SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES, CHITTOOR

(Autonomous)

DEPARTMENT OF CIVIL ENGINEERING.

Institute Vision

To emerge as a Centre of Excellence for Learning and Research in the domains of engineering, computing and management.

Institute Mission

IM1: Provide congenial academic ambience with state -of -art of resources for learning and research.

IM2: Ignite the students to acquire self-reliance in the latest technologies.

IM3: Unleash and encourage the innate potential and creativity of students.

IM4: Inculcate confidence to face and experience new challenges.

IM5: Foster enterprising spirit among students.

IM6: Work collaboratively with technical Institutes / Universities / Industries of National and International repute

Department Vision

To become a Centre of excellence in Civil Engineering and provide professional competency, academia and practical skills to the students so as to meet the current and future challenges of infrastructure development of the Nation

Department Mission

DM1: Provide congenial academic ambience with necessary infrastructure and learning resources

DM2: Inculcate confidence to face and experience new challenges from industry and society.

DM3: Ignite the students to acquire self-reliance in State-of-the-Art Technologies

DM4: Foster Enterprising spirit among students

Program Educational Objectives (PEOs)

Graduates of Civil Engineering shall

PEO1: Have Professional competency through the application of knowledge gained from subjects like Mathematics, Physics, Chemistry, Inter-Disciplinary and core subjects like Surveying, Building Planning, Construction materials, analysis and design of Civil structures, Environmental and Transportation Engineering **(Professional Competency)**.

PEO2: Excel in one's career by critical thinking towards successful services and growth of the organization or as an entrepreneur or through higher studies. **(Successful Career Goals).**

PEO3: Enhance knowledge by updating advanced technological concepts for facing the rapidly changing world and contribute to society through innovation and creativity **(Continuing Education and Contribution to Society).**

Program Specific Outcomes (PSO's)

After the completion of the Program, The student shall able to,

PSO1: Apply the knowledge obtained in core areas for the analysis and design civil Engineering structures using relevant codes of practice, materials, techniques and software.

PSO2: Adapt state-of-the-art practices and materials in civil Engineering projects with human values and ethics with team spirit

Program Outcomes

Engineering Graduates will be able to:

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.

ACADEMIC REGULATIONS FOR B. TECH (REGULAR-FULL TIME)
(Effective for the students admitted into I year from the Academic Year 2018-2019 onwards)

1. ELIGIBILITY FOR ADMISSION

Admission of the B.Tech program shall be made subjects to the eligibility qualifications and Specialization prescribed by the University for each Program from time to time. Admission shall be made either on the basis of Merit/ Rank Obtained by the Qualifying candidates in EAMCET/ECET or otherwise specified whichever is relevant.

2. AWARD OF B.TECH. DEGREE

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

- **i.** Pursues a course of study for not less than four academic years and in not more than eight academic years.
- **ii.** For Lateral entry students, shall pursue a course of study for not less than three academic years and in not more than six academic years.
- **iii.** Registers for 160 credits and secure all 160 credits.
- **iv.** Lateral entry students shall register for 126 credits and secure all 126 credits

3. ACADEMIC REQUIREMENTS

Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years (for Regular Entry) / Six academic years (for Lateral entry) from the year of their admission, shall forfeit their seat in B.Tech. Course and their admission stands cancelled.

4. CURRICULUM AND COURSE STRUCTURE

The curriculum shall comprise Humanities and Social Science (HS), Basic Sciences (BS), Engineering Science (ES), Professional Core (PC), Core Elective (CE), Open Elective (OE), Project Work (PW), Audit Course (AC), On-line Comprehensive Test (OCT).

SUBJECT COURSE CLASSIFICATION

All subjects/ courses offered for the under graduate programme in B.Tech. degree programmes are broadly classified as follows. The Institution has followed almost all the guidelines issued by AICTE/UGC.

S.No	Broad Course Classification	Course Group Category	Course Description
1	Foundation Courses	BS - Basic Sciences	Includes mathematics, physics and chemistry subjects
		ES - Engineering Sciences	Includes fundamental engineering subjects
		HS - Humanities and Social Sciences	Includes subjects related to humanities, social sciences and management
2	Core Courses	PC – Professional Core	Includes core subjects related to the parent discipline/ department / branch of Engineering.
3	Elective Courses	CE - Core Electives	Includes electives subjects related to the parent discipline department branch of engineering
		OE - Open Electives	Elective subjects which include inter disciplinary subjects or subjects in an area outside the parent discipline department branch of engineering
		MOOC – Electives	Online courses which include inter disciplinary subjects or subjects in an area outside the parent discipline department
4	Employability Enhancement Courses	Project Work	B.Tech major project work
		On-line Comprehensive Test	Comprehensive Exams (with one credit)
		Industrial training	Industrial Internship or Industrial visit or Industrial training (non Credit)
		Reasoning and Aptitude	Courses which includes mathematical analysis to understand and Solve the real life problems. (non Credit)
5	Minor Courses	Communication and Soft Skills Lab	Courses which includes improve the communication skills and personality development (with one credit)
6	Audit Course	1.Constitution of India 2.Environmental sciences 3.Professional Ethics	Mandatory Courses (non Credit)

5. INDUCTION PROGRAM for I. B.Tech

When new students enter an institution, they come with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new

environment and inculcate in them the ethos of the institution with a sense of larger purpose. Precious little is done by most of the institutions, except for an orientation program lasting a couple of days. We propose a 3-week long induction program for the UG students entering the institution, right at the start. Normal classes start only after the induction program is over. Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature. The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it. The following (Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Familiarization to Department / Branch & Innovations, Basic Science and Foundation of Mathematics) are the activities under the induction program in which the student would be fully engaged throughout the day for the entire duration of the program.

6. CONTACT PERIODS

Depending on the complexity and volume of the course, the number of contact hours per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours / week as follows.

- Contact classes (Theory): 1 credit per lecture hour per week.
- Laboratory Hours (Practical): 1 credit for 2 Practical hours, per week.
- Project Work: 1 credit for 2 hours of project work per week

6.1 DEFINITION OF CREDIT

1 Hr. Lecture (L) per week =1 credit

1 Hr. Tutorial (T) per week =1 credit

1 Hr. Practical (P) per week = 0.5 credit

2 Hours Practical (Lab)/week =1 credit

7. SUPPLEMENTARY EXAMINATIONS

The student eligible to appear the supplementary external examinations if he was absent for it or failed in it or not registered. However, IV-II semester students there will be an advanced Supplementary Examinations.

8. DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject–wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, project work shall be evaluated for100 marks whereas audit courses shall be evaluated for a maximum of 30 internal marks.

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

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

Internal Examinations:

For theory subjects, during the semester, there shall be two mid-term examinations. Each mid-term examination consists of objective paper for 10 marks and subjective paper for 15 marks with duration of 1hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper). However 5 marks are awarded for 5 assignments (unit-wise). Assignments one & two are collected from the students before I mid-term examinations and assignments three, four and five are collected from the students before II mid-term examinations for every theory subjects.

Objective paper shall be for 10 marks. Subjective paper shall contain 5 questions of which student have to answer 3 questions for 15 marks.

Note 1: The subjective paper shall contain 5 questions of equal Weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks; any fraction shall be rounded off to the next higher mark.

Note 2: The midterm examination shall be conducted first by distribution of the Objective paper, simultaneously marking the attendance, after 20 minutes the answered objective paper shall be collected back. The student is not allowed to leave the examination hall. Then the descriptive question paper and the answer booklet shall be distributed. After 90minutes the answered booklets are collected back.

If the student is absent for the internal examination, no re-exam or make up shall be conducted and internal marks for that examination shall be considered as zero.

First midterm examination shall be conducted for I & II units of syllabus and second midterm examination shall be conducted for III, IV & V units.

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

For Ex:

Marks obtained in first mid: 20 Marks obtained in Second mid: 20

Internal Marks: (20x0.8) + (20x0.2) = 20

Final internal marks= Internal Marks+ Assignment marks

If the student is absent for any one midterm examination, the final internal marks shall be arrived at by considering 80% Weightage to the marks secured by the student in the appeared examination and zero to the other.

For Ex:

Marks obtained in first mid: Absent Marks obtained in Second mid: 20

Internal Marks: (20x0.8) + (0x0.2) =16

Final internal marks= Internal Marks+ Assignment marks

End Examinations:

End examinations (Theory subjects)

(i). End examination of theory subjects shall have the following pattern:

a. There shall be two parts, Part-A and Part-B.
b. Part-A shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 short answer questions from each unit.
c. Part-B Shall be either-or type questions of 10 marks each. Student shall answer any one of them.
d. Each of these questions from Part-B shall cover one unit of the syllabus.

(ii). End examination of theory subjects consisting of two parts of different subjects,

for ex: Electrical & Mechanical Technology, shall have the following pattern:

a. Question paper shall be in two parts viz., Part A and Part B with equal Weightage
b. In each part, there shall be 3 either-or type questions for 12, 12 and 11 marks.

Note: The answers for Part A & Part B shall be written in two separate answer books.

End examinations (Practical subjects):

For practical subjects there shall be a 30 sessional marks (15 marks allotted for internal practical examination to be conducted before the last working day and 15 marks for Day-to-day work in the laboratory shall be evaluated by the concerned laboratory teacher based on the regularity / record / viva-voce) and end examination shall be for 70 marks.

The end examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department.

In a practical subject consisting of two parts (ex: Engineering Workshop & IT Workshop), the end examination shall be conducted for 35 marks in each part. Internal examination shall be evaluated as above for 30 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

Drawing Courses

For the subject having design and/or drawing, such as Engineering Drawing / Graphics, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination.

All the drawing related courses are evaluated in line with laboratory courses. The distribution shall be 30 marks for internal evaluation (15 marks for day to day evaluation (unit wise chart work) and 15 marks for unit-wise assignments) and 70 marks for semester end examinations.

There shall be two midterm examinations in a semester for duration of 2hrs each for 15 marks with weightage of 80% to better mid marks and 20% for the other.

The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks, any fraction shall be rounded off to the next higher mark. There shall be no objective paper in internal examination. The sum of day to day evaluation with assignments and the internal test marks will be the final sessional marks for the subject.

In the end examination pattern for Engineering Drawing / Graphics there shall be 5 questions, either-or type, of 14 marks each. There shall be no objective / short answer type questions in the end examination.

Audit courses

There shall three audit pass courses in Constitution of India, Environmental Science and Professional Ethics with no credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared pass in the audit course only when he / she secures 40% or more in the internal examinations. In case if student fails, re-exam shall be conducted for failed candidates every six months / semester at a mutual convenient date of college / student satisfying the conditions mentioned in item 1 of the regulations.

On-line Comprehensive Test (OCT):

There shall be two On-line comprehensive Tests, one at the end of the II year II semester and the other at the end of III year – II semester, with 100 objective questions for 100 marks on the subjects studied in the respective semesters. The Controller of Examination is given responsibility of preparing question bank / question paper conducting online examination maintains confidentiality. A student shall acquire one credit assigned to the On-line Comprehensive Test only when he / she secure 40% or more marks. In case, if a student fails in On-line Comprehensive Test, he / she shall reappear at the next supplementary examination when offered.

Massive Online Open Course's (MOOC'S)

The college in line with the developments in Learning Management Systems (LMS) intends to encourage the students to do online courses in MOOCs, offered nationally / internationally. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self- learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion of the course from the MOOCs providers. Institution intends to encourage the students to do one MOOC in III year II Semester of the B.Tech. Programme. The respective departments shall give a list of standard MOOCs providers among NPTEL, edx, Udacity, Coursera, or any other standard providers, whose credentials are endorsed by the HoD. Each department shall appoint Coordinators / Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same. A student shall choose an online course (relevant to his / her program of study) from the given list of MOOCS providers, as endorsed by the teacher concerned, with the approval of the HOD. Students

may be permitted to register one online course (which is provided with certificate) in 3rd year 1st semester and they should produce the course completion certificate of that course to the controller of Examination to become eligible for fulfillment of the degree.

9. CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS, also called as Open Electives (OEs) will be implemented in the college. The CBCS provides choice for students to select from the prescribed courses. In which students can take courses of their choice, learn at their own pace and adopt an interdisciplinary approach to learning. It is mandatory for Under Graduate (UG) students to study 2 CBCS courses. The students have to choose one open elective (OE -I) in III year II semester, and one (OE-II) in IV year I semester, from the list of open electives given. However, the student cannot opt for an open elective subject offered by their own (parent) department, if it is already listed under any category of the subjects offered by parent department in any semester.

10. CORE ELECTIVES

Students have to choose core electives (CE-I and CE-II) in IV year I semester and core electives (CE-III and IV) in IV year II semester, from the list of core electives courses given. However, the students may opt for core elective subjects offered in the related area.

11. VALUE ADDED COURSES (VAC)

Every student to undergo one Value Added Course (VAC) per semester from second year first semester (II-I) to fourth year first semester (IV-I). The details of the syllabus, time table and faculty may be sent to the Controller of Examinations after approval from the Head of the Institution concerned at-least one month before the course is offered. Students can take a minimum of 30 lectures / Practices / Training session per course.

12. INDUSTRIAL VISIT

Industrial Visit for every student is required to go for at least one Industrial Visit starting from the second year of the Programme. The Heads of Department shall ensure that necessary arrangements are made in this regard.

13. INDUSTRIAL TRAINING / INDUSTRIAL INTERNSHIP

Industrial Training / Industrial Internship for every student is required to go for at least one Industrial Training / Industrial Internship starting from the third year of the Programme. The Heads of Departments shall ensure that necessary arrangements are made in this regard.

14. PRESERVATION OF RECORDS

The laboratory records, internal test papers and end examination answer booklets shall be preserved for minimum of 2 years in the institution.

15. ATTENDANCE REQUIREMENTS

A student shall be eligible to appear for University examinations if he / she acquires minimum of 75% of attendance in aggregate of all the subjects in a semester.

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

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

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

A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek readmission for that semester when offered next.

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

16. MINIMUM ACADEMIC REQUIREMENTS (Regular Students)

The following academic requirements have to be satisfied in addition to the attendance requirements.

1. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subjects or project if he secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In case of audit courses he/she should secure 40% of the total marks.
2. A student shall be promoted from II to III year only if he / she fulfil the academic requirement of securing 40% of the credits in the subjects that have been studied up to II year II semester from the following examinations, if any fraction shall be rounded off to the next higher credit.

   For I/I sem one regular and two supplementary examinations

   For I/II sem one regular and one supplementary examinations.

   For II/I sem one regular examinations.

   For II/II sem one regular examinations.
3. A student shall be promoted from III year to IV year only if he / she fulfil the academic requirements of securing 40% of the credits in the subjects that have been studied up to III year II semester from the following examinations, if any fraction shall be rounded off to the next higher mark.

   For I/I sem one regular and four supplementary examinations.

   For I/II sem one regular and three supplementary examinations.

For II/I sem one regular and two supplementary examinations.

For II/II sem one regular and one supplementary examinations.

For III/I sem one regular examinations.

For III/II sem one regular examinations.

and in case if student is already detained for want of credits for particular academic year by sections 16.2 and 16.3 above, the student may make up the credits through supplementary exams of the above exams before the commencement of third or fourth year I semester class work respectively of next year.

17. MINIMUM ACADEMIC REQUIREMENTS (For Later Entry Students)

The Following academic requirements have to be satisfied in addition to the attendance requirements.

A student shall be deemed to have satisfied them minimum academic requirements and earned the credits allotted to each theory practical, design drawing subjects or projects if he secures not less than 35% of marks in the end examinations and a minimum of 40 % of marks in the sum total of the internal evaluation and examination taken together. In the Seminar he/she should secure 40 %

A Student shall be promoted from III year to IV year only if he / she fulfils the academic requirements of securing 40% credits of the subjects that have been studied up to III year II semester (if any fraction shall be rounded off to the next higher credit) from

For II/I sem one regular and two supplementary examinations.

For II/II sem one regular and one supplementary examinations.

For III/I sem one regular examinations.

For III/II sem one regular examinations.

In case if student is already detained for want of credits for particular academic year by sections 16.2 and 16.3 above, the student may make up the credits through supplementary exams of the above exams before the commencement of third or fourth year I semester class work respectively of next year.

A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained.

18. COURSE PATTERN

The entire course of study is for four academic years. All years shall be on semester pattern. A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.

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

19. WITH–HOLDING OF RESULTS

If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

20. GRADING

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

Table – Conversion into Grades and Grade Points assigned

Range in which the Marks In the Subject Fall	**Grade**	**Grade Points Assigned**
≥ 90	S	10
80-89	A	9
70-79	B	8
60-69	C	7
50-59	D	6
40-49	E	5
< 40	F (Fail)	0
Absent	Abs (Absent)	0

i. A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered.

ii. For non-credit courses "Pass" shall be indicated instead of the letter 'P' and this will not be counted for the computation of SGPA/CGPA

20.1. SEMESTER GRADE POINT AVERAGE (SGPA) AND CUMULATIVE GRADE POINT AVERAGE (CGPA):

i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$SGPA = \Sigma (C_i \times G_i) / \Sigma C_i$

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

iii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$CGPA = \Sigma (C_i \times S_i) / \Sigma C_i$

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

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

v. SGPA will be given to those who cleared all the subjects in that semester

vi. GRADE POINT: It is a numerical weight allotted to each letter grade on a 10-point scale.

vii. LETTER GRADE: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

21. AWARD OF CLASS:

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

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

22. TRANSITORY REGULATIONS

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

Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B.Tech from the date of commencement of class work, subject to Section 2 and they will be in the academic regulations into which the candidate is presently rejoining.

23. MINIMUM INSTRUCTION DAYS:

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

24. REVALUATION

A candidate can apply for revaluation of his / her end examination answer paper in a theory courses. The examination section shall issue a notification inviting applications for the revaluation after publishing the results. The application forms can be obtained from the examination section. A candidate can apply for revaluation of answer scripts in not more than 5subjects at a time.

No revaluation for comprehensive Examination, practical and project work.

25. CONDUCT AND DISCIPLINE

i. Students shall conduct themselves within and outside the precincts of the Institute in a manner befitting the students of an Institute of National importance

ii. As per the order of the Hon'ble Supreme Court of India, ragging in any form is banned: acts of ragging will be considered as gross indiscipline and will be severely dealt with.

iii. The following additional acts of omission and /or commission by the students within or outside the precincts of the college shall constitute gross violation of code of conduct and are liable to invoke disciplinary measures

(a) Ragging

(b) Lack of courtesy and decorum: indecent behaviour anywhere within or outside the campus.

(c) Wilful damages or stealthy removal of any property /belongings of the Institute / Hostel or of fellow students

(d) Possession, consumption of distribution of alcoholic drinks or any kind of hallucinogenic drugs

(e) Mutilation or unauthorized possession of library books

(f) Hacking in computer systems

(g) Furnishing false statements to the disciplinary committee, or willfully withholding information relevant to an enquiry

(h) Organizing or participation in any activity that has potential for driving fellow students along lines of religion caste batch of admission hostel or any other unhealthy criterion.

(i) Resorting to noisy and unseemly behavior, disturbing studies of fellow students

(j) Physical or mental harassment of fresher through physical contact or oral abuse

(k) Adoption of unfair means in the examination

(l) Organizing or participating in any group activity except purely academic and scientific Programmers in company with others in or outside campus without prior permission of the Principal

(m) Disturbing in drunken state or otherwise an incident in academic or students function or any other public event.

(n) Not obeying traffic rules in campus not following safety practices or causing potential danger to oneself or other persons in any way.

(o) Any other act or gross indiscipline

iv. Commensurate with the gravity of the offence the punishment may be reprimand fine and expulsion from the hostel debarment from an examination rustication for a specified period or even outright expulsion from the College

v. The reprimanding Authority for an offence committed by students in the Hostel and in the Department or the classroom shall be respectively, the managers of the Hostels and the Head of the concerned Department

vi. In all the cases of offence committed by students in jurisdictions outside the purview of clause (19.v) the Principal shall be the Authority to reprimand them.

vii. All Major acts of indiscipline involving punishment other than mere reprimand shall be considered and decided by the Principal Students Disciplinary Committee appointed by the Principal.

viii. All other cases of Indiscipline of Students like adoption of unfair means in the examinations shall be reported to the Vice-Principal for taking appropriate action and deciding on the punishment to be levied.

ix. In all the cases of punishment levied on the students for any offence committed the aggrieved party shall have the right to appeal to the Principal who shall constitute appropriate Committees to review the case.

26. TRANSFER DETAILS

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

27. GENERAL

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

Malpractices rules- nature and punishments are appended.

Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively.

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

NATURE OF MALPRACTICES/ IMPROPER CONDUCT PUNISHMENT	PUNISHMENT
1. (a) possesses or keeps access 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/ practical) in which he/she 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.	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 inside 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/she will be handed over to the police and a case is registered against him/her.	Expulsion from the examinations hall and cancellation of the performance in that subject only of all the candidates involved in case of an outsider He / She will be handed over to the police and a case is registered against him/her.
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 examinations hall and cancellation of the performance in that subject and all other subjects the candidates has already appeared including practical examinations and projects work and shall not be permitted to appear for the reaming examinations of the subjects of that semester/Year The Hall Ticket of the candidate will be cancelled and retained by the CE.

3. Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall 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 practical's 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.
4. Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper or answer book or additional sheet, during or after the examination.	If the imposter is an outsider, he/she will be handed over to the police and a case is registered against him/her. 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.
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 Superintendent/Assistant-Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has

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 or causes any injury to his person or to any of his relatives whether by offensive words spoken or written or by signs or by visible representation or assaults the officer-in-charge, or any person on duty inside or outside the examination hall or any of his relatives, or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	(have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7. Leaves the exam hall taking away answer script or intentionally tears off 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 the external examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8. Possesses 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. Belongs to college, who is not a candidate for the particular examination or any person not connected with the college but indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college will be expelled 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 state to the examination hall.	Expulsion from the examination hall cancellation of the performance.
11. Copying is 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 Principal for further action to award suitable punishment.	

Regulation Amendments

Massive Online Open Course's (MOOC'S):

If, the student is unable to complete the certified MOOC within the stipulated period of time or if the candidate selected the MOOC has discontinued from the standard MOOC provider, the college has to conduct the equivalent examination (on the same MOOC syllabus) internally with the approval of the head of the department on the request of students along with separate examination fee.

Issue of Photocopy of Answer Script:

i. A student can request for the photo copy of answer script of any theory examination within one week after the declaration of the results by paying the fee.

ii. The examination section shall issue a notification inviting applications for the issue of photocopy of answer script after publishing the results.

iii. The application forms can be obtained from the examination section.

Challenge Valuation:

i. A student can apply for challenge valuation by prescribed fee.

ii. Challenging valuation shall be carried out by an external subject expert.

iii. The challenging valuation should be done strictly as per the scheme of valuation supplied by the examination section in the presence of Principal.

iv. The examination section shall issue a notification inviting applications for the challenging valuation after publishing the results. The application forms can be obtained from the examination section.

CURRICULUM and SYLLABUS – 2018

I.B.Tech. I Sem.

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18SAH111	Communicative English	HS	2	-	-	2	30	70	100
2	18SAH114	Engineering Mathematics - I	BS	2	1	-	3	30	70	100
3	18SAH112	Engineering Physics	BS	2	1	-	3	30	70	100
4	18CSE111	Problem Solving using Python	ES	2	1	-	3	30	70	100
5	18MEC111	Engineering Graphics	ES	1	-	4	3	30	70	100
6	18SAH115	Engineering Physics Lab	BS	-	-	2	1	30	70	100
7	18CSE112	Problem Solving using Python Programming Lab	ES	-	-	2	1	30	70	100
8	18MEC112	Engineering Workshop and IT Workshop	ES	-	-	2	1	30	70	100
Contact Hours per week				9	3	10	-	-	-	-
Total Hours per week				22			-	-	-	-
Total credits (6 Theory + 3 Labs)							17	-	-	-
Total Marks								240	560	800

I.B.Tech. II Sem.

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18SAH121	Technical English	HS	2	-	-	2	30	70	100
2	18SAH122	Engineering Mathematics – II	BS	2	1	-	3	30	70	100
3	18SAH113	Engineering Chemistry	BS	2	1	-	3	30	70	100
4	18CIV121	Engineering Mechanics	ES	2	1	-	3	30	70	100
5	18EEE113	Basic Electrical and Electronics Engineering	ES	2	1	-	3	30	70	100
6	18SAH116	Engineering Chemistry Lab	BS	-	-	2	1	30	70	100
7	18EEE114	Basic Electrical and Electronics Engineering Lab	ES	-	-	2	1	30	70	100
8	18MEC122	Computer Aided Drafting Lab	ES	-	-	2	1	30	70	100
Contact Hours per week				10	4	6	-	-	-	-
Total Hours per week				20			-	-	-	-
Total credits (6 Theory + 3 Labs)							17	-	-	-
Total Marks								240	560	800

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES, CHITTOOR
(Autonomous)
DEPARTMENT OF CIVIL ENGINEERING

II.B.Tech. I Sem.

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18SAH211	Engineering Mathematics -III	BS	2	1	-	3	30	70	100
2	18MEC218	Basic Mechanical Engineering	ES	2	1	-	3	30	70	100
3	18CIV211	Building Planning and Drawing	PC	1	-	4	3	30	70	100
4	18CIV212	Building Materials and Construction	PC	3	-	-	3	30	70	100
5	18CIV213	Strength of Materials -I	PC	2	1	-	3	30	70	100
6	18CIV214	Surveying-I	PC	2	1	-	3	30	70	100
7	18CIV215	Strength of Materials Lab	PC	-	-	2	1	30	70	100
8	18CIV216	Surveying-I Lab	PC	-	-	2	1	30	70	100
9	18AUD211	Constitution of India	AC	2	-	-	-	-	-	-
10	18SAH212	Reasoning and Aptitude –I	HS	2	-	-	-	-	-	-
Contact Hours per week				16	4	8	-	-	-	-
Total Hours per week				28			-	-	-	-
Total credits (6 Theory + 3 Labs)							20	-	-	-
Total Marks								240	560	800

II.B.Tech.II Sem.

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18SAH222	Probability and Statistics	BS	2	1	-	3	30	70	100
2	18MBA221	Principles of Management	HS	3	-	-	3	30	70	100
3	18CIV221	Engineering Geology	PC	3	-	-	3	30	70	100
4	18CIV222	Fluid Mechanics-I	PC	2	1	-	3	30	70	100
5	18CIV223	Strength of Materials -II	PC	2	1	-	3	30	70	100
6	18CIV224	Surveying-II	PC	2	1	-	3	30	70	100
7	18CIV225	Engineering Geology Lab	PC	-	-	2	1	30	70	100
8	18CIV226	Surveying-II Lab	PC	-	-	2	1	30	70	100
9	18CIV227	Online Comprehensive Test-I	PC	1	-	-	1	-	100	100
10	18AUD212	Environmental Science	AC	2	-	-	-	-	-	-
11	18SAH223	Reasoning and Aptitude –II	HS	2	-	-	-	-	-	-
Contact Hours per week				19	4	4	-	-	-	-
Total Hours per week				27			-	-	-	-
Total credits (6 Theory + 3 Labs)							21	-	-	-
Total Marks								240	560	800

III B.Tech- I Semester

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18CIV311	Concrete Technology	PC	3	-	-	3	30	70	100
2	18CIV312	Design of Reinforced Concrete Structures	PC	2	1	-	3	30	70	100
3	18CIV313	Fluid Mechanics-II	ES	2	1	-	3	30	70	100
4	18CIV314	Structural Analysis -I	PC	2	1	-	3	30	70	100
5	18CIV315	Hydrology & Irrigation Engineering	PC	2	1	-	3	30	70	100
6	18CIV316	Geotechnical Engineering-I	PC	2	1	-	3	30	70	100
7	18CIV317	Fluid Mechanics and Hydraulic Machinery Lab	ES	-	-	2	1	30	70	100
8	18CIV318	Geotechnical Engineering Lab	PC	-	-	2	1	30	70	100
9	18SAH311	Communication and Soft Skills Lab	HS	-	-	2	1	30	70	100
10	MOOC	Massive Online Open Course	AU	-	-	-	-	-	-	P
Contact Hours per week				13	5	6	-	-	-	-
Total Hours per week				24			-	-	-	-
Total credits (6 Theory + 3 Labs)							21	-	-	-
Total Marks								270	630	900

III B.Tech- II Semester

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18CIV321	Design of Steel Structures	PC	2	1	-	3	30	70	100
2	18CIV322	Environmental Engineering-I	PC	2	1	-	3	30	70	100
3	18CIV323	Transportation Engineering	PC	2	1	-	3	30	70	100
4	18CIV324	Geotechnical Engineering-II	PC	2	1	-	3	30	70	100
5	18CIV325	Structural Analysis -II	PC	2	1	-	3	30	70	100
6	**OE-I**	**Open Elective-I**	OE	3	-	-	3	30	70	100
7	18CIV326	Environmental Engineering Lab	PC	-	-	2	1	30	70	100
8	18CIV327	Concrete Technology Lab	PC	-	-	2	1	30	70	100
9	18CIV328	Project Skills Lab	PW	-	-	2	1	30	70	100
10	18CIV329	On-line Comprehensive Test-II	PC	-	1	-	1	-	100	100
Contact periods per week				13	6	6	-	-	-	-
Total periods per week				25			-	-	-	-
Total credits (6 Theory + 3 Labs+1 OCT)							22	-	-	-
Total Marks								270	730	1000

IV B.Tech- I Semester

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18CIV411	Traffic Engineering	PC	3	-	-	3	30	70	100
2	18CIV412	Environmental Engineering-II	PC	2	1	-	3	30	70	100
3	18CIV413	Estimation, Costing and Valuation	PC	2	1	-	3	30	70	100
4	18CIV414	**Core Elective-I**	CE	3	-	-	3	30	70	100
5	18CIV415	**Core Elective-II**	CE	3	-	-	3	30	70	100
6	**OE-II**	**Open Elective-II**	OE	3	-	-	3	30	70	100
7	18CIV416	Transportation Engineering Lab	PC	-	-	2	1	30	70	100
8	18CIV417	Computer Aided Analysis and Design Lab	PC	-	-	2	1	30	70	100
9	18AUD411	Professional Ethics	AC	2	-	-	-	P	-	-
Contact periods per week				18	2	4	-	-	-	-
Total periods per week				24			-	-	-	-
Total credits (6 Theory + 2 Labs)							20	-	-	-
Total Marks, Concrete Technology Lab								240	560	800

IV B.Tech- II Semester

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18CIV421	Prestressed Concrete	PC	2	1	-	3	30	70	100
2	18CIV422	Advanced Structural Design	PC	2	1	-	3	30	70	100
3	18CIV423	**Core Elective-III**	CE	3	-	-	3	30	70	100
4	18CIV424	**Core Elective- IV**	CE	3	-	-	3	30	70	100
5	18CIV425	Project Work	PW	-	-	20	10	30	70	100
Contact periods per week				10	2	20	-	-	-	-
Total periods per week				32			-	-	-	-
Total credits (4 Theory + 1 Project Work)							22	-	-	-
Total Marks								150	350	500

CORE ELECTIVES

IV B.Tech- I Semester (Core Elective-I)

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18CIV414A	Air Pollution and Control Engineering	CE	3	-	-	3	30	70	100
2	18CIV414B	Bridge Engineering	CE	2	1	-	3	30	70	100
3	18CIV414C	Tall Structures	CE	2	1	-	3	30	70	100
4	18CIV414D	Principles of Water Quality Management	CE	3	-	-	3	30	70	100
5	18CIV414E	Remote Sensing and GIS	CE	3	-	-	3	30	70	100
6	18CIV414F	Prefabricated Structures	CE	2	1	-	3	30	70	100

IV B.Tech- I Semester (Core Elective-II)

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18CIV415A	Railways, Airport and Harbour Engineering	CE	3	-	-	3	30	70	100
2	18CIV415B	Environmental Engineering Materials	CE	3	-	-	3	30	70	100
3	18CIV415C	Structural Dynamics and Earthquake Engineering	CE	2	1	-	3	30	70	100
4	18CIV415D	Quality Control And Safety Management in Construction	CE	3	-	-	3	30	70	100
5	18CIV415E	Disaster Management and Mitigation	CE	3	-	-	3	30	70	100
6	18CIV415F	Urban And Regional Planning	CE	3	-	-	3	30	70	100

IV B.Tech- II Semester (Core Elective-III)

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18CIV423A	Construction Technology and Project Management	CE	2	1	-	3	30	70	100
2	18CIV423B	Environmental Impact Assessment	CE	3	-	-	3	30	70	100
3	18CIV423C	Finite Element Methods	CE	2	1	-	3	30	70	100
4	18CIV423D	Intelligent transportation systems	CE	3	-	-	3	30	70	100
5	18CIV423E	Ground Water Engineering	CE	3	-	-	3	30	70	100
6	18CIV423F	Environmental management system	CE	3	-	-	3	30	70	100

IV B.Tech- II Semester (Core Elective-IV)

S.No	Subject Code	Subject	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
1	18CIV424A	Computer Applications In Civil Engineering	CE	2	-	2	3	30	70	100
2	18CIV424B	Repair and Rehabilitation of Structures	CE	3	-	-	3	30	70	100
3	18CIV424C	Ground Improvement Techniques	CE	3	-	-	3	30	70	100
4	18CIV424D	Municipal Solid Waste Management	CE	3	-	-	3	30	70	100
5	18CIV424E	Design and Drawing of Irrigation Structures	CE	2	-	2	3	30	70	100
6	18CIV424F	Water Resource Engineering	CE	3	-	-	3	30	70	100

OPEN ELECTIVE-I

III B.Tech. II Sem. (Open Elective-I)

Subject Code	Subject	Offered Department (Except Parent Department)	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
18OSAH321	Mathematical Modeling - Analysis and Applications	S&H	OE	3	-	-	3	30	70	100
18OSAH322	Business Communication and Career Skills		OE	3	-	-	3	30	70	100
18OSAH323	LASER and Fiber Optics		OE	3	-	-	3	30	70	100
18OCSE321	Object Oriented Programming	CSE	OE	3	-	-	3	30	70	100
18OCSE322	Operating Systems		OE	3	-	-	3	30	70	100
18OCSE323	Web Programming		OE	3	-	-	3	30	70	100
18OMEC321	Industrial Robotics	MECH	OE	3	-	-	3	30	70	100
18OMEC322	Power Plant Technology		OE	3	-	-	3	30	70	100
18OMEC323	Mechatronics System		OE	3	-	-	3	30	70	100
18OEEE321	SCADA System and Applications	EEE	OE	3	-	-	3	30	70	100
18OEEE322	Servicing of Electrical Appliances		OE	3	-	-	3	30	70	100
18OEEE323	Power System Reforms		OE	3	-	-	3	30	70	100
18OECE321	Machine Vision System	ECE	OE	3	-	-	3	30	70	100
18OECE322	Foundation of Nano-Electronics		OE	3	-	-	3	30	70	100
18OECE323	Medical Electronics		OE	3	-	-	3	30	70	100

IV B.Tech. I Sem. (Open Elective-II)

Subject Code	Subject	Offered Department (Except Parent Department)	Subject Category	Scheme of Instructions Hours per Week				Scheme of Examination Maximum Marks		
				L	T	P/D	C	I	E	Total
18OSAH411	Graph Theory with Applications	S&H	OE	3	-	-	3	30	70	100
18OSAH412	Banking and Insurance		OE	3	-	-	3	30	70	100
18OSAH413	Managing Innovation and Entrepreneurship		OE	3	-	-	3	30	70	100
18OCSE411	Fundamentals of DBMS	CSE	OE	3	-	-	3	30	70	100
18OCSE412	Basics of Internet of Things		OE	3	-	-	3	30	70	100
18OCSE413	Information Security		OE	3	-	-	3	30	70	100
18OMEC411	Quality Control Reliability	MECH	OE	3	-	-	3	30	70	100
18OMEC412	Industrial Engineering and Psychology		OE	3	-	-	3	30	70	100
18OMEC413	3D Printing and Design		OE	3	-	-	3	30	70	100
18OEEE411	Wind Energy Conversion Systems	EEE	OE	3	-	-	3	30	70	100
18OEEE412	Fundamentals of Energy Auditing		OE	3	-	-	3	30	70	100
18OEEE413	Introduction to Power Quality		OE	3	-	-	3	30	70	100
18OECE411	Fundamentals of Artificial Intelligence	ECE	OE	3	-	-	3	30	70	100
18OECE412	Fundamentals of Embedded Systems		OE	3	-	-	3	30	70	100
18OECE413	Data Communication and Networks		OE	3	-	-	3	30	70	100

SUMMARY OF CREDIT ALLOCATION

S.NO	SUBJECT AREA	CREDITS AS PER SEMESTER								TOTAL CREDITS
		I-I	I-II	II-I	II-II	III-I	III-II	IV-I	IV-II	
1.	HS	2	2		3	1	-	-	-	8
2.	BS	7	7	3	3	-	-	-	-	20
3.	ES	8	8	3	0	1	-	-	-	20
4.	PC	-	-	14	15	19	18	11	6	83
5.	CE	-	-	-	-	-	-	6	6	12
6.	OE	-	-	-	-	-	3	3	-	6
7.	AC	-	-	0	0	-	-	0	-	0
8.	PW	-	-	-	-	-	1	-	10	11
Total		**17**	**17**	**20**	**21**	**21**	**22**	**20**	**22**	**160**

Note: HS- Humanities and Social Science and; BS- Basic Sciences;
ES – Engineering Science; PC – Professional Core; CE- Core Elective;
OE- Open Elective; PW-Project Work; AC – Audit Course.

PERCENTAGE – WISE CREDIT DISTRIBUTION

S.No	Category	Credits Allocated	Percentage –wise Credit Distribution
1	HS- Humanities and Social Sciences	8	5
2	ES – Engineering Science	20	12.50
3	BS – Basic Sciences	20	12.50
4	PC – Professional Core	83	51.875
5	CE- Core Elective	12	7.50
6	OE- Open Elective	6	3.75
7	PW – Project Work	11	6.875
8	AC – Audit Course	0	0
Total		**160**	**100**

I B.Tech I Semester

		L	T	P/D	C
18SAH111	**COMMUNICATIVE ENGLISH**				
	(Common to all Branches)	2	-	-	2

Course Educational Objectives:

CEO1: To Provide Knowledge on Behavioral aspects, developing vocabulary by deriving various ways of forming words.

CEO 2: To cultivate Individual and Team Work skills, Knowledge on the usage of foreign language words in to English Language,

CEO3: To Cultivate Adaptability Skills in work place, Knowledge on Grammatical aspects of Verbs and Adverbs, words by applying stress, how to express one's opinions and dialogue writing.

CEO4: Acquiring of Entrepreneurship Skills, Usage of grammar aspects of Prepositions, Pronunciation of suffix words, and acquisition of writing skills.

CEO5: Contextual knowledge to recognize the need of ability to engage in independent and life- long learning in the broadest context of technological change.

UNIT-I

"ISWARAN" (A Story from R.K. Narayan's Malgudi Days) - Word Formation: Clipping- Acronym- Blending- Back-formation- Derivation - Borrowing – Coinage- Compounding - Nouns- Kinds and Uses - Pronouns-Kinds and uses - Listening to Vowel Sounds - Introducing self and others - Reading Comprehension.

UNIT-II

"WHITE WASHING THE FENSE" (Team work skills by Mark Twain) - A-Z Root words from foreign languages and their use in English – Adjectives - Degrees of Comparison - Listening to Consonant Sounds – Greetings - Reading Strategies - Sentence Structures and formation.

UNIT-III

"SENOR PAYROLL" (Adaptability skills by William E. Barrett) - Verbs-Forms - List of Regular and Irregular verbs-Be verbs-Gerunds - Adverbs-types and formation of adverbs - Listening to Word Stress - Expressing opinions – Paraphrasing -Dialogue Writing.

UNIT-IV

"ACQUISITION OF ENTREPRENEURSHIP SKILLS" (a brief biography of AZIM PREMJI) – Prepositions - Uses - Listening to Inflections - Describing objects/persons/places – Summarizing - Writing a Moral Story.

UNIT-V

"REFLECTIONS OF FUTURE THE YEAR 2050" by Theodore J. Gordon - Conjunctions – Articles - Listening to a passage - Telephone Conversation - Short Story Review - Expansion of Proverbs.

Course Outcomes:

On successful completion of the course, students will be able to		POs related to Cos
CO1	Understand the concepts on behavioral aspects, Development of vocabulary by deriving various ways of forming words, identification of Nouns and Pronouns and their usage, Pronunciation of Phonetic Vowel Sounds, Communicate effectively with others and how to read and understand a passage.	PO1, PO10
CO2	Develop Individual and Team Work skills, Knowledge on the usage of foreign language words, identification of and their usage	PO1, PO9, PO10
CO3	Cultivate Adaptability Skills in work place Knowledge on Grammatical aspects of Verbs and Adverbs. Writing dialogues effectively.	PO1, PO9, PO10
CO4	Understand in Acquiring of Entrepreneurship Skills Usage of grammar aspects on Prepositions Pronunciation of inflectional suffix words by describing objects, persons and places Acquiring writing skills through interpreting moral stories.	PO1, PO9, PO10
CO5	Knowledge to Recognize the need of ability to engage in independent and life-long learning Usage of grammar aspects on Conjunctions and Articles Communicate effectively in English over phone Reviewing a short stories and Expansion of proverbs.	PO1, PO10, PO12

Prescribed Book: The text book prepared by the Department of English of SITAMS.

Other References:

1. Exercises in spoken English: Parts I-III, CIEFL, Hyderabad, Oxford University Press.
2. Communication Skills: Sanjay Kumar and Pushpa Latha, Oxford University Press. 2011.
3. Practical English Usage: Michael Swan, Oxford University Press, 1995.
4. Remedial English Grammar: F.T. Wood. Macmillan, 2007.

