocomposites- Pond Liners- Covers for Reservoirs- Canal Liners- Landfill Liners- Caps and closures- moisture barriers- An added advantage- Geocomposites in Separation- Reinforcement- Filtration- Geocomposites as Geowebs and Geocells</td><td>Hours – 10</td></tr>
<tr><td colspan="2">Unit – 4</td></tr>
<tr><td>Natural Geotextiles-Natural fibres as geotextiles- factors governing the use jute fibres- coir geotextiles- bamboo/timber- combination of geotextiles</td><td>Hours – 10</td></tr>
<tr><td colspan="2">Unit – 5</td></tr>
<tr><td>Applications of Geosynthetics- Geosynthetics in road ways-Role of sub grade conditions- Application in paved roads-Reinforced Earth Retaining Walls-Components-External stability- Internal stability</td><td>Hours – 10</td></tr>
<tr><td colspan="2">Course outcomes:
On successful completion of this course, students will be able to
1. Realize the importance of geosynthetic materials.
2. Design various geosynthetic components.
3. Understand different methods with geosynthetics.
4. Understand concepts of designing geosynthetics for various drainage problems.
5. Understand various additional advantages of natural geo textiles.
6. Apply the knowledge of geosynthetics in infrastructure facilities.</td></tr>
<tr><td colspan="2">Question paper pattern:</td></tr>
</table>

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carries 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. 'Designing with Geosynthetics by Robert M. Koerner, Prantice Hall, Eaglewood Cliffs, NJ 07632.
2. 'An Introduction to Soil Reinforcement and Geosynthetics' by G.L.Sivakumar Babu (2009), Universities Press (India) Pvt. Ltd.
3. 'Engineering with Geosynthetics', by G. Venkatappa Rao and GVS Suryanarayana Raju – Tata McGraw Hill Publishing Company Limited – New Delhi.

Reference Books:

1. 'Construction and Geotechnical Engineering using Synthetic Fabries' by Robert M. Koerner and Josoph P. Welsh. John Willey and Sons, New York.
2. 'Foundation Analysis and Design' by J.E. Bowles McGraw Hill Publications.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	-	-	-	1	-	-		-
2	3	-	3	2	3	-	-	-	-
3	3	-	2	2	3	-	-	-	-
4	2	-	2	2	2	-	-	-	-
5	3	-	1	-	3	-	-	-	-
6	3	-	-	-	3	-	-	-	-
Course	3	-	2	1	2	-	-	-	-

ADVANCED STRUCTURAL DESIGN
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER – IV/II

Subject Code	18CECEP8014-e	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 03

Course Objectives:
This course will enable students to:

- Familiarize the students with raft foundations and retaining walls
- Equip students with the concept of design of different types of water tanks.
- Understand the concept of flat slabs.
- Familiarize the different types of Bunkers and Silos.
- Understand the concept of loading on chimneys.
- Understand the different types of the transmission towers.

Unit -1	
Design of R.C.C retaining walls: Cantilever and Counter fort, Design and analysis of Raft foundation.	**Hours – 10**
Unit -2	
Analysis and design of R.C.C water tanks: Circular and Intze type waters tanks.	**Hours – 10**
Unit – 3	
Design of flat slabs: Direct Design and Equivalent Frame methods-check for punching shear	**Hours – 10**
Unit – 4	

Analysis and design of Bunkers and Silos- with different loading	**Hours – 10**
Unit – 5	
Analysis and Design of Chimneys- Concept of loading, Introduction to transmission towers- principles and procedures	**Hours – 10**

Course outcomes:

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

1. Design the raft foundations and different types of R.C.C. Retaining walls.
2. Analyze and design different types of R.C.C Water tanks.
3. Design the flat slabs
4. Understand the concept in design of Bunkers and Silos
5. Analyze and design the R.C.C Chimneys.
6. Understand different types of transmission towers and concept of loading

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.

4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Reinforced Concrete Structures' Vol-2, B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Reinforced Concrete Structures, N. Subrahmanian, Oxford Publishers
3. Design Drawing of Concrete and Steel Structures, N. Krishna Raju University Press 2005.

Reference Books:

1. Reinforced concrete design, S. U, Pillai and D. Menon, Tata Mc.Grawhill Publishing Company
2. Advanced RCC design Vol-II by S.S. Bhavikatti , 2nd Edition

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	3	3	-	-	-	-		-
2	2	3	3	-	-	-	-	-	-
3	2	3	3	-	-	-	-	-	-
4	2	3	3	-	-	-	-	-	-
5	2	3	3	-	-	-	-	-	-
6	1	3	3	-	-	-	-	-	-
Course	2	3	3	-	-	-	-	-	-

PRESTRESSED CONCRETE (Proposed syllabus for the academic year 2018-19) SEMESTER – IV/II			
Subject Code	18CECEP8025-a	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
Credits – 03			

Course Objectives:

This course will enable students to:

- Familiarize Students with concepts of prestressing
- understand about different systems and devices used in prestressing
- Understand the different losses of prestress including short and long term losses
- Familiarize students with the analysis and design of prestressed concrete members
  under flexure, shear and torsion
- Analyze the application of prestressed concrete to Civil engineering
- understand the anchorage zone Stresses in Post tensioned members

Unit -1	
Introduction to Pre-stressed concrete: basic concepts and general principles, materials used and their properties, methods and techniques of pre-stressing. Advantages and applications of Prestressed Concrete. Shrinkage, Creep, Deformation; Prestressing Systems- Introduction, Tensioning	**Hours – 10**

devices, Pre-tensioning Systems, Post tensioning Systems	
Unit -2	
Analysis of Pre-stressed concrete sections: Basic Assumptions. Design & Analysis of prestress, Resultant Stresses at a section- pressure line-Concepts of load balancing- Stresses in Tendons, Cracking moment. Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage & creep of concrete , Relaxation of steel, slip in anchorage, frictional losses- Total losses allowed for design.	**Hours – 10**
Unit – 3	
Design of Pre-stressed Concrete sections for flexure. Design approaches in working stress method and limit stress method. Code procedures. Control of deflections- Factors influencing-Prediction of short term and long term deflections.	**Hours – 10**
Unit – 4	
Design for Shear and torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for torsion, Design for Combined bending, shear and torsion.	**Hours – 10**
Unit – 5	
Transfer of Prestress in pre tensioned members-Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able	

to

1. Understand the different methods of prestressing
2. Estimate effective prestress including the short and long term losses
3. Analyze and design prestressed concrete beams under flexure and shear
4. Understand the relevant IS Codal provisions for prestressed concrete
5. Apply pre tensioning post tensioning concepts in different constructions.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Pre stressed Concrete, N. Krishna Raju, Tata McGraw hill
2. Pre stressed Concrete by Raja Gopal
3. IS: 1343 -2012

Reference Books:

1. Pre stressed Concrete, T. Y. Lin & Burns, Wiley Publications
2. Pre stressed Concrete by E.G. Navy Neni

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	-	1	-	2	-	-	-		-
2	1	-	1	-	-	-	-	-	-
3	1	1	2	1	-	-	-	-	-
4	2	2	-	1	-	-	-	-	-
5	1	2	2	2	-	-	-	-	-
6	2	1	2	-	-	-	-	-	-
Course	2	2	1	2	-	-	-	-	-

<table>
<tr><td colspan="4">ADVANCED FOUNDATION ENGINEERING
(Proposed syllabus for the academic year 2018-19)
SEMESTER – IV/II</td></tr>
<tr><td>Subject Code</td><td>18CECEP8025-b</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>4 + 1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Know different methods to determine bearing capacity of foundations.
Know the methods of determining settlements and the corrections to be applied to settlements.
Study the mat foundation concepts in different soils.
Familiarize the advanced concepts of pile foundations.
Study the foundation defects on expansive soils.</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Bearing capacity of Foundations: General bearing capacity equation –
Meyerhof's, Brinch Hansen's and Vesic's methods- Bearing capacity of Layered Soils: Strong layer over weak layer, Weak layer on strong layer – Bearing capacity of foundation on top of slope – Bearing capacity of foundations at the edge of the slope.</td><td>Hours – 10</td></tr>
</table>

Unit -2	
Settlement analysis: Immediate settlement of footings resting on granular soils – Schmertmann& Hartman method – De Beer and Martens method - Immediate settlement inclays – Janbu's method – correction for consolidation settlement using Skempton– Correction for construction period	**Hours – 10**
Unit – 3	
Mat foundations – Purpose and types of isolated and combined footings – Mats/Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils – compensated rafts.	**Hours – 10**
Unit – 4	
Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils – Davisson and Gill method – Brom's analysis.	**Hours – 10**
Unit – 5	
Foundations in expansive soils – definitions of swell potential and swelling pressure – determination of free swell index – factors affecting swell potential and swelling pressure – foundation practices – sand cushion method – CNS layer - drilled piers and belled piers – under-reamed piles – moisture control	**Hours – 10**

methods.	

Course outcomes:

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

1. Estimate the bearing capacity of foundations using various methods.
2. Determine the settlements and the corrections to be applied to settlements of footings.
3. Calculate the ultimate bearing capacity of mat foundations.
4. Understand the advanced concepts of pile foundations.
5. Perform appropriate foundation practices on expansive soils.

Question paper pattern:

Section A:

3. This section contains ten one or two line answer questions carrying 1 mark each.
4. Two questions from each unit should present.

Section B:

5. This Section will have 10 questions.
6. Each full question carries 12 marks.
7. Each full question will have sub question covering all topics under a unit.

The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

4. ‘Basics and applied soil mechanics ‘by Gopalranjan and ASR Rao, New Age Publishers.
5. ‘Soil mechanics and Foundation Engineering ‘by VNS Murthy, CBS Publishers.
6. ‘Principles of Foundation Engineering’ by BM Das, Thomson Brooks/Cole.

Reference Books:

3. ‘Foundation Analysis and Design’ by JE Bowles, John Wiley.
4. ‘Foundation Design’ by WC Teng, Prentice Hall Publishers.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P
1	3	3	2	-	-	-	-	-	-	-	
2	3	3	3	-	2	-	-	-	-	-	
3	3	3	3	-	-	-	-	-	-	-	
4	3	3	3	-	-	-	-	-	-	-	
5	2	2	2	-	-	-	-	-	-	-	
Overall Course	3	3	3	-	1	-	-	-	-	-	

GROUND WATER IMPROVEMENT & MANAGEMENT (Proposed syllabus for the academic year 2018-19) SEMESTER – IV/II			
Subject Code	18CECEP8025-c	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Recognize groundwater as an important natural resource.
- Understand flow towards wells in confined and unconfined aquifers.
- Understand the principles involved in design and construction of wells.
- Create awareness on improving the groundwater potential using various recharge techniques.
- Know the importance of saline water intrusion in coastal aquifers and its control measures.
- Understand ground water modeling.

Unit -1	
Introduction: Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation. **Well Hydraulics:** Steady radial flow and unsteady radial flow to a well in confined and unconfined	**Hours – 10**

aquifers, Application of Darcy's law.	
Unit -2	
Well Design: Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.	**Hours – 10**
Unit – 3	
Well Construction and Development: Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail- down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.	**Hours – 10**
Unit – 4	
Artificial Recharge Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge **Saline Water Intrusion** Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of saline water intrusion.	**Hours – 10**
Unit – 5	
Groundwater Modeling and Management: Basic principles of groundwater modeling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models.	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able	

to

1. Estimate aquifer parameters and yield of wells
2. Analyse radial flow towards wells in confined and unconfined aquifers.
3. Design wells and understand the construction practices.
4. Determine the process of artificial recharge for increasing groundwater potential.
5. Apply appropriate measures for groundwater management.
6. Develop various ground water Models.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Groundwater, Raghunath H M, New Age International Publishers,2005.
2. Groundwater Hydrology, dd D. K., Wiley India Pvt Ltd., 2014.

3. Groundwater Hydrology, dd D K and L W Mays, CBS Publications,2005.

References:

1. Groundwater Assessment and Management, Karanth K R, Tata McGraw Hill Publishing Co., 1987.
2. Groundwater Hydrology, Bouwer H, McGraw Hill Book Company, 1978.
3. Groundwater Systems Planning and Management, Willis R and W.W.G. Yeh, Prentice Hall Inc., 1986.
4. Groundwater Resources Evaluation, Waln W C, McGraw Hill Book Company, 1978

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	2	1	2	-	-	-	-	-	-
4	2	-	3	-	-	-	-	-	-
5	2	2	2	-	-	-	-	-	-
6	1	2	2	-	-	-	-	-	-
Course	2	1	1	-	-	-	-	-	-

SOLID AND HAZARDOUS WASTE MANAGEMENT (Proposed syllabus for the academic year 2018 -2019) SEMESTER – IV/II			
Subject Code	18CECEP8025-d	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Impart the basic knowledge of solid waste management.
- Know the various methods solid waste collection.
- Knowledge about waste minimization.
- Study the design and operation of solid waste disposal.
- Understand the hazardous waste management techniques.

Unit -1	
Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities, Terms related ISWM like WTE, ULB, TLV etc..	**Hours – 10**

Unit -2	
Basic Elements in Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste Collection of Solid Waste: Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.	**Hours – 10**
Unit – 3	
Transfer, Transport and Transformation of Waste: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements. Unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization. Warm composting, vermin composting	**Hours – 10**
Unit – 4	
Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems – designated waste landfill remediation. Case studies.	**Hours – 10**
Unit – 5	
Hazardous Waste Management: sources, collection, transport, treatment and disposal methods. Incineration, Biomedical waste management, e-waste management and nuclear waste management.	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to 1. Understand the different solid waste management techniques. 2. Choose appropriate method of solid waste.	

3. Suggest the solid waste minimization technique.
4. Design the solid waste management method.
5. Suggest the appropriate hazardous waste management technique.

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Integrated Solid Waste Management, George Techobanoglous, McGraw Hill Publication, 1993
2. Solid Waste Engineering, Vesilind, P.A., Worrell, W., Reinhart, D., Cenage learning, New Delhi, 2004
3. Hazardous Waste Management, Charles A. Wentz, McGraw Hill Publication, 1995

Reference Books:

1. Solid and Hazardous Waste Management PM Cherry, CBS Publishers and Distriburs. New Delhi, 2016.
2. Solid Waste Engineering, William A Worrell, P Aarue Vesilind, Cengage Learning, New Delhi 2016.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	1	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	-	1	2	-	-	-	2	-	-
4	-	-	-	-	-	-	2	-	-
5	1	2	2	-	-	-	-	-	-
Course	2	2	2	-	-	-	2	-	-

AIR, NOISE POLLUTION AND CONTROL (Proposed syllabus for the academic year 2018 -2019) SEMESTER – IV/II			
Subject Code	18CECEP8036-a	Internal Marks	30
Number of Lecture Hours/Week	3 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Know the analysis of different air pollutants.
- Know the Thermodynamics and kinetics of air pollution
- Understand Air quality management and Emission standards
- Understand the control of Air Pollution
- Understand the Noise pollution, Noise standards and Control
- Understand the air pollution control equipment.