I B.Tech I Sem

18SAH114	**ENGINEERING MATHEMATICS – I**	L	T	P/D	C
	(Common to all Branches)	2	1	-	3

Course Educational Objectives:

CEO1: To learn the reduction of a given matrix to echelon and normal forms, rank of a matrix, solve system of linear equations by different methods and determining the eigen values and eigen vectors and develop linear transformation with emphasis on the role of eigen-values and eigen- vectors.

CEO2: To understand the Taylor's and Maclaurin's series of function in single variable and to familiarize the knowledge of partial derivatives, extreme values in multivariables.

CEO3: To identify important characteristics of first order ordinary differential equations(FOODE) and develop appropriate method of obtaining solutions of FOODE and explore the use of FOODE as models in various applications

CEO4: To learn the concepts of Laplace Transforms and inverse Laplace Transforms and to explore the solving initial value problems by using Laplace transform method.

UNIT – 1:**MATRICES**

Rank - Echelon form and Normal form - Solution of linear system of homogeneous and non- homogeneous equations - Direct methods - Gauss elimination, Gauss Jordan method - Eigen values, Eigen vectors - Properties - Cayley-Hamilton theorem(without proof) - Inverse and powers of a matrix. – Diagonalization of a matrix using similarity transformation only.

UNIT – 2:DIFFERENTIAL CALCULUS AND ITS APPLICATIONS

Taylor's and Maclaurin's series for single variable (simple examples) - Functions of several variables - Jacobian – Taylor's and Maclaurin's series for two variables - Maxima and minima of functions of two variables - Lagrangian method of undetermined multipliers with three variables only.

UNIT – 3: ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER, FIRST DEGREE AND ITS APPLICATIONS & SPECIAL FUNCTIONS

Exact equations, Equations reducible to exact, Linear and Bernoulli's equation Applications: Orthogonal Trajectories, Newton's law of cooling only.

Beta and Gamma functions – Evaluation of Integrals (Simple examples)

UNIT - 4:LAPLACE TRANSFORM - I

Laplace transform of standard functions - First shifting theorem - Second shifting theorem - Transform of Derivatives & Integrals - Inverse transform.

UNIT - 5: LAPLACE TRANSFORM – II

Laplace Transform of Unit step function, Dirac's delta function and Periodic function - Convolution theorem - Application of Laplace transforms to ordinary differential equations of first and second order.

Course Outcomes

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Demonstrate knowledge in estimating ranks in solving linear equations through matrix methods, eigen values and eigen vectors and to develop analytical skills in solving problems involving diagnoliation using eigen values and eigen vectors	PO1,PO2,P012
CO2	Demonstrate knowledge in Taylor's and Maclaurin's series of a function of single variable, finding maximum and minimum values attained by functions of several variables and Develop analytical skills in solving problems involving functional dependence and independence using partial derivatives	PO1,PO2
CO3	Demonstrate knowledge in first order ordinary differential equations, Develop analytical skills in solving problems involving first order ordinary differential equations and Develop skills in designing Mathematical models for Newton's Law of cooling and orthogonal trajectories	PO1,PO2,P03
CO4	Demonstrate knowledge in Laplace transform and inverse Laplace transform and use the appropriate shift theorems in finding Laplace and inverse Laplace transforms	PO1,PO2
CO5	Develop analytical skills in solving problems involving initial value problems for constant coefficient linear ordinary differential equations using Laplace transform	PO1,PO2,PO3 PO4,PO12

Text books:

1. Engineering Mathematics–I, 2012,T.K.V.Iyengar,B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, S. Chand and Company Ltd, New Delhi.
2. Higher Engineering Mathematics, 34/e, 1999, Dr. B. S. Grewal, Khanna Publishers, Delhi.

Reference books:

1. Engineering Mathematics for JNTU, 2012, B.V. Ramana, Tata McGraw Hill Publishers, New Delhi.
2. A Text Book of Engineering Mathematics,2011, N.P.Bali,Laxmi publications(P)Ltd, New Delhi.
3. Higher Engineering Mathematics, Dr. M. K. Venkata Ramana, National Pub, Madras
4. Engineering Mathematics, Volume - 1, 2012, E.Rukmangadachari, E.Keshava Reddy, Pearson Educations, Chennai.
5. Advanced Engineering Mathematics, 8/e, 2009, Erwin Kreyszig, Wiley India, New Delhi.

I B.Tech I Sem

18SAH112	ENGINEERING PHYSICS	L	T	P/D	C
	(Common to all Branches)	2	1	-	3

Course Educational Objectives:

CEO1: To understand the principles and applications optics, Lasers and Optical Fibers in various Streams of Engineering

CEO2: To analyze the structure of crystals by using X-Ray Diffraction Technique and to study properties, productions and applications of ultrasonic

CEO3: To develop ideas & mathematical solutions to Quantum mechanics & Semiconductors **CEO4:** To recognize the concepts of Superconductors and classification of magnetic materials **CEO5:** To Introduce Nano-materials & their applications in various fields of science and technology

UNIT - 1:PHYSICAL OPTICS, LASERS AND FIBER OPTICS

Physical Optics: Interference in thin films by reflection (Qualitative Analysis) - Newton's rings (Qualitative) – Diffraction – Fraunhofer Diffraction at single slit-Diffraction Grating.

Lasers: Laser characteristics – Spontaneous and Stimulated emissions - Population inversion – Pumping Mechanisms-Solid state laser (Ruby laser) - Gas (He-Ne) laser - Applications of lasers. **Fiber Optics**: Principle of Optical Fiber **-**Structure of optical fiber - Types of optical fibers –Step Index and Graded Index Fibers- Numerical aperture –Acceptance angle-Fiber optics in communications (Block Diagram)–Simple Applications.

UNIT - 2:CRYSTAL STRUCTURES AND ULTRASONICS

Crystal Structures: Introduction - Space lattice –Basis-Unit cell - Lattice parameters - Crystal Systems - Structures of Simple Cubic - Body Centered Cubic - Face Centered Cubic crystals - X-ray diffraction- Bragg's law –Laue Method of X-Ray Diffraction.

Ultrasonics: Introduction – Properties of ultrasonic waves - Piezoelectric Effect-Production of ultrasonic waves by Piezoelectric method -Applications of Ultrasonics.

UNIT - 3:QUANTUM MECHANICS AND SEMI CONDUCTORS

Quantum Mechanics: de Broglie's Hypothesis- Kinetic Energy and de Broglie wavelength – de Broglie wavelength of electrons -Properties of Matter waves-Time independent Schrodinger's wave equation –Physical Significance of Wave function-Particle in one dimensional potential box (Only upto Eigen Values of Electrons).

Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative) - Drift and diffusion - Hall Effect –Applications of Hall Effect- Direct and indirect band gap semiconductors

UNIT - 4: MAGNETIC MATERIALS AND SUPERCONDUCTIVITY

Magnetic Materials: Classification of dia - para - ferro magnetic materials on the basis of magnetic moment (Qualitative) - Hysteresis curve - soft and hard magnetic materials and Applications. **Superconductivity:** General properties - Meissner Effect – Type-I and Type-II superconductors - BCS Theory - Josephson's effect - Applications of superconductors.

UNIT - 5: PHYSICS OF NANOMATERIALS

Nanomaterials: Introduction to Nanomaterials –Types of Nano materials (One dimensional, Two dimensional and Three dimensional Nano materials) - Significance of nanoscale- surface to, volume ratio –Quantum Confinement effect-Synthesis of Nanomaterials - Ball milling Method - Chemical vapour deposition methods –Optical, thermal, mechanical and electrical properties of nano materials
- Applications of Nanomaterials.

Course Outcomes

	On successful completion of the course the students will be able to	**POs related to COs**
CO1	Acquire the knowledge and applications on Optics, LASERS and Fiber Optics.	PO1, PO2
CO2	Identify appropriate method for the production of Ultrasonics and their usage and understanding different crystal structures	PO1, PO2
CO3	Develop the skills to solve complex problem in quantum mechanics and Semiconductors	PO1, PO2,PO4
CO4	Analyze the concepts of Superconductors and magnetic materials and their appropriate applications in the field of Engineering and Technology	PO1,PO2
CO5	Apply the theoretical concepts pertaining to Nanomaterials in various fields engineering and Technology	PO1,PO12

Text Books:

1. Engineering Physics, 2011, M.R. Srinivasan, New Age International, Chennai.
2. Engineering Physics, First Edition 2014, K. Thyagarajan, McGraw Hill Publishers, New Delhi.

Reference Books:

1. Concepts of Modern Physics, 8/e, 2007, Aurther Beiser, Tata McGraw Hill Publishers, New Delhi.
2. Modern Engineering Physics, 2012, A.S. Vasudeva, S. Chand & Co., New Delhi.
3. Materials Science, 1/e, 2004,M. Vijaya and G. Rangarajan, Tata McGraw Hill Publishers, New Delhi .
4. Physics, Part I and II(Part I 5/e,2002, Part II 5/e,2001), Halliday and Resnick, John Wiley & Sons (Asia)
5. Engineering Physics, 7/e, 2006, Gaur & Gupta, Dhanpati Rai Publications, New Delhi

I B.Tech I Sem

		L	T	P/D	C
18CSE111	**PROBLEM SOLVING USING PYTHON PROGRAMMING**				
	(Common to all Branches)	2	1	-	3

Course Educational Objectives:

CEO1: To understand the basics of problem solving and python programming.
CEO2: To develop the basic skills of Python program in interactive and script mode.
CEO3: To design control structure like selection control and iterative control statement.
CEO4: To construct Python programs using Lists, Dictionaries and sets
CEO5: To build Python Programs using functions, software object, turtle graphics, file handling to read and write data from/to files.

UNIT- 1:INTRODUCTION TO PROBLEM SOLVING

Fundamentals: what is computer science - Essence of computational problem solving - Limits of computational problem solving - Computer Algorithms - Computer Hardware - Computer software - Computational problem solving. **Python programming language:** IDLE python development environment - python standard library - Bit of python - learning how to use IDLE - First program in Python. **Problem solving example:** Calculating the Drake Equation.

UNIT- 2:DATA AND EXPRESSIONS

Literals: Numeric literals - String literals - Control characters - String formatting - Implicit and explicit line joining. **Variables and Identifiers:** Variable assignment and keyboard input – Identifiers - keywords and other predefined identifiers. **Operators, Expressions and Data types**: Operators - Arithmetic Operators – Expressions - Operator precedence - Operator Associativity - Data type - Multi-type expression. **Computational Problem solving:** Restaurant Tab calculation and Age in seconds.

UNIT- 3:CONTROL STRUCTURES

Control Structures and Boolean expressions: Control structures - Relational operators - Membership operators - Boolean operators - Operator precedence and Boolean Expressions - Short- Circuit Evaluation - Logically Equivalent Boolean Expression. **Selection Control:** If statement - Indentation in python - Multi-Way Selection. **Iterative Control:** While statement - Infinite Error Checking - Infinite loops - Definite Vs Infinite loops - Boolean Flags and Indefinite loops. **Problem Solving:** Numbers of days in month and Calendar month programs.

UNIT-4:LISTS, DICTIONARIES AND SETS

Lists: List structures - Common list operations - List traversal - Lists in Python - Python list type – Tuples – sequences - Nested lists - Iterating over lists in python - For loop - Built-in range function - Iterating over list elements vs. List index values - While loops and lists - More on Python lists. **Dictionaries and Sets**: Dictionary types in Python - Set data type. **Problem solving:** Chinese Zodiac Program - Password Encryption/Decryption Program - Calendar Month program and A Food Co-op's Worker Scheduling Simulation.

UNIT-5: FUNCTIONS, SOFTWARE OBJECTS AND TEXT FILES

Functions: Function routines - Defining Functions - Calling Value-Returning Functions - Calling Non-Value-Returning Functions - Parameter Passing -Keyword Arguments in Python - Default Arguments in Python - Variable Scope. **Software Objects:** Object references - Turtle graphics - creating a Turtle Graphics Window - the "Default" Turtle - Fundamental Turtle Attributes and Behavior - Additional Turtle Attributes - Creating Multiple Turtles. **Text Files:** Fundamentals – opening - reading and writing text files - string processing – traversal - operations and methods. **Problem solving:** Temperature conversion - GPA calculation and Credit card calculation.

Course Outcomes

On successful completion of this course the students should be able to		**POs related to COs**
CO1	Demonstrate problemapproaches techniques and acquire knowledge in IDLE development environment in interactive and script mode	PO1, PO2,PO5
CO2	Indentify computational problem solving approaches to solve problems using python variables, expression and operators	PO1, PO2, PO5
CO3	Identify and develop python programs using control structures like selection control and iterative control statements.	PO1, PO2, PO3, PO5
CO4	Analyze lists, set, tuples and dictionaries to develop python program.	PO1, PO2, PO3, PO5
CO5	Understand and Build Python Programs using functions, software objects, turtle graphics and file handling to read and write data from/to files.	PO1, PO2, PO3, PO4,PO5

Text Books:

1. Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2016.
2. Mark Lutz, "Programming Python," O'Reilly Publications, Fourth Edition, 2011.

Reference Books:

1. Kenneth Lambert and B.L. Juneja, Fundamentals of Python, Cengage Learning, Third Edition, 2012.
2. Python Programming: A Modern Approach, VamsiKurama, Pearson.
3. Learning Python, Mark Lutz, Orielly.
4. Introduction to Python, Kenneth A. Lambert, Cengage.

I B.Tech I Semester

		L	T	P/D	C
18MEC111	**ENGINEERING GRAPHICS**				
	(Common to all branches)	1	-	4	3

Course Educational Objectives:

CEO1: To expose them to existing national and international standards related to technical drawings.

CEO2: To develop drawing skills for communication of concepts, ideas and design of engineering products.

CONCEPTS AND CONVENTIONS (Not for Examination)

Importance of drawings in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size and layout of drawing sheets - Lettering, numbering and dimensioning - Basic geometrical constructions.

UNIT – 1: ENGINEERING CURVES

Engineering Curves: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method and rectangular hyperbola – Construction of cycloid, epi cycloid and hypo cycloid – Construction of involutes of square and circle – Tangent and normal for the above curves.

UNIT – 2: PROJECTION OF POINTS, LINES AND PLANE SURFACES

Projection of Points: Principles of orthographic projection – Conventions – First angle projection and third angle projections – Projection of points. **Projection of Lines:** Projection of straight lines (only first angle projections) inclined to one and both the principal planes – Determination of true lengths and true inclinations by rotating line method. **Projection of Planes:** Regular planes inclined to one and both the principal planes by change of position method.

UNIT – 3: PROJECTION OF SOLIDS AND SECTION OF SOLIDS

Projection of Solids: Projection of simple solids like prisms, pyramids, cylinder and cone, when the axis is inclined to one principal plane. **Section of Solids:** Sectioning of right regular solids like prisms, pyramids, cylinder and cone, the solids are in simple vertical position and inclined to one plane, when the cutting plane is inclined to one of the principal planes – Obtaining true shape of section.

UNIT – 4: DEVELOPMENT OF SURFACES AND ISOMETRIC PROJECTIONS

Development of Surfaces: Development of lateral surfaces of simple and sectioned solids like prisms, pyramids, cylinder and cone. **Isometric Projection:** Principles of isometric projection – Isometric scale – Isometric projections of simple solids and truncated solids like prisms, pyramids, cylinder and cone.

UNIT – 5: ORTHOGRAPHIC PROJECTIONS AND PERSPECTIVE PROJECTIONS

Orthographic Projections: Principles and methods of orthographic projections – Plane of projections – Representation of three dimensional objects – Layout of views – Conversion of 3D objects to 2D objects. **Perspective Projection:** Perspective projection of simple solids like prisms and pyramids by visual ray method.

Course Outcomes:

	On successful completion of the course, students will be able to	POs related to COs
CO1	Construct the Engineering Curves and generate tangent and normal for those curves.	P01,P02,P03,P10
CO2	Draw the Projection of Points, Lines and Plane Surfaces.	P01,P02,P03, P10
CO3	Draw the Projection of Solids, Sections of Solids like Prisms, Pyramids, Cylinder and Cone.	P01,P02,P03, P10
CO4	Construct the Isometric Scale, Projections and develop the development of surfaces.	P01,P02,P03, P10
CO5	Draw the Orthographic and Perspective projections of Solids.	P01,P02,P03, P10

Text Books:

1. Engineering Drawing, N.D. Bhatt and V. M. Panchal, 50th edition, Charotar Publishing House, 2010.
2. A Text book of Engineering Graphics, K.V.Natrajan, 2009, Dhanalakshmi Publishers, Chennai.

References Books:

1. Engineering Drawing, K.L.Narayana and P.Kannaiah, 2/e, 2012, Scitech Publishers.
2. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production, Luzzader, Warren.J and Duff,John M., 2005, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi.
3. Engineering Graphics, K.Venugopal and V.Prabhu Raja, 2008, New Age International (P) Limited.
4. Engineering Drawing, M.B.Shah and B.C.Rana, 2/e, 2009, Pearson Education.
5. Engineering Drawing, Basant Agarwal and C.M.Agarwal, 2008, Tata McGraw Hill Publishing Company Limited, New Delhi.

I B.Tech I Sem

		L	T	P/D	C
18SAH115	**ENGINEERING PHYSICS LABORATORY (Common to all branches)**	-	-	2	1

Course Educational Objectives:

CEO1: To Demonstrate Knowledge on measurement of various physical quantities using optical Methods and fundamentals of magnetic fields.

CEO2: To Identify different physical properties of materials like band gap, magnetic field Intensity etc, for engineering and technological applications

CEO3: To provide valid conclusions on phenomena Interference and Diffraction.

Name of the Experiment

1. Diffraction grating - Measurement of wavelength of given Laser.
2. Determination of magnetic field along the axis of a current carrying circular coil -Stewart Gees method
3. Determination of numerical aperture and acceptance angle of an optical fiber
4. Determination of particle size using a laser source
5. Parallel fringes – Determination of thickness of thin object using wedge method
6. Newton's rings – Determination of radius of curvature of given plano convex lens
7. B-H curve – Determination of hysteresis loss for a given magnetic material
8. Determination of Energy band gap of semiconductor

Course Outcomes:

On completion of the laboratory course the student will be able to		**POs related to COs**
CO1	Demonstrate Knowledge on measurement of various quantities using optical methods and fundamentals of magnetic fields	PO1
CO2	Identify different physical properties of materials like band gap, magnetic field intensity etc, for engineering and technological applications	PO2
CO3	Provide valid conclusions on phenomena Interference and Diffraction	PO4
CO4	Follow ethical values during conducting of Experiments	PO8
CO5	Work individually or in a team effectively	PO9
CO6	Communicate verbally and in written form pertaining to results of the Experiments	PO10
CO7	Learns to perform experiments involving physical Phenomena in future years	PO12

I B. Tech I Semester

18CSE112	**PROBLEM SOLVING USING PYTHON PROGRAMMING LAB**	L	T	P/D	C
	(Common to all branches)	-	-	2	1

Course Educational Objectives:

CEO1: To design the algorithms and flowchart for python programs.
CEO2: To understand the concepts of expressions and control structures in python
CEO3: To develop the python programs using functions.
CEO4: To analyze the concepts of python lists, tuples and dictionaries.
CEO5: To gain knowledge on file handling using python programming

Recommended Systems/Software Requirements:

- For Windows: IDLE/ Spyder python development environment.
- For Linux: Default python version installed/ higher version.

LIST OF EXERCISES:

Task-1:

Develop and analyze various phases of Software Development Life cycle (SDLC) through Gantt chart.

Task-2:

a. Design a flowchart for biggest of three numbers.
b. Design a flowchart to find whether the given input is leap year or not.
c. Develop a flowchart to display the multiple of 3 up to 100.

Task-3:

a. Write a python script to calculate the Drake equation.
b. Develop a simple python scripts to illustrate numeric literals and string literals.

Task-4:

a. Write a python script to calculate Restaurant Tab calculation.
b. Write a python program to calculate the approximate number of atoms that the average person contains and the percentage of the universe that they comprise.
c. Write a Python program to read temperature from the user in Fahrenheit and displays the equivalent temperature in Celsius.

Task-5:

a. Write a python program to determine the approximate age of an individual in seconds.
b. Write a Python program that prompts the user for two integer values and displays the result of the first number divided by the second with exactly two decimal places displayed.
c. Write a Python program that prompts the user for two floating-point values and displays the result of the first number divided by the second with exactly six decimal places displayed.

Task-6:

a. Write a Python program in which the user enters either 'A' - 'B'or 'C'. If 'A' is entered the program should display the word 'Apple' - if 'B' is entered it displays 'Banana' - and if 'C' is entered it displays 'Coconut'.
b. Repeat 6a) using if statement with elifheaders instead.
c. Write a Python program in which a student enters the number of college credits earned. If the number of credits is greater than 90 - 'Senior Status' is displayed- if greater than 60 -'Junior Status' is displayed - if greater than 30 - 'Sophomore Status' is displayed else 'Freshman Status' is displayed.

Task-7:

a. Write a program to sum a series of (positive) integers entered by the userexcluding all numbers that are greater than 100.
b. Write a program in which the user can enter any number of positive and negative integer values that displays the number of positive values entered as well as the number of negative values.