Unit -1	
Air pollution, samples and analysis of pollutants, Conversion of ppm in µg/m^3, Definition of terms related to air pollution and control, secondary air pollutants-indoor air pollutants-climatic change and its impact –carbon trade.	**Hours – 12**
Unit -2	
Thermodynamics and kinetics of air pollution: Application in the removal of gases like SO_X, NO_X, CO and HC-Air fuel ratio- Computation and control	**Hours – 10**

of products of combustion, automobile pollution, odors pollution control and flares.	
Unit – 3	
Ambient Air Quality Management: Monitoring of SPM, SO_2, NO_X and CO-Stack monitoring for flue gases-micro meteorological monitoring –weather station-Emission standards- Gaussian model and fume dispersion.	**Hours – 10**
Unit – 4	
Air pollution control-Control OF NO_X & SO_X emissions-Control of particulates-control at sources, process changes, Equipment modification, design ,operation of control equipments, settling chambers, cyclone separators, fabric filters, scrubbers, electrostatic precipitators	**Hours – 10**
Unit – 5	
Noise pollution and control: Noise standards, Measurement and control methods-Reducing and residential and industrial noise-ISO-14000 series	**Hours – 8**
Course outcomes: On successful completion of this course, students are able 1. Judge the ambient air quality based on the analysis of air pollutants 2. Apply particulate and gaseous control measures for an industry 3. Understand the flume behavior in a prevailing Environmental condition 4. Estimate carbon credits for various day to day activities 5. Describe the noise pollution measures to be taken to control the noise pollution. 6. Select the proper noise control measures	
Question paper pattern:	

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.

   The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Air Pollution and Control, K.V.S.G. Murali Krishna, Laxmi Publications, New Delhi,2015
2. Air Pollution, M. N. Rao and H. V. N. Rao, Tata McGraw Hill Company.

Reference Books:

1. An Introduction to Air pollution, R. K. Trivedy and P.K. Goel, B.S. Publications.
2. Air Pollution by Wark and Warner - Harper & Row, New York.
3. Environmental Science and Engineering by S.K.Dhameja

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	2	-	-	-	-	2-	2		-

2	2	2	-	-	-	2	2	-	-
3	-	1	-	-	-	2	2	-	-
4	-	-	-	-	2	2	2	-	-
5	-	2	-	-	2	2	2	-	-
6	1	2	-	-	-	2	2	-	-
Course	2	1	-	-	2	2	2	-	-

SOIL DYNAMICS AND MACHINE FOUNDATIONS

(Proposed syllabus for the academic year 2018 -2019)

SEMESTER – IV/II

Subject Code	18CECEP8036-b	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03

Credits – 03

Course Objectives:

This course will enable students to:

- Know the fundamentals of vibrations.
- Understand the theories of vibration analysis.
- Discuss about the laboratory and field tests to compute the dynamic soil properties of the soil mass.
- Understand the design of machine foundations under different loads and soil conditions.
- Learn the concept of vibration isolators.

Unit -1	
Introduction: Types of motion- SHM- Fundamental definitions- SDOF systems- Free and forced vibration with and without damping - Constant force and rotating mass type	**Hours – 10**

excitation –Types of damping-Equivalent stiffness of springs in series and parallel. – Resonance and its effect - magnification-logarithmic decrement –Transmissibility.	
Unit -2	
Theories of Vibration Analysis- EHS Theory and lumped parameter model- Different modes of vibration- Natural frequency of foundation soil system – Barkan and IS methods – Pressure bulb concept – Reisner Theory – Limitations of Reisner theory – Sung's solutions -- Pauw's Analogy – Heigh's Theory.	**Hours – 10**
Unit – 3	
Dynamic properties of soils: Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination-damping factor from free and forced vibration tests.– Block vibration test – Determination of Damping factor.	**Hours – 10**
Unit – 4	
Design of machine foundations – general requirements design – criteria for machine foundations, permissible amplitudes and bearing pressure Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.	**Hours – 10**

Unit – 5	
Vibration Isolation: Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators- Types and their characteristics- Dynamic bearing capacity, Earth retaining structures under dynamic loads.	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to 1. Describe the fundamentals of Vibration. 2. Use theories of vibrations to find the behavior of soil under dynamic loading. 3. Conduct various laboratories and field tests to determine the dynamic soil properties and its interpretation. 4. Design machine foundations under different loads and soil conditions. 5. Understand the concept of vibration isolators.	
Question paper pattern: **Section A:** 1. This section contains ten one or two line answer questions carrying 1 mark each. 2. Two questions from each unit should present. **Section B:** 1. This Section will have 10 questions. 2. Each full question carries 12 marks.	