Task-8:

a. Write a program containing a pair of nested while loop that displays the integer values 1–100. ten numbers per row - with the columns aligned as shown below

```
1   2   3   4   5   6   7   8   9 10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
91 92 93 94 95 96 97 98 99 100
```

b. Display the integer values 1–100 as given in question 8a) using only *one* while loop.

Task-9:

a. Write a python script to calculate the number of days in a month.
b. Write a python program to display a calendar month for any given month between January 1800 and December 2099.

Task-10:

a. Write a Python program that prompts the user for a list of integers - stores in another list only those values between1–100 and displays the resulting list.
b. Write a Python program that prompts the user to enter a list of first names and stores them in a list. The program should display how many times the letter 'a' appears within the list.

Task-11:

a. Write a Python script to generate all the possible spellings of the last four digits of any given phone number – use Dictionaries.

Task-12:

a. Write a Python function named zeroCheck that is passed with

b. three integers and returns true if any of the integers is 0 otherwise it returns false.
c. Write a Python function named ordered3 that is passed three integers, and returns true if the three integers are in order from smallest to largest otherwise it returns false.

Task-13:

a. Write a python script that allows a user to convert a range of values from Fahrenheit to Celsius or Celsius to Fahrenheit using functions.
b. Write a Python function named **Hello World** that displays
c. "Hello World, my name is *name* "for any given name passed to the routine.

Task-14:

a. Write a python script to create a simple text file. Write the contents into the created file and read the contents from the file and display the same on to the console screen.

Task-15:

a. **Mini project:** Horse Race Simulation
Create a visualization of a horse race using python script in which horses are moved ahead a random distance at fixed intervals until there is a winner.

Course Outcomes:

	On successful completion of this course the students should be able to	POs related to COs
CO1	Develop algorithms and flowcharts for given problems	PO1
CO2	Implement conditionals and loops to design the python programming	PO2
CO3	Develop Python programs step-wise by defining functions and calling them.	PO3
CO4	Implement lists, set, tuples and dictionaries to develop python program.	PO4
CO5	Build Python Programs using file handling mechanisms to read and write data from/to files.	PO5
CO6	Follow the ethical principles in implementing the programs	PO8
CO7	Do experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form, the understanding about the experiments.	PO10
CO9	Continue updating their skill related to lists, tuples and dictionaries implementing programs in future.	PO12

Reference Books:

1. Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2016.

2. Mark Lutz, "Programming Python," O'Reilly Publications, Fourth Edition, 2011.

I B.Tech I Semester

		L	T	P/D	C
18 MEC112	**ENGINEERING WORKSHOP AND IT WORKSHOP (Common to all branches)**	-	-	2	1

Course Educational Objectives:

CEO1: To provide exposure to the students with hands on experience on various basic engineering practices in civil, mechanical and electrical engineering.

CEO2: To include training on PC Hardware, Internet & World Wide Web and Productivity Tools including Word, Excel and Power Point.

ENGINEERING WORKSHOP

TRADES FOR EXERCISES:

1. **Carpentry:** Two exercises from: Middle T lap joint – Dove tail lap joint – Mortise and tenon joint from out of 300 x 50 x 35 mm soft wood stock.
2. **Sheet Metal:** Two exercise from: Square tray – Open scoop – Frustum of pyramid from out of 22 or 20 gauge G.I. sheet.
3. **Fitting:** Two exercises from: Square joint – V joint – Dove tail joint from out of 50 x 50 x 5 mm M.S. flat piece.
4. **House Wiring:** Two exercise from: Two lamps controlled by one switch in series and parallel – One lamp controlled by 2 two way switches (stair case) – Wiring for fluorescent lamp.
5. **Plumbing:** Two exercise from: Basic pipe connections – Mixed pipe material connection –
   Pipe connections with different joining components.
6. **Machining:** Exercise on drilling and tapping.

TRADES FOR DEMONSTRATION:

a. Lathe machine.
b. Grinding machine.
c. Arc and gas welding.

Course Outcomes (Engineering Workshop):

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate the knowledge on differ tools used in carpentry, fitting, sheet metal, basic machining process, house wiring and plumbing sections	PO1
CO2	Analyze the basic pipeline connection using different joining connections	PO2
CO3	Design small components using different materials includes wood, GI sheet and MS plates	PO3
CO4	Apply basic electrical engineering tools on the house wiring practice	PO5
CO5	Follow the ethical principles in while doing the exercises.	PO8
CO6	Do the exercises effectively as an individual and as a team member in a group.	PO9

CO7	Communicate verbally among team members and in written form, the understanding about the trade exercises.	PO10
CO8	Continue updating their skill related to trades.	PO12

Text Books:

1. Lab manual provided by the department.

IT WORKSHOP

PC HARDWARE

1. Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.
2. Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video shall be given as part of the course content.
3. Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
4. Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva
5. **Hardware Troubleshooting:** Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva
6. **Software Troubleshooting:** Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

LaTeX and Word

7. **Word Orientation:** The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
8. Using LaTeX and Word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Excel

9. **Excel Orientation:**The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks

and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

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

LaTeX and MS/equivalent (FOSS) tool Power Point

11. Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and PowerPoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).
12. Second Exercise helps students in making their presentations interactive. Topic covered during this Exercise includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts

Internet& World Wide Web

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

    Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers.
14. Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated by the student to the satisfaction of the instructors.

    Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computers to be safe on the internet. They need to first install an anti virus software, configure their personal firewall and windows update on their computer.

Course Outcomes (IT Workshop):

On the successful completion of this course, the student should be able to,		POs related to COs
CO1	Acquire knowledge on computer system such as system unit, input devices, and output devices connected to the computer.	PO1
CO2	Demonstrate the booting process that includes switching on the system, execution of POST routine, then bootstrap loader, and loading of the operating system, and getting it ready for use.	PO2
CO3	Demonstrate the working of the internet that include the use of protocols, domains, IP addresses, URLs, web browsers, web servers,mail-servers, etc.	PO3

CO4	Familiarize with parts of MS Office, To create and save a document, To set page settings, create headers and footers, To use various formatting features such as bold face, italicize, underline, subscript, superscript, line spacing, etc.	PO5
CO5	Follow the ethical principles in implementing the programs	PO8
CO6	Do experiments effectively as an individual and as a team member in a group.	PO9
CO7	Communicate verbally and in written form, the understanding about the experiments	PO10
CO8	Continue updating their skill related to MS Office, Internet and Computer in future.	PO12

Reference books:

1. Comdex Information Technology course tool kit , 2003, Vikas Gupta, WILEY Dream tech, New Delhi
2. The Complete Computer upgrade and repair book, 3/e, 2008, Cheryl A Schmidt, WILEY Dream Tech,New Delhi
3. Introduction to Information Technology, 2008, ITL Education Solutions limited, Pearson Education, New Delhi
4. PC Hardware and A+ Handbook, 2004, Kate J. Chase, Microsoft press
5. LaTeX Companion,2/e, 2002, Leslie Lamport, Addison Wesley, New Delhi
6. IT Essentials PC Hardware and Software Companion Guide, 3/e, 2008, David Anfinson and Ken Quamme, CISCO Press, Pearson Education, New Delhi
7. IT Essentials PC Hardware and Software Labs and Study Guide, 3/e, 2008, Patrick Regan, CISCO Press, Pearson Education, New Delhi
8. Troubleshooting, Maintaining and Repairing PCs, 5/e, 2008, S.J.Bigelow, TMH, New Delhi

I B.Tech II sem

		L	T	P/D	C
18SAH121	**TECHNICAL ENGLISH**				
	(Common to all Branches)	2	-	-	2

Course Educational Objectives:

CEO1: To Provide Knowledge on developing Technical Vocabulary communicating in a verbal manner.
CEO2: To cultivate types of listening skills, Knowledge on the usage of foreign language words in to English Language,
CEO3: To acquire Knowledge on use of technology for societal aspects.
CEO4: To get knowledge on earlier technology used and latter technology in India.
CEO5: To understand the ability to write poems and communicate by using technological words.

UNIT-I COMMUNICATION SKILLS FOR PROFESSIONALS

Verbal-Areas of communication - Suggestions to improve verbal communication - Non-verbal communication - Category and features - Cultural differences in non - verbal communication - Suggestions to improve non-verbal communication – Tenses - Listening to Dialogues - Role Play - Reading Short Stories

UNIT-II ACTIVE LISTENING

Introduction -Types of listening -Traits of a good listener - Active versus passive listening - Implications of effective listening – Verbs - Transitive and Intransitive - Identification of TV and ITV in a sentence - Voice of Verbs - Active and Passive - Listening to Intonation - Welcome/Valedictory speech - Reading Poetry - Note Making.

UNIT-III TECHNOLOGY WITH A HUMAN FACE (A lecture by E.F.Schumacher)

Direct speech and Indirect speech - Modal Verbs - Listening to Short Stories - Conveying Vote of Thanks - Reading News papers - Precise Writing.

UNIT-IV Dr. A.P.J ABDUL KALAM (A missile Man)

Question tags - Subject-Verb agreement - Listening to English Songs - Process Description Reading Articles from Journals - Letter writing –official.

UNIT-V THE EXPRESS – By Stephen Spendor (A Technological poem)

Sentence structures (Simple, Compound and Complex sentence) - Listening to speeches - Product Description - Reading Scientific Texts - Paragraph Writing - Essay writing.

Course Outcomes:

On successful completion of course, the student will be able to		POS related to COS
CO1	Acquire Knowledge on developing Technical Vocabulary by communicating in verbal by using proper tense form in the way of acting and writing.	PO1, PO10
CO2	Acquire Knowledge on the usage of foreign language words in to English Language through various types of listening skills by observing proper intonation and voice of verbs.	PO1, PO9
CO3	Acquire Knowledge on the use of technology for societal aspects through listening inspiring biographies of scientists besides learning some grammatical aspects on the usage of direct and indirect speeches by applying modal verbs.	PO1, PO12
CO4	Acquire knowledge on the achievements made by the scientists on the earth by reading scientific articles from various journals present in the library and through motion pictures in internet.	PO1, PO12
CO5	Understand how to describe a technological gadget through poetical expression by applying technological words besides writing short essays using simple to complex sentence.	PO1, PO10, PO12

Prescribed Book: The text book prepared by the Department of English of SITAMS.

Other References:

1. Exercises in spoken English: Parts I-III, CIEFL, Hyderabad, Oxford University Press.
2. Communication Skills: Sanjay Kumar and Pushpa Latha, Oxford University Press. 2011.
3. Practical English Usage: Michael Swan, Oxford University Press, 1995.
4. Remedial English Grammar: F.T. Wood. Macmillan, 2007.

I B.Tech II Sem

		L	T	P/D	C
18SAH122	**ENGINEERING MATHEMATICS – II (Common to all Branches)**	2	1	-	3

Course Educational Objectives:

CEO1: To develop skill to analyze appropriate method to find the root of the Algebraic and Transcendental Equations and to develop skill to apply the concept of interpolation for the Prediction of required values

CEO2: To identify important characteristics of higher order ordinary differential equations(HOODE) and develop appropriate method of obtaining solutions of HOODE

CE03: To develop skill to design Sine and Cosine waves with the help of Fourier Series and Transforms.

CEO4: To learn the concepts of z-transformation and inverse z- Transforms and to explore the solving difference equations by using z- transform method.

UNIT – 1:SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS AND INTERPOLATION

Solution of Algebraic and Transcendental Equations: Introduction - The Bisection method - The method of False position - The Iteration method - Newton-Raphson method (Single Variable). **Interpolation:** Introduction - Finite differences - Forward differences - Backward differences - Newton's forward and backward difference formulae for interpolation - Lagrange's formula.

UNIT – 2:LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} ,Sin ax, Cos ax, polynomials in x, e^{ax} v(x), x^m v(x) - Method of variation of parameters – Differential Equations reducible to constant coefficients: Cauchy-Euler equation and Legendre linear equation

UNIT – 3:FOURIER SERIES

Determination of Fourier coefficients - Fourier series - Even and odd functions - Fourier series in an arbitrary interval - Even and odd periodic continuation - Half-range Fourier sine and cosine expansions.

UNIT – 4:FOURIER TRANSFORMS

Fourier integral theorem(only statement) - Fourier sine and cosine integrals - Fourier transform - Fourier sine and cosine transforms - Properties - Inverse transforms - Finite Fourier transforms.

UNIT –5:Z- TRANSFORMS

Z-transforms - Properties - Damping rule - Shifting rule - Initial and final value theorems - Inverse Z-transform - Convolution theorem - Solution of difference equations by Z-transforms

Course Outcomes:

	On successful completion of course, the student will be able to	POs related to COs
CO1	Demonstrate knowledge in solving algebraic and transcendental equations by various mathematical methods and Design novel mathematical methods for constructing the interpolating polynomials to the given data	PO1,PO2, PO12
CO2	Demonstrate knowledge in higher order linear differential equations and develop analytical skills in solving problems involving higher order non homogeneous linear differential equations	PO1,PO2, PO12
CO3	Develop analytical skills in evaluating the properties of functions through Fourier series	PO1,PO2, PO12
CO4	Develop analytical skills in evaluating the properties of functions through Fourier transform	PO1,PO2, PO12
CO5	Demonstrate knowledge in z-transform and inverse z-transform and develop analytical skills in solving problems involving difference equations using z-transformation	PO1,PO2,PO3, PO4,PO12

Text books:

1. Mathematical Methods, 2012, T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad , S. Chand and Company Ltd, New Delhi.
2. Higher Engineering Mathematics, 34/e, 1999, Dr. B. S. Grewal, Khanna Publishers, Delhi

Reference books:

1. Engineering Mathematics–I, 2012, T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, S. Chand and Company Ltd, New Delhi.
2. Engineering Mathematics for JNTU, 2012, B.V. Ramana, Tata McGraw Hill Publishers, New Delhi.
3. Higher Engineering Mathematics, Dr. M. K. Venkata Ramana, National Pub & Co, Madras.
4. A Text Book of Engineering Mathematics,2011, N.P.Bali, Laxmi publications(P)Ltd, New Delhi.
5. Advanced Engineering Mathematics, 8/e, 2009, Erwin Kreyszig, Wiley India, New Delhi.

I B.Tech II Sem

		L	T	P/D	C
18SAH113	**ENGINEERING CHEMISTRY (Common to all Branches)**	2	1	-	3

Course Educational Objectives:

CEO1: To learn different purification method and analysis the impurities present in water.
CEO2: To develop skill to describe the mechanism and control of corrosion.
CEO3: To train the students to effectively use the knowledge of polymer science.
CEO4: To learn the concept of refractories and to develop skill to apply the concept of Electrochemistry and fuels

UNIT- 1:WATER AND WATER FOR INDUSTRIAL PURPOSE

Water: Sources of water - Types of Impurities in Water - Hardness of water - Temporary and permanent hardness - Estimation of hardness by EDTA Method and numerical problems - Analysis of water - Dissolved oxygen - Disadvantages of hard water - Methods of treatment of water for domestic purpose - Sterilization - Chlorination -Ozonisation. **Water for industrial purpose:** Water for steam making - Boiler troubles - Priming and foaming - Boiler corrosion - Scales and sludge - Caustic embrittlement - Water treatment - Internal treatment - Colloidal - Phosphate - Calgon - Carbonate - Sodium aluminate conditioning of water - External treatment - Ion - exchange process - Demineralization of brackish water – Reverse osmosis.

UNIT - 2:SCIENCE OF CORROSION

Definition - Types of corrosion - Dry corrosion(Direct chemical attack) - Wet corrosion - Theories of corrosion and mechanism - Electro chemical theory of corrosion - Galvanic corrosion - Concentration cell corrosion - Oxygen absorption type - Factors influencing the corrosion - Control of corrosion - Cathodic protection - Sacrificial anode and impressed currentcathodic protection method.

UNIT - 3:POLYMERS

Polymerization reactions - Basic concepts - Types of polymerization - Addition and condensation polymerization with mechanism - Plastics -Thermosetting and thermoplastics – Composition, Properties and Engineering applications of teflon, bakelite, nylon and rubber - Processing of natural rubber and compounding. **Elastomers:** Buna S - Buna N - Polyurethane Rubber and Silicone Rubber.

UNIT - 4:PHASE RULE, STRUCTURAL MATERIALS AND REFRACTORIES

Phase rule: Definition - Terms involved in phase rule - Phase rule equation - Phase diagrams - One component system (water system) - Two component system (lead- silver system). **Structural materials:** Cement - Composition of Portland cement - Analysis - Setting and hardening of cement (reactions) and role of gypsum in Portland cement. **Refractories:** Definition - Classification with examples - Criteria of a good refractory material - Causes for the failure of refractory materials.

UNIT - 5: FUELS AND ELECTRO CHEMISTRY

Fuels: Definition and classification of fuels. Liquid fuels- Classification of petroleum, refining of petroleum by Bergius process. Gaseous fuels – natural gas, producer gas,

water gas, coal gas and biogas**. Electro Chemistry**: Conductance - Equivalent conductance - Molar conductance – Conduct metric titrations - Conductivity Measurements. **Fuel cells**: Introduction, Hydrogen oxygen fuel cell and methanol fuel cell

Course Outcomes:

	On successful completion of course, the student will be able to	POs related to COs
CO1	Demonstrate the fundamentals of water technology and develop analytical skills in determination hardness of water and different purification methods.	PO1, PO2
CO2	Demonstrate the knowledge in corrosion phenomenon and develop skills in different methods for control of corrosion	PO1, PO2
CO3	Demonstrate the knowledge on polymeric materials and to prepare polymeric material for environmental safety .	PO1, PO2,PO7
CO4	Analyze the effect of cement materials, causes for the failure of refractory materials and understanding of phase rule.	PO1, PO2
CO5	Understand and apply the concept of electrochemistry and analysis the fuels and different types of fuels cells.	PO1, PO2

Text books:

1. Chemistry for Engineers, 4/e, 2009, Prof. K. N. Jayaveera, Dr. G. V. Subba Reddy and Dr. C. Ramachandraiah, Tata McGraw Hill Publishers, New Delhi.
2. Text book of Engineering Chemistry, 15/e, 2008, Jain and Jain, DhanpatRai Publishing Company, New Delhi.
3. Text book of Engineering Chemistry, 18/e, 2008, S. S. Dara, S. Chand & Co, New Delhi.

Reference books:

1. Engineering Chemistry, 5/e, 2009, Dr. K. B. Chandrasekhar, Dr. U.N. Dash, Dr. Sujatha Mishra, Scitech Publications(India) Pvt. Ltd, Hyderabad.
2. Fuel Cells Principles and Applications, 4/e, 2008,B.Viswanath, M. AuliceScibioh, Universities press, Hyderabad.
3. Chemistry of Engineering Materials, 3/e, 2008, C.V.Agarwal, Tara Publication, Varanasi.
4. Physical Chemistry, 12/e, 2009, Glasston& Lewis,Dhanptharai Publishers,New Delhi.
5. Engineering Chemistry (Vol.1&2), 5/e, 2004, J C Kuriacose and J. Rajaram, Tata McGraw Hill Publishers, New Delhi.

I B.Tech II Semester

		L	T	P/D	C
18CIV121	**ENGINEERING MECHANICS**				
	(Common to Civil and Mechanical Branches	2	1	-	3

Course Educational Objectives:

CEO1: To develop capacity to predict the effect of forces and motion in a system for further carrying out the design and analysis of engineering components.

UNIT-I:STATICS OF PARTICLES

Concepts: Scope of mechanics - Preview of statics - Fundamental concepts and axioms - Principle of transmissibility - Force and its characteristics - Parallelogram law of forces - Triangle law of forces - Polygon law of forces. **Coplanar, Collinear and Concurrent forces:** Classicfication – Resultant of Coplanar, Collinear, Collinear coplanar and Concurrent coplanar forces (analytical methods only). **Co-planar parallel forces:** Moment of forces – Principle of moments – Types of parallel forces – Resultant of two parallel forces – Force and couple – Parallel forces in plane – Equilent systems. **Equilibrium:** Principle and law of equillibrium – Action and reaction – Free body diagram.

UNIT-II:CENTRE OF GRAVITY AND MOMENT OF INERTIA

Centre of Gravity: Centroid and centre of gravity - Centroids of lines and areas - Rectangular, circular, triangular areas, T section, I section and composite sections by method of moments - Theorems of Pappus and Guldinus. **Moment of Inertia:** Parallel axis theorem and perpendicular axis theorem - Radius of gyration - Moment of inertia of simple and composite areas (rectangle, circle, semi-circle, quarter circle, I-Section, T section, C section) - Polar, product, principle axis and mass moment of inertia (rectangular, circular and cone sections).

UNIT-III:ANALYSIS OF FRAMES, VIRTUAL WORK AND FRICTION

Analysis of Perfecr Frames: Types – Assumptions – Reactions of supports – Analysis of frames by method of joints and sections (simple frames only). **Virtual Work:** Pricinciple of virtual work – Virtual work done by moment. **Friction:** Types – Laws of friction – Co-efficient of friction – Angle and cone friction – Angle of repose – Friction on horizontal and inclined plane – Ladder friction.

UNIT-IV:KINEMATICS

Linear Motion: Velocity – Acceleration – Equation of motion in straight line.

Curvlinear Motion, Rotation and Translation: Angular velocity and acceleration – Equation of motion in circular path Motion of rotation and translation. **Projectiles**: Velocity and angle of projections – Times of flight Horisontal range – Equation of path of projectile – Motion of body thrown in horizontal and inclined plane.

UNIT-V: KINETICS

Laws of Moion : Newton's laws of motion – Motion on rough and inclined surfaces – Motion of two bodies connected by strings – D'Alembret's principle applicable to motion. **Collision of Elastic Bodies:** Time of compression, restution and collision – Types of impacts – Co-efficient of restution Loss of kinetic energy during impact – Direct and indirect impact of a body on a fixed plane. **Work, Power and Energy:** Work – Power – Work done and power developed by torque – Mechanical energy – Law of coservation of energy.

Course Outcomes:

On successful completion of the course, students will be able to		POs related to COs
CO1	Demonstrate and apply the knowledge of principles of mechanics, system of forces and free body diagram to determine the net effect of the forces acting on a body.	PO1, PO2.
CO2	Find the location of Centroid, center of gravity and moment of inertia for the given appropriate composite sections.	PO1, PO2, PO3
CO3	Analyse the bodies subjected to friction, simple frames and apply principle of virtual work to find reactions.	PO1, PO2, PO3
CO4	Analyse the kinematics of a body undergoing rectilinear, curvilinear motion.	PO1, PO2
CO5	Apply the Dynamic equilibrium principles and work energy equations to solve appropriate problems.	PO1, PO2

Text Books:

1 Engineering Mechanics, A K Tayal, Umesh publications, New Delhi, 2010.
2 Vector Mechanics for Engineers, Beer,F.P and Johnson Jr. E.R, McGraw-Hill Education (India) Pvt. Ltd. 10th Edition, 2013.

Reference Books:

1 Engineering Mechanics, S.Timoshenko, D.H.Young and J.V Rao, Tata McGraw Hill, New Delhi.
2 Engineering Mechanics, N.H. Dubey, 1/e, Tata McGraw-Hill Education Pvt. Ltd, Noida, 2011.
3 Engineering Mechanics, 1/e, 2011, P.J. Shah, S.Chand and Company Pvt.Ltd., New Delhi.
4 Engineering Mechanics (Dynamics and Statics), Sadhu Singh, Khanna Publishers, New Delhi.
5 A Textbook of Engineering Mechanics, R.K. Bansal, 6/e, Laxmi Publications, 2015.

I B.Tech II Sem

		L	T	P/D	C
18EEE113	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**				
	(Common to Civil & Mechanical Branches)	2	1	-	3

Course Educational objectives:

CEO 1: To introduce electric circuits and its analysis
CEO 2: To impart knowledge on solving circuits using network theorems
CEO 3: To learn construction and operation of D.C. machines and transformers.
CEO 4: To learn basic principles of all measuring instruments.
CEO 5: To demonstrate knowledge on overview of the principles, operation and application of basic electronic devices and Logic gates.

UNIT-I INTRODUCTION TO ELECTRICAL ENGINEERING

Ohm's Law, Basic Circuit Components, Kirchhoff's laws, Simple Problems. Types of Sources, Series, Parallel Circuits, Star-Delta Transformation, Network Theorems-Superposition and reciprocity, Thevenin's and Norton's Theorems and Maximum Power Transfer Theorem.

UNIT-II SINGLE PHASE AC CIRCUITS

R.M.S, Average values and form factor for different periodic waveforms - phase and phase difference of sinusoidal alternating quantities - steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation - concept of reactance, impedance, susceptance and admittance - Power triangle, power factor

UNIT-III DC AND AC MACHINES

Principle of Operation of DC Generators, Types of DC Generators, EMF Equation in DC Generator, OCC of a DC Shunt Generator. Principle of Operation of DC Motors, Types of DC Motors, Torque Equation, Losses and Efficiency, Calculation in DC Motors, Speed control of DC Shunt motor - Principles of Operation of Transformer, Constructional Details, Losses and Efficiency, - Principles of Operation of Three Phase Induction motor

UNIT-IV MEASURING INSTRUMENTS

Introduction, Classification of Instruments, Operating Principles, Essential Features of Measuring Instruments, Moving Coil and Moving Iron Instruments, Dynamometer Wattmeter and Energy meter

UNIT -V: ANALOG AND DIGITAL ELECTRONICS:

The P-N Junction Diode - Volt-Ampere Characteristics-Applications of Diode, Diode as a Rectifier- Operation of Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Zener Diode- Volt-Ampere Characteristics, .Bipolar Junction Transistor (BJT)

– Types of Transistors, Operation of NPN Transistor, Input-Output Characteristics of CE Configurations, BJT act as Amplifier. Logic Gates and Truth Tables-NOT, OR, AND, EX-OR, EX-NOR, Universal Gates- NAND, NOR Gates. Boolean algebra and De Morgan's Theorems.

Text Books:

1. Basic Electrical Engineering-by M.S Naidu and S Kamakshaiah.
2. Electronic Devices and Circuits by N.Salivahanan, and N.Suresh Kumar, 3/e,TMH , 2012.

References Books:

1. Basic Electrical Engineering by T.KNagasarkar and M.S Sukhija
2. Principle of Electrical Engineering by V.K Mehtha,S Chand Publications.
3. Theory and Problems of BEE by DP Kothari and IJ Nagrath.
4. Introductory Circuit Analysis by R.L. Boylestad, PEARSON,12th edition, 2013
5. Digital Design by Morris Mano, 3/e,2006,Prentice Hall of India, New Delhi

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Demonstrate knowledge on basic circuit components and basic concepts of electrical engineering, Analyze Circuits by different network reduction techniques	PO1, PO2
CO2	To determine and analyze different parameters of periodic waveforms and Analyze the steady state analysis of R, L,C circuits.	PO1, PO2
CO3	Demonstrate knowledge on Construction and performance of DC and AC motor and transformer Analyze Losses and Efficiency of motors and transformer	PO1, PO2
CO4	To understand and evaluate the calibration of different electricalmeasuring instruments	PO1, PO2, PO3
CO5	To Acquire knowledge on internal structure of PN junction, all the electronic devices. and logic gates	PO1, PO2

18SAH116	ENGINEERING CHEMISTRY LABORATORY (Common to all branches)	L	T	P/D	C
		-	-	2	1

Course Educational Objectives:

CEO1: Demonstrate Knowledge on measurement of various analysis of water treatment methods

CEO2: Identify the different salt analysis of copper for engineering and technological applications.

CEO3: Provide valid conclusions on phenomena of dissolved oxygen.

Name of the Experiment

1. Preparation of Standard EDTA solution and Estimation of Hardness of Water
2. Preparation of Standard EDTA and Estimation of Copper
3. Estimation of dissolved oxygen in given water sample
4. Estimation of alkalinity of water
5. Estimation of Acidity of water sample
6. Preparation of Standard Potassium Dichromate and Estimation of Ferrous Iron
7. Preparation of Standard Potassium Dichromate and Estimation of Copper by Iodometry
8. Determination of strength of the given Hydrochloric acid against standard sodium hydroxide Solution by Conductometric titration
9. Conductometric titration of $BaCl_2$ Vs Na_2SO_4 (Precipitation Titration)
10. Determination of viscosity of the given oils through Redwood viscometer

Course Outcomes:

On successful completion of the course the will be able to,		POs related to COs
CO1	Demonstrate Knowledge on estimation of water treatment methods and other samples.	PO1
CO2	Identify the different salt analysis for engineering and technological applications.	PO2
CO3	Provide valid conclusions on phenomena of different samples.	PO4
CO4	Follow ethical codes during conducting of experiments	PO8
CO5	Do experiments effectively as an individual and as a team member in a group.	PO9
CO6	Communicate verbally and in written form pertaining to results of the Experiments.	PO10
CO7	Learns to perform different experiments involving water for future enhancements.	PO12

18EEE114 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB
(Common to Civil & Mechanical Branches)

L	T	P/D	C
-	-	2	1

Course Educational Objectives:

CEO1: To gain practical experience on fundamental electric laws.
CEO2: To gain practical experience on verification of theorems.
CEO3: To evaluate the performance characteristics of DC and AC Machines
CEO4: To gain practical experience on basic electronic devices and Circuits
CEO5: To gain practical experience on different logic gates

.Part A (ELECTRICAL EXPERIMENTS)
(Any five of the following)

1. Verification of KCL and KVL
2. Verification of Superposition Theorem.
3. Verification of Thevinins Theorem.
4. Verification of maximum power transfer theorem.
5. Magnetization characteristics of D.C shunt generator determination of critical fieldresistance.
6. Load Test on Three Phase SQUIREL Cage Induction Motor

Part B (ELECTRONICS EXPERIMENTS)
(Any five of the following)

1. Volt-Ampere Characteristics of P-N Junction Diode.
2. Volt-Ampere Characteristics of Zener Diode
3. Half-wave rectifier- a) Without filter b) With filter.
4. Full-Wave Rectifier- a) Without Filter b) With Filter
5. Verification of Basic Logic gates- AND, OR, NOT,
6. Verification of Universal Logic Gates- NAND, NOR

Course Outcomes:

On successful completion of the course the will be able to,		**POs related to COs**
CO1	Demonstrate knowledge on basic electrical laws electronic principles in engineering applications.	PO1
CO2	Analyze and Verify different network theorems practically.	PO2
CO3	Design and develop various electrical and electronic circuits and logic gates and performance characteristics of DC shunt generator	PO3
CO4	Conduct investigation and testing on DC and AC machines	PO4
CO5	Select appropriate design tools and procedure to simulate and implement electronic devices, circuits and logic gates	PO5
CO6	Follow ethical principles in designing and implementing various electrical and electronic circuits and logic gates	PO8
CO7	Do experiments effectively as an individual and as a member in a group.	PO9
CO8	Communicate verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue updating their skill related to AC and DC Machines, electronic devices , circuits and logic gates for various applications during their life time	PO12

I B.Tech II Semester

		L	T	P/D	C
18MEC122	**COMPUTER AIDED DRAFTING LAB (Common to Mechanical and Civil Engineering Branches)**	-	-	2	1

Course Objectives:

CEO1: To understand the design of the engineering components in a machine
CEO2: To develop a skill on creating the 2D and 3D models of components
CEO3: To understand part drawing and Assembly of components in a machine

List Exercises:

1. Study of capabilities of software for Drafting and Modeling - Coordinate systems (absolute, relative, polar, etc.) - Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a title block with necessary text and projection symbol.
3. Draw the two dimensional diagram with follow the principles of dimensioning.
4. Drawing of curves like parabola, spiral, involute using B-spline or cubic spline.
5. Drawing of front view and top view of simple solids like prisms, pyramids, cylinder, cone, etc. with dimensioning.
6. Drawing sectional views of prisms, pyramids, cylinder, cone, etc.
7. Draw the development of surfaces on simple objects like prisms, pyramids, cylinder, cone, etc.
8. Creation of 3D models of simple objects and obtaining 2D multi-view drawings from 3D model.
9. Drawing front view, top view and side view of objects from the given pictorial views. (eg. V-block, base of a mixie, simple stool, objects with hole and curves.)
10. Drawing of simple 3D mechanical components like bolt, nut, screws, shafts, gears etc.
11. Drawing of a plan of residential building (two bed rooms, kitchen, hall, etc.)
12. Drawing of a simple steel truss.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

Course Outcomes:

On successful completion of the course, students will be able to		**POs related to COs**
CO1	Apply the knowledge of engineering fundamentals to Understand the role of design of Components.	PO1
CO2	Analyze the components as per the drawing standard	PO2
CO3	Design and Development of mechanical part drawing and Assembly of components implemented in real time applications.	PO3
CO4	Apply appropriate techniques, resources use to Create Mechanical Components 3D modeling by modern engineering software tools.	PO5
CO5	Follow the ethical principles while creating the 2D, 3D modeling	PO8

CO6	Draw effectively as an individual drawing practice in laboratory.	PO9
CO7	Communicate verbally and in written form about the drawing procedure.	PO10
CO8	Continue updating their skill related to drawing and modeling of the components in future.	PO12

Text Books:

1. Lab manual provided by the department.

II B.Tech I Sem

		L	T	P/D	C
18SAH211	**ENGINEERING MATHEMATICS – III (Common to all Branches)**	2	1	0	3

Course Educational Objectives:

CEO1: To learn the method of evaluation of numerical integration and to solve ordinary differential equations numerically using numerical methods

CEO2: To learn the concepts of double and triple integrals and compute double and triple integrals

CEO3: To learn partial differential equations and how they can serve as models for physical processes and also master the technique of separation of variables to solve partial differential equation

CEO4: To develop skill to explain the characteristics of scalar and vector valued functions and master these in calculations, provide a physical interpretation of the gradient, divergence, curl and related concepts and carry out differentiation and integration of vector valued functions

UNIT – 1:NUMERICAL INTEGRATION AND NUMERICALSOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Numerical integration: Trapezoidal rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor's series - Picard's method of successive approximations - Euler's method - Runge-Kutta methods - Predictor- Corrector method - Milne's method.

UNIT – 2:MULTIPLE INTEGRALS

Multiple Integrals: Double and triple integrals - Change of variables - Change of order of integration.

UNIT - 3:PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Method of separation of variables.

UNIT - 4:VECTOR DIFFERENTIATION

Introduction to Vector Differentiation , Scalar and Vector point functions- Gradient of a Scalar function - Divergence & Curl of a Vector function and their properties.

UNIT - 5:VECTOR INTEGRATION

Line Integral - Potential function - Area , Surface and volume integrals - Green's , Stoke's and Gauss divergence theorem(excluding their proof) - Verification of Green's, Stoke's and Gauss divergence theorems.

Course Outcomes:

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

	Course Outcomes	POs related to COs
CO1	Demonstrate knowledge in finding the numerical values to integrals through different mathematical methods and solving ordinary differential equations numerically through various methods and	PO1,PO2, PO12
	Design novel mathematical methods for solving the ordinary differential equations.	
CO2	Demonstrate knowledge in evaluating double and triple integrals	PO1,PO2, PO12
CO3	Develop analytical skills for the problems involving partial differential equations and the methods to solve them	PO1,PO2, PO12
CO4	Demonstrate knowledge in differentiation of vector functions and to provide an understanding of characteristics of scalar and vector valued functions and master these in calculations, provide a physical interpretation of the gradient, divergence, curl and related concepts.	PO1,PO2, PO12
CO5	Demonstrate knowledge in integration of vector functions and to Develop skills in providing solutions for line, surface and volume integrals by vector methods and work done, flux through vector integrations and correlate them with the applications of various integral theorems	PO1,PO2, PO12

Text Books:

1. Mathematical Methods, 2012, T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad , S. Chand and Company Publishers, New Delhi.
2. Higher Engineering Mathematics, 34/e, 1999, Dr. B. S. Grewal, Khanna Publishers, Delhi

Reference books:

1. Engineering Mathematics–I, 2012, T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, S. Chand and Company Ltd, New Delhi.
2. Engineering Mathematics for JNTU, 2012, B.V. Ramana, Tata McGraw Hill Publishers, New Delhi
3. Advanced Engineering Mathematics, 8/e, 2009, Erwin Kreyszig, Wiley India, New Delhi.
4. Introductory Methods of Numerical Analysis, S S Sastry, 4/e 2005, PHI Publishers.
5. A Text Book of Engineering Mathematics, 2011, N.P.Bali, Laxmi publications(P)Ltd, New Delhi.

II B.Tech I Sem

18MEC218 BASIC MECHANICAL ENGINEERING

L	T	P/D	C
2	1	0	3

Course Educational Objectives:

CEO1: To describe sources of energy and types of power plants.

CEO2: To acquire knowledge on I.C engines, Refrigeration system and Air conditioned system its classification and working principles

CEO3: To learn various aspects of different manufacturing techniques such as various welding methods.

CEO4: To provide knowledge on the power transmission system

CEO5: To provide knowledge on material handling and machineries

UNIT –I POWER PLANT ENGINEERING

Introduction of Renewable sources and Non-Renewable sources - Classification of Power Plants – Working principle of Steam, Gas, Diesel, Hydro-electric and Nuclear Power plants (Layout approach only). - Steam turbines: Description and working – Impulse and Reaction turbines.

UNIT –II INTERNAL COMBUSTION ENGINES, AIR COMPRESSORS AND REFRIGERATION AND AIR-CONDITIONING

Internal Combustion Engines: Working principle of Petrol and Diesel Engines–Four strokeand two stroke engine – Comparisons. **Air Compressors:** Classifications – Single stage and multistage reciprocating compressor - Types of rotary air compressors. **Refrigeration and AirConditioning**: Terminology - Principle of vapour compression and vapour absorption system–Window and Split type room Air conditioner.

UNIT –III WELDING TECHNOLOGY

Classification of welding process - Types of welds and welded joints and their characteristics Design of welded joints - Heat affected zones in welding – Types of electrodes - Gas welding and flame characteristics - Metal arc welding - TIG and MIG welding – Submerged arc welding Electro slag and gas welding - Plasma arc welding – Thermit welding – Electron beam welding - Friction and friction stir welding - Induction welding - Explosive welding - Laser welding - Gas cutting - Welding defects causes and remedies - Brazing and soldering.

UNIT –IV POWER TRANSMISSION SYSTEM

Belt, Rope and Chain Drives : Introduction - Selection of belt drive - Types of belt drives,materials used for belts and ropes, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt – Classification of chain- length, angular speed ratio, classification of chain drives. **Gear Drives:** Basics of spur, helical, bevel gears, worm and worm wheel and rack and pinion gears.

UNIT –V MATERIAL HANDLING SYSTEM AND EARTH MOVING MACHINERIES

Material Handling: Introduction - Principles of material handling–Equipment – Materialtransport systems - Industrial trucks, automated guided vehicle systems, monorails and other railguided vehicles, Belt and bucket conveyor systems, crane and hoists. **Earth MovingMachineries:** Bull dozers–Power showels–Excavators - Concrete mixer

On successful completion of the course the student will be able to:

Course Outcomes		**POs related to COs**
CO1	Acquire knowledge on different types of power plants	PO1, P03
CO2	Familiarize with the types of air compressors, working principle of two stroke and four stroke engines.	PO1,PO4 PO12
CO3	Demonstrate various types of joining processes and choose the appropriate one according to the application.	PO1, PO3
CO4	Understand different types of belt drives and basics of gear drives	PO1
CO5	Recognize and select the different types of material handling devices for various applications.	PO1,PO12

Text Books:

1. Basic Civil and Mechanical Engineering, G.Shanmugam and M.S.Palanichamy, Tata McGraw Hill Publishing Co., New Delhi, 1996.
2. Thermal Engineering, R.K Rajput, 8/e, Laxmi Publications (P) Ltd, New Delhi, 2010.

Reference Books:

1. Power plant Engineering, P.K. Nag, 3/e, Tata Mc Graw Hill, 2013.
2. Manufacturing Technology, Vol- I, P.N. Rao, 4/e, Tata Mc Graw Hill, 2013.
3. Theory of Machines, R.SKhurmi and J.K Gupta, 14/e, S.Chand& Company Pvt. Ltd., New Delhi, 2013.
4. Manufacturing Technology, P.N. Rao, 3/e, Tata McGraw-Hill Education Pvt. Ltd., Noida., 2012.

Internal Combustion Engines, V.Ganesan, 4/e, Tata McGraw-Hill Education Pvt. Ltd., Noida, 2012.**II B.Tech I Semester**

L	T	P	C
1	0	4	3

18CIV211 BUILDING PLANNING AND DRAWING

Course Educational Objectives:

CEO1: To understand the regulations as per National Building Code

CEO2: To identify the functional requirements and building rules.

CEO3: To understand the sketches and working drawings

CEO4: At the end of this course the student should be able to draft on computer building drawings (Plan, elevation and sectional views) in accordance with development and control rules satisfying orientation and functional requirements for the following:

PART-A

UNIT – I PRINCIPLES OF BUILDING PLANNING:

Introduction – Selection of Site – Orientation, location of buildings, thermal comfort, roominess, grouping, circulation, privacy, sanitation, elegance,economy, flexibility and practical considerations, Eco system concept.

UNIT – II BUILDING BYE–LAWS AND REGULATIONS:

Introduction-Objectives of building bye-laws-Principles underlying building bye laws-Terminology Floor area ratio (FAR), Floor space index (FSI)-Classification of buildings-Open space requirements- Built up area limitations-Height of the buildings-Wall thickness-Lighting and ventilation requirements.

PLANNING OF RESIDENTIAL BUILDINGS:

Introduction-Minimum standards for various parts of the buildings - Requirements of different rooms and their grouping-Verandah-Drawing room –Bed room-Kitchen-Dining room-Store room- Bath room-Water closet-Staircase-Garrage.

UNIT – III PLANNING OF PUBLIC BUILDINGS:

Introduction-Educational buildings-Hospitals and dispensaries-Office buildings-Banks-Industrial buildings-Hotels and motels-Buildings for recreation, Master Plan Preparation.