3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. ‘Vibration of soils and foundations’ by Richart Hall and woods.
2. Principles of Soil Dynamics, Das, Braja M., and Ramana G.V. 2nd Edition, Cengage Learning Engineering Publishers, 2010.

Reference Books:

1. ‘Vibration Analysis and foundation Dynamics’ by NSV KameswaraRao, Wheeler Publishing, New Delhi.
2. Soil Dynamics and Machine Foundations, Swami Saran, Galgotia Publications Pvt. Ltd.

Course Outcomes to Program Outcomes Mapping:

CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**
1	3	2	1	2	1	-	-		-	-
2	3	3	3	2	3	-	-	-	-	-
3	3	3	3	2	3	-	-	-	-	-
4	2	2	2	2	2	-	-	-	-	-
5	3	2	1	2	3	-	-	-	-	-
Course	3	2	2	2	3	-	-	-	-	-

<table>
<tr><td colspan="4">BRIDGE ENGINEERING
(Proposed syllabus for the academic year 2018 -2019)
SEMESTER - IV/II</td></tr>
<tr><td>Subject Code</td><td>18CECEP8036-c</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>4+1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>60</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Learn about different types of Bridges and IRC standards
Study the design concepts of Slab Bridges under various loads
Analyse and design the various elements of T-Beam bridge
Study the design concepts of Plate Girder Bridges
Study the analysis and design of box culverts under loading</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Introduction- Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, pre stressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span-Derivation of Economic span- Abutments pier and end connections- types of foundations-Open, Pile, Well Foundations, Bearings – Types- Introduction to</td><td>Hours – 10</td></tr>
</table>

Loading standards- Railway and IRC Loading, Impact loading	
Unit -2	
Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Pigeaud's method	**Hours – 10**
Unit – 3	
T-Beam bridges- Analysis and design of various elements of bridge –Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing Guyon's –Massonet Method –Henry- Jaegar Methods- Courbon's theory-	**Hours – 10**
Unit – 4	
Box Culverts: Loading – Analysis and Design- Reinforcement detailing **Plate Girder Bridges**: Elements of plate girder and their design-web- flange intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing	**Hours – 10**
Unit – 5	
. **Plate Girder Bridges**: Elements of plate girder and their design-web- flange intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to 1. Explain different types of Bridges and IRC standards	

2. Design the concepts of Slab Bridges under various loadings
3. Design the various elements of T-Beam bridge
4. Design the Plate Girder Bridges
5. Understand the design concepts of Box Culverts

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.

   The student will have to answer 5 full questions selecting one full question from each unit.

Text Book

1. Essentials of Bridge Engineering, Jhonson Vicr D
2. Design of Bridge Structures, T. R. Jagadeesh, M.A. Jayaram, PHI
3. Design of Bridges, N. Krishna Raju, Tata McGraw Hill

References:

1. Design of Concrete Bridges, Aswini, Vazirani, Ratwani
2.Design of Steel Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications

3. Design of R C Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications
4. IRC Relevant Codes, IS: 456-2000

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P
1	-	-	-	-	-	-	-		-	-	
2	1	2	1	-	-	-	-	-	-	-	
3	1	1	2	-	-	-	-	-	-	-	
4	1	-	3	-	-	-	-	-	-	-	
5	-	2	2	-	-	-	-	-	-	-	
6	1	2	2	-	-	-	-	-	-	-	
Course	2	1	1	-	-	-	-	-	-	-	

<table>
<tr><td colspan="4">CONTRACTS MANAGEMENT
(Proposed syllabus for the academic year 2018-19)
SEMESTER – IV/II</td></tr>
<tr><td>Subject Code</td><td>18CECEP8036-d</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>4 + 1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Understand the Importance of Contracts, Overview of Contract Management
Understand types of Contracts, Parties a Contract and Contract Formation
Study the remedies for under performance parameters
Learn about contract administration and risk management.
Learn about contract closure and review.</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Introduction, Importance of Contracts, Overview of Contract Management, Overview of Activities in Contract Management; Planning and People-Resource Management</td><td>Hours – 10</td></tr>
<tr><td colspan="4">Unit -2</td></tr>
<tr><td colspan="3">Types of Contracts, Parties to a Contract; Contract Formation, Formulation of Contract, Contract Start-Up, Managing Relationships; Common contract clauses(Notice to proceed, rights and duties of</td><td>Hours – 10</td></tr>
</table>

various parties, notices to be given, Contract Duration and Price., EPC and LS contracts.	
Unit – 3	
Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination. Changes & variations, Notices under contracts; Conventional and Alternative Dispute Resolution methods. Various Acts governing Contracts.	**Hours – 10**
Unit – 4	
Contract Administration and Payments- Contract Administration, Payments; Contract Management in Various Situations Contract Management in NCB Works, Contract Management in ICB Works Contracts, Contract of Supply of Goods- Design, Supply and Installation Contracts, Contract Management in Consultancy, Managing Risks and Change- Managing Risks, Managing Change;	**Hours – 10**
Unit – 5	
Contract Closure and Review-Ending a Contract, Post-Implementation Review; Legal Aspects in Contract Management- Contract Management Legal View, Dispute Resolution, Integrity in Contract Management; Managing Performance- Introduction, Monitoring and Measurement	**Hours – 10**
On completion of the course, the students will have: 1. Explain the Importance of Contracts and Overview of Contract Management 2. Understand the types of contracts. 3. Plan the performance parameters. 4. Understand about contract administration risk management. 5. Apply legal remedies for contracts.	
Question paper pattern:	