PART-B

UNIT – IV DRAWING EXERCISES (Hands on Exercises):

1 a) Conventional signs used in building drawing
   (b) Doors, windows and ventilator
2 Single storied residential building with RCC Roof (Copying Exercise)
3 Drawing plan, elevation and section of a single storied residential building for the given line sketch and specifications
4 Multi–storied residential building with RCC roof
5 Drawing plan, elevation and section of an industrial building for the given line sketch and specifications
6 Planning and drawing of plan, elevation and section of a single storied residential building with RCC roof for the given site and accommodation details.

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

Course Outcomes		POs related to Cos
CO1	Identify the factors to be considered in planning and construction of buildings.	PO1,
CO2	Plan a building following the bye-laws	PO1,PO7,PO6
CO3	Design residential and public building	PO7,P03,PO4
CO4	Draw the symbols and plan of a residential building using Auto Cad Software and prepare building drawings for residential building and hospital buildings.	PO5,PO1

FINAL EXAMINATION PATTERN:
The end examination paper shall consist of **Part A** and **Part B**. Part A consists of three questions (from the syllabus of the Units I, II, & III), out of which two questions are to be answered. Each question carries 15 marks. Part B consists of compulsory question with internal choice (from the syllabus of Unit IV) for 40 marks.
FOR INTERNAL ASSESSMENT:
Out of the total sessional marks of 30 allotted for this subject, 20 marks are to be awarded based on the performance in the two sessional examinations, 10 marks are to be awarded based on the day to day work of submission of drawing sheets.

Text Books:
1. Planning and Designing and Scheduling , 2009, Gurucharan singh and Jagadish singh, Standard Publishers.
2. Building planning and Drawing, 2012, Dr. N.Kumara swamy and A.Kameswara rao, Charator publications.

Reference Books:
1. Planning and Designing of buildings, Third edition, Y.S. Sane, Allies Book Stall.
2. Building by laws by state and Central Governments and Municipal corporations, National Building Code.
3. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill.

II B.Tech I Semester

L	T	P	C
3	0	0	3

18CIV212:BUILDING MATERIALS & CONSTRUCTION

Course Educational Objectives:

CEO1: To teach students about the Physical and Mechanical properties of construction materials and their respective testing procedure.

CEO2: To teach students about the building materials available in market to be used for many components of building industry.

CEO3: To teach students about the principles and methods to be followed in constructing various components of a building.

CEO4: To teach students about the deterioration and repair of buildings.

UNIT I

INTRODUCTION: Importance – Classification of construction materials – Properties of materials. IS Standards for Building materials and construction.

STONES: Properties of building stones – Relation to their structural requirements – Classification of stones – Dressing of stones – Natural bed – Testing of stones.

BRICKS: Composition of good brick earth – Methods of manufacturing of bricks – Comparison between clamp burning and kiln burning –Qualities of a good brick-Testing of bricks.

TILES: Characteristics of good tile- Manufacturing methods-Types of tiles – Testing of tiles.

UNIT II

STEEL: Importance – Types of steels- Properties of steels and usage-Testing procedures of steels. **CEMENT:** Functions of ingredients of cement – Properties of cement – Types of cements –Testing of cements – Hydration of cement and hydration products.

CONCRETE: Importance of W/C Ratio, Strength, ingredients including admixtures, workability, testing for strength, elasticity, non-destructive testing, mix design methods.

WOOD: Structure – Properties – Seasoning of timber- Classification of various types of wood used in buildings –Defects in timber.

MODERN MATERIALS OF CONSTRUCTION: Galvanized iron, Fiber-reinforced plastics, steel aluminum,Properties and uses of iron, aluminum, glass, plastic, rubber, gypsum.

UNIT III

BUILDING COMPONENTS: Foundation, Sub and Super structure, roofing, doors and windows and flooring.

FOUNDATIONS: Shallow foundations – Spread, combined strap and mat footings.

FLOORS: Materials used-Different types of floors-Concrete, mosaic, terrazzo, tiled floors.

ROOFS: Pitched, flat and curved roofs _ Lean-to-roof, couple roofs, trussed roofs-King and queen post trusses – RCC roofs.

STAIRS: Terminology – Types of stairs.

UNIT IV

SURFACE FINISHES: Plastering – Pointing – White washing and distempering – Damp proofing- Painting – Constituents of paint – Types of paints – Processing and defects of painting. Form work and scaffolding.

BUILDING SERVICES

VENTILATION: Necessity – Functional requirements – Natural and mechanical ventilation.

LIGHTING: Day and artificial lighting – Types of lighting in working places.

FIRE PROTECTION: Causes – Fire load – General fire safety requirements – Fire resistant construction, rain water harvesting for buildings.

GREEN BUILDING: Outlines of Green Building Concept.

UNIT V

REPAIR AND REHABILITATION OF BUILDINGS:

Introduction- Need for rehabilitation- Types of damages-Effects of damages-Rehabilitation methods (Grouting)-Methods of Repair (Shortcreting, epoxy-cement mortar injection).

Course Outcomes:

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

	Course Outcomes	POs related to COs
CO1	Learn and identify the relevant physical and mechanical properties pertaining to the construction industry.	PO1
CO2	Demonstrate the relevant BIS testing procedure to be carried out to ascertain the quality of building materials.	PO1,PO3
CO3	Develop ability to choose the modern construction material appropriate to the climate and functional aspects of the buildings	PO1,PO3,PO4
CO4	ability to supervise the construction technique to be followed in brick, stone and hollow block masonry, Concreting, flooring, roofing, plastering and building services	PO1,PO4
CO5	To know about the causes of deterioration, crack pattern and damages. And correcting works	PO1

TEXT BOOKS:

1. Building Material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. Building Materials by M.L.Gambhir, TMH Pubilishers.
4. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.

REFERENCES:

1. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
2. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
3. A Textbook on Building Construction by S.K.Sharma, S.Chand Pubilishers.

II B.Tech I Semester **L T P C**
2 1 0 3

18CIV213: STRENGTH OF MATERIALS-I

Course Educational Objectives:

CEO1: The subject provide the knowledge of simple stresses and strains, flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.

UNIT – I: SIMPLE STRESSES AND STRAINS

Introduction – Deformable bodies **-** 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, thermal stresses in composite bars, Elongation of a bar due to its own weight, analysis of bar of uniform strength ,Strain energy **–** Resilience – Gradual, sudden, impact and shock loadings – simple applications

UNIT–II: SHEAR FORCE AND BENDING MOMENT

Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load, inclined load, couples, and combination of these loads- – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III: 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 – application to simple cases including overhanging beams-deflections of propped cantilevers for simple loading cases.

UNIT – IV: CONJUGATE BEAM METHOD AND DIRECT AND BENDING STRESSES

Conjugate beam method: Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.**Direct and bending stresses :** Stresses under the combined action of direct loading and bending moment, core of a section –stresses due to direct loading and bending moment about both axis in case of columns

UNIT – V FLEXURAL STRESSES AND SHEAR STRESSES

FLEXURAL STRESSES : Theory of simple bending – Assumptions – Derivation of bending equation: M/I =f/y = E/R – Neutral axis – practical applications of bending equation-Moment of the force on a partial area of a beam section about the neutral axis-strength of a section. Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I, T,sections – Design of

Rectangular,circular,I,T Sections.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Acquire knowledge on simple stresses and strains, exhibit the different loading conditions.	PO1, PO2
CO2	Identify appropriate beams for different structures and Analyze shear force and Bending moment for various beams with different loading conditions.	PO1, PO2,
CO3	Analyze the Flexural stresses and validate shear stress distribution across various beam sections.	PO1, PO2
CO4	Obtain Knowledge on deflection of beams and develop slope and deflection equations for various beam sections with different methods.	PO1, PO2,PO4
CO5	Acquire knowledge on direct and bending stresses and Evaluate stresses in the case of chimneys, retaining walls and dams	PO1, PO2

Text Books:

1. Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
2. Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
3. Strength of Materials by B.S.Basavarajaiah, Universities Press, Hyderabad

References:

1. Strength of Materials by Ghosh & Datta, New Age Pubilishers
2. Strength of Materials by Dr.R.K.Bansal, Lakshmi Publications.
3. Strength of Materials by S.S.Rattan, TMH Publishers.

II B.Tech I Semester	L	T	P	C
	2	1	0	3

18CIV214 SURVEYING – I

Course Educational Objectives:

CEO1: To ensure that the student develops knowledge of the basic and conventional surveying instruments,

CEO2: Principles behind them and working of the instruments

CEO3: Plotting of the area from the field measurement

CEO4: Determination of the area and the theory behind curves.

UNIT–I: BASIC CONCEPTS

Surveying – History; Definition; primary divisions, Classification, Principles of surveying Plan and map; Basic Measurements; Instruments and Basic methods; Units of measurement, Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision Sources and types of errors, theory of probability. **Chain surveying**: Instruments for chaining, Ranging out, chaining a line on a flat ground; chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy. Principles of chain surveying; Basic definitions; Well-Conditioned Triangle, Field book, Field work; Offsets, Cross Staff survey; obstacles in chain survey-problems, Conventional signs.

UNIT-II: COMPASS SURVEY

Introduction,Bearings and angles, Designation of bearings, Conversion of bearings from one system to the other, fore bearing and back bearing, Calculation of bearing from angles, Theory of Magnetic compass (i.e. Prismatic compass), Temporary adjustments of compass-Magnetic Declination, Local attraction-Related Problems-Errors in compass survey.

Plane table surveying: Introduction, Accessories, Working operations, Methods of plane tabling, Three point problem-Mechanical method - Graphical method, Two point problem, Errors in plane tabling

UNIT-III: LEVELLING

Introduction, basic definitions, methods of leveling, leveling instruments: dumpy level, levelling staff, Temporary adjustments of dumpy level, theory of simple and differential leveling, Level field book, Classification of direct leveling methods, Reciprocal leveling, Profile leveling and Cross sectioning, Curvature and Refraction, Difficulties in leveling, errors in leveling.

Contouring: Introduction, contour interval, Characteristics of contours Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours, Contour gradient-Uses of contour maps.

UNIT-IV: TRAVERSE SURVEYING

Introduction, Selectionand marking of traverse stations, methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Gale's traverse table, Omitted measurements.

UNIT-V: COMPUTATION OF AREAS AND VOLUMES

Methods of determining areas, areas by sub-division into triangles, areas from offsets to a base line: regular and irregular intervals, area by double meridian distances, area by co-ordinates. Embankments and cutting for a level section, two level sections, three level section and multi level section, capacity of a reservoir . **Minor instruments:** Uses and working of the minor instruments: hand level, line ranger, optical square, Abney level, clinometers, pantagraph, sextant and planimeter.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Demonstrate the knowledge on chain, compass, plane table, auto level, areas and volumes	PO1, PO2,PO4
CO2	Analyze surveying techniques, tools and survey data	PO1, PO2, PO3,
CO3	Design different types of levelling and prepare contour maps	PO1, PO2, PO3, PO5
CO4	Solve complex engineering survey problems through proper survey and interpretation	PO1, PO2, PO4
CO5	Use appropriate modern tools in surveying	PO1, PO2,PO5

Text books:

1. Surveying (Vol – 1), B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi publications (P) Ltd., New Delhi
2. Text book of surveying, C.Venkataramaiah, Universities Press.
3. Surveying (Vol – 1) , Duggal S.K, Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.

References:

1. Plane Surveying , Chandra AM, New age International PVt.Ltd., Publishers,New Delhi, 2002
2. Surveying (Vol-1), Arora K R Standard Book House, Delhi, 2004
3. Advanced Surveying, Satheesh Gopi, R.Shanta Kumar and N.Madhu, Pearson education

II B.Tech I Semester

L	T	P	C
0	0	2	1

18CIV215 STRENGTH OF MATERIALS LABORATORY

Course Educational Objectives:

CEO1: The objective of the course is to make the student to understand the behavior of materials under different types of loading for different types structures.

LIST OF EXERCISES:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. hardness test.
6. Spring test.
7. Compression test on wood
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.

LIST OF MAJOR EQUIPEMENT:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test.
3. Wooden beam for flexure test.
4. Torsion testing mahine
5. Brinnell's/Rock well's hardness testing machine.
6. Spring testing machine
7. Compression testing machine
8. Izod Impact machine
9. Beam setup for Maxwell's theorem verification

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Acquire the knowledge on conducting experiments for testing strength of various materials	PO1
CO2	Analyze the behavior of simple structural elements under simple loadings	PO2
CO3	Design the materials strength using various impact and deflection test.	PO3
CO4	Use appropriate modern tools in surveying	PO5
CO5	Follow the ethical principles while doing the	PO8

	experiments	
CO6	Do the experiments effectively as an individual and as a team member in a group.	PO9
CO7	Communicate verbally and in written form pertaining to results of the experiments	PO10
CO8	Continue updating their skill related to material strength in future.	PO12

II B.Tech I Semester **L T P C**
0 0 2 1

18 CIV216 SURVEYING LABORATORY –I

Course Educational Objectives:

CEO1: Student shall learn the conduct of standard practices using instruments like chain, compass, dumpy level, theodolite in the field and to plot from field data.

CEO2: Student shall learn the conduct of leveling and grid contouring by different methods.

List of Experiments:

I. Chain Surveying:

1. To find the area of the given plot using chain, tape & cross–staff.
2. To find the distance between inaccessible points.

II. Compass Surveying:

3. Traversing using prismatic compass.
4. To find the distance between inaccessible points.

III. Plane table Surveying:

5. Radiation method and Intersection methods
6. Traversing method

IV. Levelling:

7. Fly levelling, reduction of levels by rise and fall method.
8. Differential levelling, reduction of levels by height of collimation method.
9. Profile levelling: L.S. and C.S.
10. Preparation of contour map.

V. Plotting:

11. Conventional signs and symbols used in surveying.
12. Plotting of L.S. & C.S

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Demonstrate the knowledge on chain, compass, plane table, auto level, areas and volumes	PO1
CO2	Analyze surveying techniques, tools and survey data	PO2
CO3	Design different types of levelling and prepare contour maps	PO3
CO4	Solve complex engineering survey problems through proper survey and interpretation	PO4
CO5	Use appropriate modern tools in surveying	PO5
CO6	Follow the ethical principles while doing the experiments	PO8

CO7	Do the experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form pertaining to results of the experiments	PO10
CO9	Continue updating their skill related to surveying in future.	PO12

II B.Tech I Semester

18AUD211	**CONSTITUTION OF INDIA**	**L**	**T**	**P/D**	**C**
		2	**-**	**-**	**-**

Course Educational Objectives:

CEO1: To know about Indian constitution and functionalities of state and central government of India

CEO2: To realize the functions of local administration in rural and urban areas

CEO3: To understand the functions of Chief election and state election commissions.

UNIT – 1: INTRODUCTION

Constitution-meaning of the term, Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

UNIT – 2: UNION GOVERNMENT AND ITS ADMINISTRATION

Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha

UNIT – 3: STATE GOVERNMENT AND ITS ADMINISTRATION

Governor: Role and Position, CM and Council of ministers, State Secretariat: Organization, Structure and Functions

UNIT – 4: LOCAL ADMINISTRATION

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT – 5: ELECTION COMMISSION

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes

	On successful completion of the course the student will be able to	POs related to COs
CO1	Understand the functions of the Indian constitution	PO6, PO8,PO12
CO2	Recognize the structure, functions of Indian central government	PO6, PO8,PO12
CO3	Realize the structure and functions of State government in India	PO6, PO8,PO12
CO4	Explain the functions of local administration in rural and urban	PO6, PO8,PO12
CO5	Understand the role of state and chief election commission	PO6, PO8,PO12

Textbooks:

1. Introduction to the Constitution of India,Durga Das Basu, Prentice Hall of India, New De1hi.
2. Indian Po1itica1 System, R.C.Agarwa1,S.Chand and Company, New De1hi.1997

References:

1. Introduction to the Constitution of India, Sharma, Brij Kishore, Prentice Hall of India, New De1hi.
2. Indian Po1itica1 System, U.R.Gahai, New Academic Pub1ishing House, Jalandar.

II B.Tech I Semester

		L	T	P/D	C
18SAH212	**REASONING AND APTITUDE - I**	2	-	-	-

Course Educational Objectives:

CEO1: To apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.

REASONING AND APTITUDE

Numbers and fractions – LCM and HCF – Simplification and roots – Averages – Percentages – Ratios and proportions – Profit and loss – Partnership and shares – Simple and compound interest – Series (Verbal) – Coding and decoding – Blood relations – Venn diagrams – Problems on ages – Directions – Assertion and reasoning – Logarithms – Syllogism.

Course Outcomes:

On successful completion of the course, students will be able to:		**POs related to COs**
CO1	Apply the mathematical concepts in real life problem solving methodologies.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10,PO11, PO12
CO2	Apply the reasoning knowledge in real life problem solving methodologies.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10,PO11, PO12

Text Books:

1. Quantitative Aptitude, Dr.R.S.Aggarwal, 2012, S.Chand and Company Ltd, New Delhi.
2. A Modern Approach to Verbal and Non-Verbal Reasoning, Dr.R.S.Aggarwal, 2012, S.Chand and Company Ltd, New Delhi.

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, Abhijit Guha, 14/e, 2010, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability and Quantitative Aptitude, Edgar Thorpe, 3/e, 2012, Tata McGraw Hill Publishers, New Delhi.
3. Fast Track Objective Arithmetic, Rajesh Verma, 2012, Arihant Publications, Meerut.

II BTech II Sem **L T P C**
2 1 0 3

18SAH222 **PROBABILITY AND STATISTICS**
(Common to CSE, MEC, CE)

Course Educational Objectives:

CEO1 : To develop skill to analyze the discrete and continuous data using appropriate Statistical Distributions like Binomial, Poisson, Normal..etc
CEO2: To develop skill to design different graphical representations like pie chart, Bar graph, scatter Diagram, line graph, Regression line etc.,
CEO3: To inculcate skill to investigate different applications of statistical distributions and the Corresponding conclusions required for the analysis of sample data.
CEO4: To develop skill to apply the concept of test of significance using t-test, f-test, chi-square test, ANOVA suitable of the required conclusion.

UNIT - 1: Probability and Random variables
Probability: Sample space and events - Probability - The axioms of probability - Some elementary theorems - Conditional probability - Baye's theorem.
Random variables: Discrete and continuous distributions – Statistical Parameters (Mean, Variance and Standard Deviation) of distribution functions.
UNIT - 2: Probability Distributions
Binomial - Poisson and Normal distributions - Related properties.
UNIT - 3: Sampling distribution and Estimation
Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) - Proportions - Sums and differences.
Estimation: Point estimation - Interval estimation - Bayesian estimation.
UNIT - 4: Test of Hypothesis and Test of Significance
Test of Hypothesis: Means - Hypothesis concerning one and two means - Type I and Type II errors
- One tail, two-tail tests.
Test of Significance: Student's t-test - F-test - Chi-square test of goodness of fit.
UNIT - 5: Curve fitting & ANNOVA
Curve fitting: The method of least squares – Linear, Parabola, Exponential and Power form.
ANNOVA: ANNOVA for one-way and two-way classification data.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Demonstrate knowledge on use the probability and Random Variables in the field of engineering	PO1,PO2,PO3
CO2	Demonstrate knowledge in probability distributions and develop analytical skills for the problems involving means, probability distributions and standard deviations sampling techniques for decision making in uncertain environments	PO1,PO2,PO3
CO3	Construct confidence intervals on parameters for a single sample	PO1,PO2,PO3, PO12
CO4	Demonstrate knowledge in testing of hypotheses and Tests of significance for small and large samples and Develop skills for analyzing the data with suitable tests of significance for practical situations through probability distributions	PO1,PO2,PO3,PO 4,PO12
CO5	Demonstrate knowledge on constructing a curve, or mathematical function, that has the best fit to a series of data points, possibly subject to constraints and develop skills for analyzing to test whether there are any statistically significant differences between the means of three or more independent (unrelated) groups using ANOVA	PO1,PO2,PO3,PO 4,PO12

Text Books:

1. Fundamentals of Mathematical Statistics, 10/e, 2001, S.C. Gupta, V.K. Kapoor, S. Chand and Company Publishers, New Delhi.
2. Probability and Statistics, 2012, T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad , S. Chand and Company Publishers, New Delhi.

Reference Books:

1. Probability and Statistics, 2011, V. Ravindranath, T.S.R. Murthy, I.K. International Pvt. Ltd, New Delhi.
2. Probability and Statistics for Engineers, 6/e, 2006, Johnson A. Richard, Miler & Fruends, Pearson Education, New Delhi.
3. Higher Engineering Mathematics, 34/e, 1999, Dr. B. S. Grewal, Khanna Publishers, Delhi
4. Probability and Statistics for Engineers, 2011, Dr. J. Ravichandran, Wiley-India Publishers, New Delhi.
5. Probability and Statistics for Engineers and Scientists, 7/e, 2002, Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Education Asia, New Delhi.

II B.Tech II Semester

18MBA221 PRINCIPLES OF MANAGEMENT

L	T	P/D	C
3	-	-	3

Course Educational Objectives:

CEO1: To enable the students to study the evolution of management and organizations

CEO2: To study the functions and principles of management and to learn the application of the principles in an organization.

UNIT – 1: INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

Definition of management – Science or art – Manager Vs Entrepreneur – Types of managers – Managerial roles and skills – Evolution of management – Scientific, human relations , system and contingency approaches – Types of business organization – Sole proprietorship, partnership, company – Public and private sector enterprises – Organization culture and environment – Current trends and issues in management.

UNIT – 2: PLANNING

Nature and purpose of planning – Planning process – Types of planning – Objectives – Setting objectives – Policies – Planning premises – Strategic management – Planning Tools and techniques

– Decision making steps and process.

UNIT – 3: ORGANISING

Nature and purpose – Formal and informal organization – Organization chart – Organization structure – Types – Line and staff authority – Departmentalization – Delegation of authority – Centralization and decentralization – Job design – Human resource management – HR planning, recruitment, selection, training and development, performance management , career planning and management.

UNIT – 4: DIRECTING

Foundations of individual and group behaviour – Motivation – Motivation theories – Motivational techniques – Job satisfaction – job enrichment – Leadership – Types and theories of leadership – Communication – Process of communication – Barrier in communication – Effective communication – Communication and IT.

UNIT – 5: CONTROLLING

System and process of controlling – Budgetary and non-budgetary control techniques – Use of computers and IT in Management control – Productivity problems and management – Control and performance – Direct and preventive control – Reporting.

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Understand the concepts of organization, management and the role of managers. Then the global management and ethical responsibilities of the engineer to the organization and society.	PO6,PO9,PO10,PO12
CO2	Obtain the knowledge of planning processes, types of plans, strategies, policies and decision making processes. And how to function effectively as a individual and team work with management principles in ethical manner.	PO6, PO8,PO9, PO10,PO11
CO3	Gain the knowledge of organizing, organization structure and the importance of team work in groups, departmentalization, staffing, selection and recruitment, understanding of the engineering and management principles.	PO6,PO9,PO10, PO12
CO4	Acquire the knowledge of directing, motivation, leadership, communication in the management of the organization. And they will understand the responsibilities of the individual and team work to manage the organization culture with ethical principles.	PO6,PO8, PO9,PO10, PO12
CO5	Know about the controlling, types of control and how to manage projects in multidisciplinary environment through proper communication. Then the life-long learning of the management skills in the broadest context of technological change.	PO6,PO9,PO10,PO11, PO12

Text Books:

1. Total Quality Management, Dale.H.Besterfiled, 3/e, 2010, Pearson Education, New Delhi.
2. Principles of Management, M. Govindarajan and S. Natarajan, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Management, Stephen P. Robbins and Mary Coulter, 8/e, Prentice Hall of India.
2. Principles of Management, Charles W.L Hill, Steven L McShane, 2007Mcgraw Hill Education, Special Indian Edition.
3. Management-A Competency Based Approach, Hellriegel, Slocum and Jackson, 10/e, 2007, Thomson South Western.
4. Management – A global and Entrepreneurial Perspective, Harold Koontz, Heinz Weihrich and mark V Cannice, 12/e, 2007, Tata Mcgraw Hill.
5. Essentials of Management, Andrew J. Dubrin, 7/e, 2007, Thomson South western.

II B.Tech II Semester

L	T	P	C
3	0	0	3

18CIV221 ENGINEERING GEOLOGY

Course Educational Objectives:

CEO1: Branches of geology and their importance in civil engineering works

CEO2: Weathering, geological classification of soils and soil erosion and conservation.

CEO3: Identification and study of minerals, rocks-rock as a construction material.

CEO4: Geological structures and their role in civil engineering project

CEO5: Earthquakes, landslides causes and preventive measures

CEO6: Geological and geophysical surveys for site selection

CEO7: Role of engineering geology in dams, reservoirs and tunnels.

UNIT – I : INTRODUCTION:

Importance of Geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

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

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

UNIT – II : PETROLOGY

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY : Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT – III : GROUND WATER ,EARTH QUAKE &LAND SLIDES

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their

causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV : GEOPHYSICAL STUDIES

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V : GEOLOGY OF DAMS ,RESERVOIRS AND TUNNELS

Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor‟s Contributing to the success of a reservoir. Geological factors influencing water tightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Demonstrate basic knowledge on weathering, minerals, rocks geological structures, geophysical methods, groundwater earthquakes and landslides and site selection for civil engineering structures	PO1, PO2, PO3
CO2	Analyze minerals, rocks, geological structures and failure of structures due to geological considerations.	PO1, PO2, PO4
CO3	Demonstrate causes and effects of natural hazards and suggest remedial measures for the societal safety	PO1, PO2, PO3, PO4
CO4	Use modern methods and apply suitable techniques in geological study for civil engineering applications	PO1, PO2, PO5
CO5	Examine and select the sites related to dams, roads, tunnels and slopes	PO1, PO2

TEXT BOOKS:

1 Engineering Geology , N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2 Engineering Geology, Vasudev Kanthi, Universities Press, Hyderabad.

REFERENCES:

1 Engineering Geology, Duggal.S.K., TMH Publishers.
2 Engineering Geology , Subinoy Gangopadhyay, Oxford University Press.
3 Engineering Geology, Prabin Singh, Katson Pubilcations
4 Principals of Engineering Geology, K.V.G.K. Gokhale – B.S publications

II B.Tech II Semester **L T P C**
2 1 0 3

18CIV222 FLUID MECHANICS – I

Course Educational Objectives:

CEO1: To understand the properties of fluids and fluid statics
CEO2: To derive the equation of conservation of mass and its applications
CEO3: To solve kinematic problems such as finding particle paths and stream lines
CEO4: To analyze laminar and turbulent flows
CEO5: To analyze the models and hydraulic similitude

UNIT – 1: PROPERTIES OF FLUIDS AND PRESSURE MEASUREMENTS

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

UNIT – 2: FLUID KINEMATICS AND DYNAMICS

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

UNIT – 3: CLOSED CONDUIT AND MEASUREMENT OF FLOW

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

UNIT – 4: LAMINAR AND TURBULENT FLOW

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

UNIT – 5: HYDRAULIC SIMILITUDE

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

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Demonstrate knowledge on fundamentals of properties of fluids and fluid pressure and its measurements	PO1
CO2	Construct the forces on immersed plane and curved surfaces with energy correction factors and analyze the forces in bend pipe	PO1, PO2
CO3	Develop continuity equation and energy equation in solving problems on flow through conduits and weirs	PO1, PO2
CO4	Validate the frictional loss in laminar and turbulent flows in pipes	PO1, PO2
CO5	Analyze the hydraulic similitude of fluids and develop the Hydraulic model laws and similarities	PO1, PO2,PO3,PO5

Text books:

1 A Textbook of Fluid Mechanics, R.K. Raj put, S. Chand 5th Edition, Laxmi Publishers, 2013.
2 Fluid Mechanics and Hydraulic Machines, R.K. Bansal, 9th Edition, Laxmi Publishers, 2011.

Reference books:

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

II B.Tech II Semester	L	T	P	C
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18CIV223 STRENGTH OF MATERIALS-II

Course Educational Objectives:

CEO1: Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.

UNIT – I: PRINCIPAL STRESSES AND STRAINS AND THEORIES OF FAILURES

Principal stresses and strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions. **Theories of failures:** Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.(definitions only)-Important points from Theories of Failures used in design

UNIT–II: THIN CYLINDERS & THICK CYLINDERS

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – Changes in dia, and volume of thin cylinders – Thin spherical shells-wire winding of thin 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-– Thick spherical shells.

UNIT – III: TORSION OF CIRCULAR SHAFTS

Torsion of circular shafts – Theory of pure torsion – Derivation of Torsion equations: – Assumptions made in the theory 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.

UNIT – IV: COLUMNS AND STRUTS

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns – assumptions – derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio

– Euler's critical stress – Limitations of Euler's theory – Rankine-Long columns subjected to eccentric loading – Empirical formulae

UNIT – V:ANALYSIS OF FRAMED STRUCUTRES AND BEAMS CURVED IN PLAN

Analysis of Framed structures: Perfect frame-basic perfect frame-deficient frame-Redundant frame-Reactionat supports analysis of trusses-method of sections-Method of

tension coefficients- **Beams curved in plan :** Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semicircular beam simply-supported on three equally spaced supports.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Acquire the knowledge on principle of stress and strain and describe the Various Theories of failures	PO1, PO2
CO2	Validate complex engineering problems associated with thin cylinders & thick cylinders	PO1, PO2, PO4
CO3	Demonstrate Knowledge on torsion of circular shafts and springs	PO1, PO2
CO4	Analyze the Types of columns and develop formulas for various boundary conditions.	PO1, PO2,PO3
CO5	Demonstrate the various functions of simple bending equation	PO1, PO2

Text Books:

(1) A Text book of Strength of materials by R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(2) Strength of Materials by R.Subramanian, Oxford University Press.

References:

(1) Strength of Materials by S.S.Rattan, TMH Publishers.
(2) Strength of Materials by D.S. Prakasa rao, University press, Hyderabad.
(3) Strength of Materials by B.C.Punmia.- Laxmi publications
(4) Mechanics of Structures, by Ghosh& Datta, New Age Pubilishers

II B.Tech II Semester	L	T	P	C
	2	1	0	3

18CIV224: SURVEYING – II

Course Educational Objectives:

CEO1: To ensure that the student develops knowledge in the working of advanced instruments

CEO2: Setting out of curves from the field measurements

CEO3: Basic knowledge on remote sensing

UNIT-I : THEODOLITE SURVEYING

Vernier Theodolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey.

Trigonometric leveling : Introduction; Determination of the level of the top of an object, When its base is accessible and When its base is not accessible; Determination of the height of the object when the two instrument stations are not in the same vertical plane.

UNIT-II : TACHEOMETRIC SURVEYING

Definition, Advantages of Tacheometric surveyingBasic systems of tacheometric measurement , Principle of stadia measurements, Determination of constants K and C, Inclined sight with staff vertical; Inclined sight with staff normal to the line of sight, Movable hair method, Tangential method,Subtansebar,Errors in Tacheometry.

UNIT-III : TRIANGULATION

Principles of triangulation, Uses of triangulation survey; Classification of triangulation; operations of triangulation survey; Signals and towers, Satellite station; Base line & Extension of the baseline. **Setting out works:** Introduction, Control stations; Horizontal control; Reference grid; Vertical control; Positioning of a structure; offset pegs, Setting out a foundation: reference pillars, batter boards, Setting out with a theodolite; Graded stakes; setting out a sewer; Setting out a culvert.

UNIT-IV : CURVES

Simple curves–Definitions and Notations, designation of a curve, Elements of simple curves, location of tangent points, selection of peg interval, Methods of setting simple curves(based on equipment) – Rankines method,Two theodolite method. Compound curves – Elements of compound curve, setting out compound curve. Reverse curves – Elements of reverse curve, relationship between various elements.

UNIT-V : ELECTRONIC DISTANCE MEASUREMENTS

Introduction, Basic conceptselectromagnetic waves, basic definitions, phase of the wave ,units, types of waves; distance from measurement of transit time, Computing the

distance from the phase differences, EDM instruments, Features of total station, Setting up and orienting a total station, on-board software-Electronic data recording, Summary of total station characteristics, Field procedures for total station in topographic survey.

Remote sensing: Introduction, Principle of Remote sensing, EM Radiation and the atmosphere, interaction of EM radiation with earth's surface, remote sensing observation platforms, sensors, applications of remote sensing. Geographical Information System: Introduction and principle of Geographical Information System, components of GIS,applications.

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

Course Outcomes		POs related to COs
CO1	Demonstrate the knowledge on theodolite, teacheometer and EDM surveying and curves.	PO1, PO2,PO5
CO2	Solve complex problems through Tacheometric surveying	PO1, PO2, PO3, PO4
CO3	Analyze surveying techniques to set out various works	PO1, PO2, PO3,
CO4	Design different types of curves	PO1, PO2
CO5	Describe different modern instruments used in surveying	PO1, PO3

TEXT BOOKS:

1. Surveying (Vol – II), B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain Laxmi publications (P) Ltd., New Delhi
2. Text book of surveying, C.Venkataramaiah, Universities Press.
3. Surveying Vol. II, Dr. K. R. Arora, Standard Book House;
4. Higher Surveying, Chandra, New age Publishers.

REFERENCE BOOKS:

1. Surveying Vol. II, S.K. Duggal. Tata Mc. Graw Hill Publishing Co.
2. Advanced Surveying, Satheesh Gopi, R.Shanta Kumar and N.Madhu, Pearson education
3. Advanced Surveying, Mahajan, Santhos K. Dhanpat Rai & Sons, Nai Sarak, Delhi, 1987.

II B.Tech II Semester **L T P C**
0 0 2 1

18CIV225 ENGINEERING GEOLOGY LABORATORY

Course Educational Objectives:

CEO1: To impart working knowledge of minerals,

CEO2: To impart working knowledge of minerals rocks and

CEO3: To impart working knowledge of minerals geological maps for civil engineering projects.

List of Experiments:

1. Megascopic identification of minerals.
2. Megascopic identification of common igneous rocks.
3. Megascopic identification of common sedimentary rocks.
4. Megascopic identification of common metamorphic rocks.
5. Structural geology problems.
6. Study and interpretation of geological maps.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Apply the knowledge on identification of minerals and rocks, structural geology problems and maps and geophysical studies	PO1
CO2	Analyze different minerals, rocks, geophysical data for engineering applications. Interpret the geological maps and geophysical data with emphasis on practical applications in civil engineering	PO2
CO3	Follow the ethical principles while doing the experiments	PO8
CO4	Do the experiments effectively as an individual and as a team member in a group.	PO9
CO5	Communicate verbally and in written form pertaining to results of the experiments	PO10
CO6	Continue updating their skill related to geology in future.	PO12

II B.Tech II Semester

L	T	P	C
0	0	2	1

18CIV226 SURVEYING LABORATORY –II

Course Educational Objectives:

CEO1: Students shall have the knowledge of various standard practices involved in trigonometric leveling and tachometric surveying.

CEO2: Students shall be able to acquire the expertise needed for setting out of circular curves

CEO3: Marking of foundation trench of a building/culvert.

CEO4: Students shall learn about total station, its use and applications.

LIST OF EXERCISES:

I. Theodolite Surveying

1. Study of theodolite in detail – practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.

II. Trigonometrical Leveling (Heights & Distances problems)

3. Base of the object is accessible
4. Base of the object inaccessible

III. Tacheometric Surveying

5. Determination of tacheometric constants
6. Determination of the horizontal distances and vertical heights by using tangential tacheometry.

IV. Setting Out Works

7. Setting out the simple circular curve by using offsets from the long chord method.
8. Setting out the simple circular curve by using Rankine‟s method.
9. Setting out the foundation trench of a building/ culvert.

V. Exercises Using Electronic Total station

10. a) Determination of remote height /elevation.
    b) Missing line measurement.
11. a) Determination of gradient of a line joining two inaccessible points.
    b) Determination of area of a given traverse.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	To understand the basics and elements of different types of curves on roads and their preliminary survey	PO1
CO2	Design simple curves; and develop survey plots and contour map	PO4
CO3	Handle Advanced survey instruments like Theodolite, Tacheometry , Total station to carry out field marking ,curves setting etc.	PO5
CO4	Follow the ethical principles while doing the experiments	PO8
CO5	Do the experiments effectively as an individual and as a team member in a group.	PO9
CO6	Communicate verbally and in written form pertaining to results of the experiments	PO10
CO7	Continue updating their skill related to surveying in future.	PO12

II B.Tech II Semester

18AUD212	**ENVIRONMENTAL SCIENCE**	L	T	P/D	C
	(Common to All Branches)	2	-	-	-

Course Educational Objectives:

CEO1: To study the nature and facts about environment.

CEO2: To finding and implementing scientific, technological, economic and political solutions to environmental problems.

CEO3: To study the interrelationship between living organism and environment.

CEO4: To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

CEO5: To study the dynamic processes and understand the features of the earth's interior and surface.

CEO6: To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

UNIT – 1: INTRODUCTION TO ENVIRONMENTAL SCIENCE AND NATURAL RESOURCES

Introduction: Definition - Scope and importance of environment - Need for public awareness - Natural Resources: Forest resources: Use and over-exploitation - Deforestation - Conservation of forests. **Mineral resources:** Use and exploitation - Environmental effects of extracting mineral resources - Case studies. **Energy resources:** Conventional energy resources - Natural gas and Nuclear fuels - Non-conventional energy resources - Solar energy - Wind energy - Tidal energy - Geothermal energy and Biogas energy - Use of alternate energy sources - Case studies.

UNIT – 2:ECOSYSTEM AND BIODIVERSITY

Ecosystem: Concept of an ecosystem - Structure and function of an ecosystem - Energy flow in the ecosystem - Food chains - Food webs - Ecological pyramids - Types - Characteristic features - Structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (Ponds - Streams - Lakes - Rivers - Oceans - Estuaries). **Biodiversity:** Introduction to biodiversity - Genetic - Species and Ecosystem diversity - Value of biodiversity: Consumptive value - Productive value - Social value - Ethical value - Aesthetic and Option values - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – 3:POLLUTION AND WASTE MANAGEMENT

Definition - Causes - Effects - Control measures of pollution. **Air Pollution:** Types of pollutants - Their sources and impacts - Air pollution control. **Noise Pollution:** Impacts of noise - Permissible limits of noise pollution - Measurement of noise - Control of noise pollution. **Soil Pollution:** Causes of soil degradation - Excessive use of fertilizers - Problems with pesticide use - Excess salt and water. **Solid waste management:** Characteristics - Generation - Collection and transportation of solid wastes - Engineered systems for solid waste management (reuse, recycle, energy recovery, treatment and disposal).

UNIT – 4:SOCIAL ISSUES AND THE ENVIRONMENT

Water conservation measures - Rain water harvesting and water shed management - Resettlement and rehabilitation of people - Its problems and concerns - Case studies - Role of NGO's - Climate change - Global warming (Green house effect) - Ozone layer depletion - Acid rain - Nuclear accidents. **Sustainable development:** Definition - Objectives - Environmental dimensions of sustainable development.

UNIT– 5: ENVIRONMENTAL LEGISLATION AND HUMAN POPULATION

Environmental acts: The water (Prevention and control of pollution) Act - The air (Prevention and control of pollution) act - The wild life (protection) act - The forest conservation act - The environmental protection act. **Case studies:** Chipko movement - Narmada bachao andolan - Silent valley project - Chernobyl nuclear disaster - and Bhopal gas tragedy. **Population growth:** Variation among nations - Population explosion - Value education - HIV/AIDS - Role of information technology in environment and human health - Case studies.

Field Work:

Visit to a local area to document environmental assets: River/ Forest/ Grasslands/ Mountains Visit to local polluted site: Urban/ Rural/ Industrial/ Agriculture
Study of simple ecosystems: Pond/ River/ Hill slope etc.

Course Outcomes:

On successful completion of the course, students will be able to:		**POs related to COs**
CO1	Gain the knowledge of natural resources of the nation and to preserve and utilize it in an appropriate manner through various projects.	PO6, PO7, PO8
CO2	Understand the concepts of environment, ecosystem, biodiversity of the nation, social and ethical responsibilities of the engineer to the society.	PO6, PO7, PO8
CO3	Realize and create the public awareness regarding various environmental pollutions in the society and to control it through individual and team work for the environmental sustainability in ethical manner.	PO6, PO7, PO8
CO4	Acquire the knowledge of social issues and its impact on the environment, sustainable development, various acts and its amendments to protect the environment through various projects and disaster management.	PO6, PO7, PO8
CO5	Know about the increase in human population and its variation among nations, human rights, role of communication in environment and human health.	PO6, PO7, PO8

Text Books:

1. Text book of Environmental Studies, 4/e, 2012, C.P. Kaushik and Anubha Kaushik, New Age International (P) Ltd., Publishers, New Delhi.
2. Text book of Environmental Studies, 1/e, 2008, Erach Bharucha, University Press (India) Private Ltd. Hyderabad.

Reference Books:

1. Environmental Studies-From Crisis to Cure, 2/e, 2012, R. Rajagopalan, Oxford University Press , New Delhi.
2. A Text Book of Environmental science and Technology ,1/e, 2008, Dr.M.Anji Reddy, B.S. Publications, Hyderabad.
3. Principles of Environmental Science and Engineering, 1/e, 2005, Keerthinarayana and Daniel Yesudiam, Hi –Tech Publications , Chennai.
4. Glimpses of Environment , 1/e, 2005, Dr. KVSG Murali Krishna, Environmental Protection Society, Kakinada, India.
5. Environmental Studies, 1/e, 2009, Anindita Basak , Pearson Education, New Delhi.

II B.Tech II Semester

18SAH223 REASONING AND APTITUDE - II

L	T	P/D	C
2	-	-	-

Course Educational Objectives:

CEO1: To apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.