Section A: 1. This section contains ten one or two line answer questions carrying 1 mark each. 2. Two questions from each unit should present. **Section B:** 1. This Section will have 10 questions. 2. Each full question carry 12 marks. 3. Each full question will have sub question covering all topics under a unit. 4. The student will have to answer 5 full questions selecting one full question from each unit.
Text/Reference Books: 1. B.S.Patil's Building and Engineering contracts, 7^{th} edition, S.P woolhouse 2. M Chakravarty, Estimating, Costing Specifications & Valuation Civil Engineering
1. IS 1200 (Parts I XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S. 2. Contracts and Estimates, B. S. Patil, Universities Press (India) Pvt. Ltd., Hyd. 3. Civil engineering contracts: An introduction to construction contracts by Stephen Wearne 4. CPWD Contract Document, Indian Contract Act-1872, AP Standard specifications

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9

1	3	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	2	1	2	-	-	-	-	-	-
4	2	-	3	-	-	-	-	-	-
5	2	2	2	-	-	-	-	-	-
6	1	2	2	-	-	-	-	-	-
Course	2	1	1	-	-	-	-	-	-

<table>
<tr><td colspan="4">REPAIR AND REHABILITATION OF STRUCTURES
(Proposed syllabus for the academic year 2018-19)
SEMESTER – IV/II</td></tr>
<tr><td>Subject Code</td><td>18CECEP8047-a</td><td>Internal Marks</td><td>30</td></tr>
<tr><td>Number of Lecture Hours/Week</td><td>4 + 1(T)</td><td>External Marks</td><td>70</td></tr>
<tr><td>Total Number of Lecture Hours</td><td>50</td><td>Exam Hours</td><td>03</td></tr>
<tr><td colspan="4">Credits – 03</td></tr>
<tr><td colspan="4">Course Objectives:
This course will enable students to:
Familiarize Students with deterioration of concrete in structures
Equip students with concepts of NDT and evaluation
Understand failures and causes for failures in structures
Familiarize different materials and techniques for repairs
Understand procedure to carryout physical evaluation of buildings and prepare report.
Know the case studies related to rehabilitation of different structures</td></tr>
<tr><td colspan="3">Unit -1</td><td></td></tr>
<tr><td colspan="3">Maintenance and Repair Strategies. Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance.</td><td>Hours – 10</td></tr>
</table>

Deterioration of concrete in structures: Physical processes of deterioration like Freezing and Thawing, Wetting and Drying, Abrasion, Erosion, Pitting, Chemical processes like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction, Sulphate attack Acid attack, temperature and their causes, Mechanism, Effect, preventive measures - Cracks: Cracks in concrete, type, pattern, quantification, measurement & preventive measures.	
Unit -2	
Non Destructive Testing- Non destructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and Pull out test, Core cutting- Corrosion: Methods for corrosion measurement.	**Hours – 10**
Unit -3	
Failure of buildings: Definition of building failure-types of failures- Causes of Failures- Faulty Design, Accidental over Loading, Poor quality of material and Poor Construction practices- Fire damage - Various aspects of Inspection, Methodology for investigation of failures-diagnostic testing methods and equipments-repair of cracks in concrete.	**Hours – 10**
Unit -4	
Materials for repair and rehabilitation - Admixtures- types of admixtures- purposes of using admixtures- chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity	**Hours – 10**

measurement- chloride content – Depth of carbonation	
Unit -5	
Repair Techniques: Grouting, Jacketing, Shotcreting, externally bonded plates, Nailing, Underpinning and under water repair; Materials, Equipments, Precautions and Processes **Case studies**: case studies related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures	**Hours – 10**

Course outcomes:

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

1. Explain deterioration of concrete in structures
2. Carryout analysis using NDT and evaluate structures
3. Assess failures and causes of failures in structures
4. Apply different materials and techniques for repairs
5. Carryout physical evaluation and submit report on condition of the structure.
6. Explain how rehabilitation to be done in different structures

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.

2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Maintenance & Repair of Civil Structures' by B.L. Gupta & Amit Gupta.
2. 'Rehabilitation of Concrete Structures' by B. Vidivelli, Standard Publishers.
3. 'Concrete Bridge Practice Construction, Maintenance &

Reference Books:

1. 'Concrete Structures- protection Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers
2. CPWD Manuals FOR Repair and Rehabilitation
3. CWC –Manuals and CWPRS Nodal Station (Pune)

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P
1	1	2	-	-	-	-	-	-	-	
2	-	2	-	-	2	-	-	-	-	
3	1	2	-	2	2	-	-	-	-	
4	1	-	-	1	1	-	-	-	-	
5	1	2	-	-	1	-	-	-	-	

6	2	1	-	-	-	1	-	-	-	
Course	2	2	-	1	2	-	-	-	-	

DESIGN OF FORM WORK

(Proposed syllabus for the academic year 2018-19)

SEMESTER – IV/II

ubject Code	18CECEP8036	IA Marks	3
umber of Lecture Hours/Week	4 + 1(T)	Exam Marks	7
otal Number of Lecture Hours	50	Exam Hours	0

Credits – 03

Course Objectives:

This Course will enable students to

- Develop students understanding of formwork and its requirement.
- Determine various loads acting on formwork.
- Design the form work for concrete structure.
- Understand the working of flying formwork.
- Familiarize students about the safety steps involved in the design of formwork an false work.

nit -1	
troduction to formwork and false work , temporary work systems , requirements, onstruction planning and site constraints, selection and types of formworks,	**Hours – 1**

ormwork materials, shoring towers and scaffolds.	
nit -2	
ormwork design: Effects of various loads such as live loads and wind pressure - n formwork- concrete density -height of pouring -temperature -rate of placing - nsistency of concrete - vibration -hydrostatic pressure and pressure distribution. oment on formwork. Formwork design for foundation, wall, column, beam and ab. Design of decks and false works. IS code provisions.	**Hours – 1**
nit – 3	
ormwork design for special structures: shells, domes, folded plates, overhead ater tanks, natural draft, cooling tower and bridges.	**Hours – 1**
nit – 4	
ying formworks such as table forms, tunnel formwork system, column mounted oring system, gang forms, slip form, and formwork for precast concrete.	**Hours – 1**
nit – 5	
ormwork failure, construction sequence and safety in use of formwork and false rk. Causes and case studies in formwork failure, formwork issues in multi- story ilding construction.	**Hours – 1**

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

1. Understand formwork, its requirements and types of formwork.
2. Analyze the various loads acting on formwork.
3. Apply formwork design skills to concrete structures.
4. Analyze the working of flying formwork.
5. Plan the safety steps involved in the design of form work and false work.

uestion paper pattern:

ection A:

1. This section contains ten one or two line answer question carrying 1 mark each.
2. Two questions from each unit should present.

ection B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each uni

ext Books:

1. Jha, K.N., Formwork for Concrete Structures, First Edition, McGraw Hill. 2012
2. Austin, C.K., Formwork for concrete, Cleaver - Hume Press Ltd., London, 1996
3. IS 14687: 1999, false work for Concrete Structures - Guidelines, BIS.

eference Books:

1. Formwork for Concrete Structures, Peurify, Mc Graw Hill India, 2015.
2. Concrete Technology by A.R. Santhakumar, Oxford Univ. Press, second edition-2018.
3. Michael P. Hurst, Construction Press, London and New York., 2003.
4. Robert L. Peurifoy and Garold D. Oberiender, Formwork for Concrete Structures, McGraw-Hill, 1996.

COURSE OUTCOMES TO PROGRAM OUTCOMES MAPPING:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0
1	3	-	-	-	-	-	-		-	-
2	2	2	1	-	-	-	-	-	-	-

3	2	1	2	-	-	-	-	-	-	-	-
4	2	-	3	-	-	-	-	-	-	-	-
5	2	2	2	-	-	-	-	-	-	-	-
6	1	2	2	-	-	-	-	-	-	-	-
Course	2	1	1	-	-	-	-	-	-	-	-

TRANSPORTATION ECONOMICS (Proposed syllabus for the academic year 2018-19) SEMESTER - IV/II			
Subject Code	18CECEP804 7-c	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Objectives:

This course will enable students to:

- Study the concepts in transportation decision making.
- Learn about transportation costs.
- Understand the vehicle operating cost
- Familiarize with the formulation of project alternatives and applying the economic analysis methods

• Understand the principles and procedure of financing of road projects.	
Unit -1	
Introductory Concepts in Transportation Decision Making: Overall transportation project development, budgeting, financial planning, the process of transportation project development, models associated with transportation impact evaluation.	**Hours – 10**
Unit -2	
Transportation costs - Classification of transportation costs, transportation agency costs, transportation user costs, general structure and behavior of cost functions and road pricing. Estimating Transportation Demand and Supply - supply equilibration, dynamics of transportation demand and supply, elasticity of travel demand and supply, classification of elasticity.	**Hours – 10**
Unit – 3	
Vehicle operating costs: Fuel costs - Maintenance and spares, Depreciation - Crew costs - Value of travel time savings - Accident costs. Economics of traffic congestion - Pricing policy.	**Hours – 10**
Unit – 4	
Economic analysis of projects - Methods of evaluation - Cost-benefit ratio, first year rate of return, net present value, and internal-rate of return methods; Indirect costs and benefits of transport projects.	**Hours – 10**
Unit – 5	
Financing of road projects - methods – Private Public Partnership (PPP) - ll collection - Economic viability of Design-Build-Operate-Transfer Schemes – Risk Analysis – B/C Ratio Analysis-	**Hours – 10**

Value for Money analysis - Case Studies.	

Course outcomes:

On successful completion of this course, students will be able

1. Understand the concepts of decision making in financ
2. Assess transportation demand and supply
3. Estimate vehicle operation cost and accident cost
4. Perform economic analysis of a transportation project
5. Apply various financing methods in road projects

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Winfrey, Economic analysis for Highways, International Textbook Company, Pennsylvania, 1969.
2. Traffic Engineering and Transport Planning - L.R Kadiyali, Khanna Publishers.
3. CRRI, Road User Cost Study in India, New Delhi,

1982 4. IRC, Manual on Economic Evaluation of Highway Projects in India, SP30, 2007
Reference Books: 1. Road Project Appraisal, for Developing Countries, J.W.Dickey ,John Wiley & Sons. 2. a). Chisty Fundamental of T.P. Engineering, by C.J. Chisty. b). Transportation Engineering & Planning by C.S. Papacostas.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	1	1	3	-	-	-	-	-	-
2	1	1	2	-	-	-	-	-	-
3	1	2	1	-	-	-	-	-	-
4	-	2	-	-	-	-	-	-	-
5	1	1	1	-	-	-	-	-	-
Course	1	2	2						

SUSTAINABLE CONSTRUCTION METHODS FOR BUILDINGS

(Proposed syllabus for the academic year 2018-19)

SEMESTER – IV/II

Subject Code	18CECEP8047	Internal Marks	30
Number of Lecture Hours/Week	4 + 1(T)	External Marks	70
Total Number of Lecture Hours	50	Exam Hours	03
		Credits – 03	

Course Learning Objectives:

This course will enable students to:

- Know the factors to be considered in planning and construction of buildings.
- Familiarize the precast construction practices and techniques
- Know building form work and staging
- Know about cutting edge sustainable construction materials.
- Acquaint with the techniques of fire resistance and thermal insulation

Unit -1	
Functional Planning of buildings: General aspects to consider for planning, bye-laws and regulations, Selection of site for building construction, Principles of planning, Orientation of building and its different elements, Components of building	**Hours – 10**
Unit -2	
Types of foundations and construction methods: Basics of form work and staging, common building	**Hours – 10**

construction methods(conventional walls and slab, conventional framed structure with block work walls), Modular construction methods for repetitive works , precast concrete construction methods, , Basics of slip form for tall Structures , Basics of construction methods for bridges.	
Unit – 3	
Precast Doors and Windows: Location of roofs and windows, Definition of technical terms, Size of doors and windows, Door frames, Types of doors and windows, Ventilators, Fixtures and fastenings. Floors and Roofs: Components of a floor, materials used for floor construction, Different types of flooring, Ground floor and upper floors, Types of roofs, Basic roofing elements and Roof coverings.	**Hours – 10**
Unit – 4	
Identification of cutting edge sustainable construction materials, technologies and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative Environmental impacts of construction activity Masonry.	**Hours – 10**
Unit – 5	
Fire protection and Thermal insulation: Causes and effect of dampness on buildings, Fire hazards, Grading of buildings according to fire resistance, Fire resisting properties of common building materials, Fire resistant construction, General methods of thermal insulation and thermal insulating materials, Safety and Security measures..	**Hours – 10**
Course outcomes: On successful completion of this course, students will be able to	

1. Identify the factors to be considered in planning and construction of buildings.
2. Understand the precast construction practices and techniques
3. Plan the building form work and staging.
4. Describe the cutting edge sustainable materials and activities.
5. Understand the techniques of fire resistance and thermal insulation

Question paper pattern:

Section A:

1. This section contains ten one or two line answer questions carrying 1 mark each.
2. Two questions from each unit should present.

Section B:

1. This Section will have 10 questions.
2. Each full question carry 12 marks.
3. Each full question will have sub question covering all topics under a unit.
4. The student will have to answer 5 full questions selecting one full question from each unit.

Text Books:

1. Varghese P. C. Building construction, PHI Learning Pvt. Ltd., 2008.
2. Punmia B. C., Jain A. J. and Jain A. J. Building construction, Laxmi Publications, 2005.

References:

1. Arora S. P., and Bindra S. P. The text book of

	building construction, Dhanpat Rai Publications, 2010.

Course Outcomes to Program Outcomes Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
1	3	-	-	-	-	-	-		-
2	2	2	1	-	-	-	-	-	-
3	2	1	2	-	-	-	-	-	-
4	2	-	3	-	-	-	-	-	-
5	2	2	2	-	-	-	-	-	-
6	1	2	2	-	-	-	-	-	-
Course	2	1	1	-	-	-	-	-	-