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REASONING AND APTITUDE

Time and work – Pipes and cistern – Time, distance and speed – Problems on trains – Boats and streams – Allegations / mixture – Permutations and combinations – Probability – Logarithms – Analogy – Classifications – Completion of incomplete patterns – Area, surface area and volume – Heights and distances – Calendars' based problems – Clocks – Data interpretation (tabulation- line graphs, bar graphs, pie charts) – Data sufficiency.

Course Outcomes:

On successful completion of the course, students will be able to:		POs related to COs
CO1	Apply the mathematical concepts in real life problem solving methodologies.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10,PO11, PO12
CO2	Apply the reasoning knowledge in real life problem solving methodologies.	PO1, PO2, PO3, PO4, PO5, PO6, PO7, PO8, PO9, PO10,PO11, PO12

Text Books:

1. Quantitative Aptitude, Dr.R.S.Aggarwal, 2012, S.Chand and Company Ltd, New Delhi.
2. A Modern Approach to Verbal and Non-Verbal Reasoning, Dr.R.S.Aggarwal, 2012, S.Chand and Company Ltd, New Delhi.

Reference Books:

1. Quantitative Aptitude for Competitive Examinations, Abhijit Guha, 14/e, 2010, Tata McGraw Hill Publishers, New Delhi.
2. Course in Mental Ability and Quantitative Aptitude, Edgar Thorpe, 3/e, 2012, Tata McGraw Hill Publishers, New Delhi.
3. Fast Track Objective Arithmetic, Rajesh Verma, 2012, Arihant Publications, Meerut

III B.Tech I Semester

L	T	P	C
3	0	0	3

18CIV311: CONCRETE TECHNOLOGY

Course Educational Objectives:

1. To familiarize the properties of cement and admixture.
2. To understand the properties of aggregate.
3. To demonstrate the knowledge on fresh concrete properties.
4. To understand the properties of hardened concrete.
5. To Understand mix design methods and concepts of special concretes.

UNIT - I: CEMENT AND ADMIXTURE (9 hours)

Cement: Portland cement – chemical composition – Hydration of cement, Setting of cement, Heat of hydration – Physical properties of cement – Tests of cement - Different grades of cement, types of cement. Admixtures: Types of admixtures – mineral and chemical admixtures, Effects of admixtures on concrete properties.

UNIT - II: AGGREGATES (9 hours)

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

UNIT - III: FRESH CONCRETE (9 hours)

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

UNIT - IV: HARDENED CONCRETE (9 hours)

Hardened Concrete: Water / Cement ratio, Abram's Law, Gel space ratio, Nature of strength of concrete, Maturity concept, Strength in tension & compression, Factors affecting strength, Relation between compressive & tensile strength, Curing. Test on Hardened Concrete: Compression tests, Tension tests, Flexure tests, Splitting tests, Pull-out test, Non-destructive testing methods, Codal provisions for NDT. Elasticity, Creep & Shrinkage, Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep, Shrinkage, Types of shrinkage.

UNIT - V: MIX DESIGN & SPECIAL CONCRETE (9 hours)

Mix Design: Factors in the choice of mix proportions, Durability of concrete, Quality control of concrete, Statistical methods, Acceptance criteria, Proportioning of concrete mixes by various methods – BIS method and ACI mix design. Special Concretes: Introduction to light weight concrete, Cellular concrete, No-fines concrete, High density

concrete, Fibre reinforced concrete, Polymer concrete, High performance concrete, Self-compacting concrete, SIFCON, Bacterial concrete (Self-healing concrete).

Course Outcomes:

Upon successful completion of this course, the students will be able to		**POs related to COs**
CO1	Demonstrate the knowledge on properties of cement and admixtures.	PO1,PO2
CO2	Demonstrate the knowledge on properties of aggregate.	PO1, PO2
CO3	Demonstrate the knowledge on fresh concrete.	PO1, PO2
CO4	Demonstrate the knowledge on properties of hardened concrete and NDT methods.	PO1, PO2
CO5	Design the concrete mix using BIS method and ACI method & understand concept of special concrete.	PO1, PO3

Text Books:

1. M. S. Shetty, "Concrete Technology", S. Chand and Company Ltd., New Delhi, 2003.
2. A.M. Neville," Properties of Concrete", Pearson Publication, 5th Edition, 2012

.**Reference Books:**

1. R. Santhakumar, "Concrete Technology", Oxford University Press, New Delhi, 2006.
2. M. L. Gambir, "Concrete Technology", Tata McGraw-Hill Publishing Co. Ltd, New Delhi, 3rd Edition, 2007
3. P. K. Mehta and J. M. Monteiro, "Concrete: Micro structure, Properties and Materials", McGraw Hill Publishers.
4. Gupta, B. L. and Amit Gupta, "Concrete Technology" , Jain Book Agency, 4th Edition, 2014.
5. ACI 211.1-91: Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete (Reapproved 2009).

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	1		-	-	-	-	-	-	-	-	-
CO.2	2	2		-	-	-	-	-	-	-	-	-
CO.3	2	2		-	-	-	-	-	-	-	-	-
CO.4	2	2		-	-	-	-	-	-	-	-	-
CO.5	2	-	3	-	-	-	-	-	-	-	-	-
CO*	**2**	**1.8**	**3**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech I Semester

L	T	P	C
2	1	0	3

18CIV312: DESIGN OF REINFORCED CONCRETE STRUCTURES

Course Educational Objectives:

1. Teach and familiarize the students with the design of various RCC structural elements.
2. Draw the structural elements so that they can be implemented in field.
3. Develop the skill to analyze and design basic concrete members.
4. Basic understanding of the behavior of Reinforced concrete structures.
5. Use appropriate method to design RCC structures.

UNIT I: INTRODUCTION TO MATERIALS (9 hours)

Concepts of RCC Design –Introduction to Working stress method - Limit State method– Material Stress- Strain Curves – Safety factors – Characteristic values. Limit state analysis and design of Singly Reinforced, Doubly reinforced – IS: 456 – 2000.

UNIT II: LIMIT DESIGN OF BEAMS (9 hours)

Beams: Limit state analysis and design of T and L Beam sections. Shear, Torsion and Bond: – concept anchorage and development length, I.S-Code provisions. Design examples in simply supported and continuous beams.

UNIT III: SLABS (9 hours)

Design of Two-way Slab, One way Slab and continuous Slab Using IS- Co-efficient.

UNIT IV: DESIGN OF COLUMNS (9 hours)

Short and Long columns –Axial loads, Uni axial IS- Code provisions.

UNIT – V: DESIGN OF FOOTINGS AND STAIRCASE (9 hours)

Design of Footings - Isolated (Square, Rectangular) Footings -Design of Stair case – Dog legged.

NOTE: All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, two way and continuous slabs

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Demonstrate the Basic Concepts of Reinforced Concrete Analysis & Design and various modes of failure of Reinforced Concrete members.	PO1, PO2
CO2	Analyze and Design of various Reinforced Concrete members such as beams	PO1, PO2, PO3
CO3	Analyze and Design of various Reinforced Concrete members such as Slabs.	PO1, PO2, PO3, PO5
CO4	Analyze and Design of various Reinforced Concrete members such as Columns.	PO1, PO2, PO4
CO5	Analyze and Design of various Reinforced Concrete members such as footings and staircase.	PO1, PO2

Text books:

1. Subramanian,N.,"Design of Reinforced Concrete Structures",Oxford University Press, New Delhi, 2013.
2. Krishnaraju.N "Design of Reinforced Concrete Structures ", CBS Publishers & Distributors Pvt. Ltd., New Delhi.

References books:

1. Jain, A.K., "Limit State Design of RC Structures", Nemchand Publications, Roorkee, 1998
2. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002
3. Unnikrishna Pillai, S., Devdas Menon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., 2009
4. Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, "Limit State Design of Reinforced Concrete", Laxmi Publication Pvt. Ltd., New Delhi, 2007.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3		-	-	-	-	-	-	-	-	-
CO.2	2	3	2	-	-	-	-	-	-	-	-	-
CO.3	2	3	2	-	3	-	-	-	-	-	-	-
CO.4	2	3		2	-	-	-	-	-	-	-	-
CO.5	2	3		-	-	-	-	-	-	-	-	-
CO*	**2**	**3**	**2**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech I Semester

L	T	P	C
2	1	0	3

18CIV313 FLUID MECHANICS -II

Course Educational Objectives:

1. To introduce Hydraulic Machineries like Turbines & Pumps along with their fundamentals
2. To introduce boundary layer concept.
3. To explain the types of open channels, their behavior and applications of open channels.
4. To identify and analyze the open channels under uniform flow.
5. To analyze the open channels under non-uniform flow.

UNIT I: IMPACT OF FREE JETS & HYDRAULIC TURBINES (9 hours)

Impact of Jets: Force exerted by Fluid Jet on Stationary & Moving Flat plate – Plate Perpendicular & Inclined to the Jet, Force Exerted by Fluid Jet on Stationary & Moving Curved Vanes – Jet hitting at center and Tangential to the blades.

Turbines: Introduction & Elements of a Hydroelectric Power plant, Head & Efficiencies of Hydraulic Turbines, Classification of Turbines – Impulse, Reaction & Mixed, Construction, Work done & efficiencies of Pelton, Kaplan & Francis turbines, Draft tube theory, Governing of Turbines; Run-away Speed, Performance under Unit & Specific Conditions, Expression for Specific Speed, Performance characteristic Curves, Cavitation in Turbines

UNIT II: PUMPS (9 hours)

Classification – Reciprocating & Centrifugal Pumps, **Reciprocating Pumps** – Components & types, Work done by Reciprocating Pumps, Co-efficient of Discharge & Slip, Indicator diagrams, Air Vessels.

Centrifugal Pumps - Components & types, Advantages over Reciprocating Pumps, Head of Pump, Specific Speed & Net Positive Suction Head (NPSH), Model Testing of Pumps, Pumps in Series & Parallel, Characteristic Curves & Cavitation

UNIT III: DRAG/LIFT & BOUNDARY LAYER THEORY (9 hours)

Introduction & types of drag, drag on cylinder, flat plate and Airfoil. Development of lift on immersed bodies such as cylinder and airfoil. Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary- layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

UNIT IV: OPEN CHANNEL FLOW – UNIFORM FLOW (9 hours)

Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Specific Energy, Specific Force & Critical Depth, Computation of Uniform flow Characteristics of uniform flow, Chezy's formula, Manning's formula - Factors affecting Manning's Roughness

Coefficient "n". Most economical section of channel, Venturi Flume, Standing Wave Flume, Parshall Flume, Determination of Mean Velocity for flow in Channels

UNIT V: OPEN CHANNEL FLOW – NON-UNIFORM FLOW (9 hours)

Introduction, Gradually Varied Flow, Classification of Channel bottom slopes & surface Profiles, Hydraulic Jump - Elements and characteristics of hydraulic jump in a rectangular channel, length and height of jump, types & location of Hydraulic Jump, surges in Open Channels

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Understand the concepts of Jets and the theory behind the operation of Hydraulic Turbines	PO1 PO2
CO2	Analyze the Operation of Hydraulic Pumps	PO1 PO6,PO2
CO3	Understand the concept of boundary layer and its types	PO1,PO2,PO6
CO4	Analyze the Uniform flow in Open Channels	PO2, PO7,PO6
CO5	Analyze the Non-Uniform flow in Open channels & understand the concept of Hydraulic Jump	PO2, PO6

Text Books:

1. Modi P.N and Seth "Hydraulics and Fluid Mechanics including Hydraulic Machines", Standard Book House New Delhi, 2009.
2. Jain.A.K.., "Fluid Mechanics" (Including Hydraulic Machines), Khanna Publishers, Twelfth Edition, 2016.
3. Subramanya.K " Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Education Private Limited, New Delhi, 2010.

Reference Books:

1. Subramanya.K ,"Flow in open channels", Tata McGraw Hill, New Delhi, 2000.
2. Ven Te Chow, "Open Channel Hydraulics", McGraw Hill, New York, 2009.
3. Hanif Chaudhry.M., "Open Channel Flow", Second Edition, Springer, 2007.
4. Rajesh Srivastava, "Flow through open channels", Oxford University Press, New Delhi, 2008.

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	2	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	2	-	-	-	2	-	-	-	-	-	-
CO.3	2	2	-	-	-	2	-	-	-	-	-	-
CO.4	-	2	-	-	-	2	2	-	-	-	-	-
CO.5	-	2	-	-	-	2	-	-	-	-	-	-
CO*	**2**	**2**			**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**

III B.Tech I Semester **L T P C**
2 1 0 3

18CIV314 STRUCTURAL ANALYSIS- I

Course Educational Objectives:

1. To Introduce Theory and Concepts of Classical methods of Structural Analysis.
2. To analyze fixed and continuous beams.
3. To analyze the arches.
4. To learn fundamentals about redundant pin joint frame using energy theorem
5. To Understand the importance of moving loads on a structure.

UNIT I: DEFLECTIONS USING ENERGY METHODS (9 hours)

Introduction to structures – Indeterminacy- Strain energy due to axial load, Shear force and bending moment. Deflections of Statically Determinate Beams, Single Storey Single bay rectangular portal frames, trusses (with 9 or less members) using unit load method and Castiglione's Theorem-I.

UNIT II: FIXED BEAMS & CONTINUOUS BEAMS (9 hours)

Introduction to Statically Indeterminate Beams with Uniformly Distributed Load, Central point load, Eccentric point load, number of point loads, Uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams –Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

Continuous Beams: Introduction-Continuous beams - Clapeyron's theorem of three moments. Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang - effect of sinking of supports.

UNIT III: ARCHES ` (9 hours)

Introduction-Hinges-Transfer of load to Arches-linear Arch-Hinges in Arch-Arch Action-Horizontal Force-Three Hinged Arch-circular Arches-springs at different levels-Maximum Bending moment Diagrams-Two Hinged Arches-Temperature stresses in arches-Two Hinged Circular Arches-fixed arches.

UNIT IV: REDUNDANT PIN JOINTED FRAMES (9 hours)

Indeterminate structures: Introduction- Degree of Indeterminacy-Determining Degree of Indeterminacy-Methods of analysis-Analysis of Statically Indeterminate trusses (having not more than 7 members and 3 members supports) with (a) External redundant supports (b) Internal redundant members using (i) unit load method (ii) Castiglione's theorem-II

UNIT V: MOVING LOADS AND INFLUENCE LINES (9 hours)

Introduction: maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point

loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses - Equivalent uniformly distributed load -Focal length.

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Acquire knowledge about strain energy concepts and found deflection for statically determinate structures	PO1,PO2
CO2	Acquire the knowledge of analyzing fixed beam and continuous beam.	PO1,PO2
CO3	Analyze Statically determinate and indeterminate arches	PO1, PO2
CO4	To learn fundamentals about redundant pin joint frame using energy theorem	PO1,PO2
CO5	Identify, formulate and solve engineering problems with real time loading	PO1,PO2,

Text Books:

1. Vaidyanathan, R &Perumal P," Structural Analysis, Vol.1 & 2", Laxmi Publications, New Delhi, 2012
2. BhavikattiS.S,"Structural Analysis Vol.1", Vikas Publishing House Pvt. Ltd., NewDelhi-4,2016.
3. Reddy, C.S "Structural Analysis", Tata McGraw Hill, 2010.

Reference books:

1. Pandit G.S. and Gupta S.P "Structural Analysis – A Matrix Approach,Tata McGraw Hill Publishing Company Ltd., 2016.
2. Negi L.S. and Jangid R.S,"Structural Analysis" ,Tata McGraw Hill Publishing Co. Ltd. 2014
3. Bhavikatti, S.S, "Structural Analysis, Vol.2", Vikas Publishing House Pvt.Ltd. New Delhi-4, 2017.

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	3	-		-	-	-	-	-	-	-	-
CO.2	3	3	-		-	-	-	-	-	-	-	-
CO.3	3	2	-		-	-	-	-	-	-	-	-
CO.4	2	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	3		-	-	-	-	-	-	-	-	-
CO*	**3**	**2.8**			-	-	-	-	-	-	-	-

III B.Tech I Semester

L	T	P	C
2	1	0	3

18CIV315 HYDROLOGY & IRRIGATION ENGINEERING

Course Educational Objectives:

1. To understand the different concepts and terms used in engineering hydrology.
2. To understand the concept of hydrograph and its applications
3. To disseminate the knowledge on different methods of irrigation
4. To disseminate the knowledge on irrigation requirements of crops.
5. To Demonstrate the knowledge on canal system

UNIT I: INTRODUCTION (9 hours)

Introduction: Concepts of Hydrologic cycle, Global Water Budget, Applications in Engineering. Sources of data. Precipitation, Forms of precipitation, characteristics of precipitation in India, measurement of precipitation: Recording and non-recording types, rain gauge network: mean precipitation over an area: Arithmetic, Theissen's and Isohyetal methods, Missing Rainfall Data – Estimation, Consistency of Rainfall records.
Abstractions from precipitation evaporation process, evaporimeters, Evaporation-factors affecting evaporation-measurement of evaporation- Infiltration- factors affecting infiltration, infiltration capacity -measurement of infiltration-infiltration indices

UNIT II: HYDROGRAPH (9 hours)

Runoff- Components of Runoff, Factors affecting runoff, Basin yield, SCS-CN method of estimating runoff, Flow duration curves, Mass curve of runoff ,Hydrograph –Distribution of Runoff – Hydrograph Analysis Flood Hydrograph – Effective Rainfall – Base Flow-Base Flow Separation - Direct Runoff Hydrograph Unit pulse and Unit step function - Unit Hydrograph, definition, limitations and applications of Unit hydrograph, derivation of Unit Hydrograph from Direct Runoff Hydrograph and vice versa - S-hydrograph, Synthetic Unit Hydrograph.

UNIT III: GROUNDWATER HYDROLOGY (9 hours)

Groundwater Hydrology Occurrence, movement and distribution of groundwater, Aquifer-Aquiclude-Aquifuge-aquifer parameters- porosity-Specific Yield-Specific Retention-Divisions of sub–surface water-Water Table-Types of aquifers- storage coefficient-coefficient of permeability and transmissibility, Specific Yield, Permeability, Storage coefficient, Transmissibility, Darcy's Law. Well Hydraulics - Steady radial flow into well for confined and unconfined aquifers, Recuperation tests. Well constants. Crop Water Requirements – Water requirement of crops-Crops and crop seasons in India.

UNIT IV: IRRIGATION ENGINEERING (9 hours)

Irrigation: Introduction- Necessity and Importance of Irrigation- advantages and ill effects of Irrigation- types of Irrigation- methods of application of Irrigation water-quality for Irrigation water-Duty and delta - relation between duty and delta-factors affecting duty- methods of improving duty.

Water Requirement of Crops: Types of soils- Indian agricultural soils-preparation of land for Irrigation- soil fertility- Soil-water-plant relationship- vertical distribution of soil moisture- soil moisture tension- soil moisture stress- various soil moisture constants- Limiting soil moisture conditions- Depth and frequency of irrigation- Gross command area- Cultivable command area- cultivated and uncultivated area- Kor depth and Kor period- crop seasons and crop rotation- Irrigation efficiencies- Determination of irrigation requirements of crops- Assessment of Irrigation water-Consumptive use of water-factors affecting consumptive use- direct measurement and determination by use of equations (theory only)

UNIT V: CANAL SYSTEMS (9 hours)

Canal Systems: Canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Regime 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-Advantages and disadvantages. Drainage of irrigated lands- necessity, methods.

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Understand the different concepts and terms used in engineering hydrology	PO1,PO2,PO3
CO2	Understand the concept of hydrograph and its applications	PO1,PO2,PO3
CO3	Explain different methods of irrigation including drip irrigation.	PO1,PO2,PO3
CO4	Explain irrigation requirements of crops.	PO1,PO2,PO3
CO5	Demonstrate the knowledge on canal system	PO1,PO2,

Text Books:

1. K. Subramanya," Engineering Hydrology", Tata McGraw-Hill
2. P.N.Modi," Irrigation and Water Resources & Water Power Engineering", Standard Book House
3. Dr. B.C.Punmia & Dr. Pande B.B. Lal," Irrigation and Water Power Engineering", Laxmi Publications pvt. Ltd., New Delhi.

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Reference Books:

1. V.P. Singh," Elements of Engineering Hydrology", Tata McGraw-Hill
2. G.L. Asawa,"Irrigation and water resources engineering", New Age International Publishers
3. Varshney," Theory and Design of Hydraulic structures", Gupta & Gupta

4. S. K. Garg ,"Irrigation Engineering and Hydraulic Structure", Khanna Publishers, 2013, Delhi.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	1	1		-	-	-	-	-	-	-	-
CO.2	2	2	2		-	-	-	-	-	-	-	-
CO.3	1	2	3		-	-	-	-	-	-	-	-
CO.4	1	2	3		-	-	-	-	-	-	-	-
CO.5	3	1			-	-	-	-	-	-	-	-
CO*	**2**	**1.6**	**2.25**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech I Semester

L	T	P	C
2	**1**	**0**	**3**

18CIV316: GEOTECHNICAL ENGINEERING – I

Course Educational Objectives:

1. To understand formation of soil and its classification
2. To study the properties of soil
3. To study the consolidation behavior of structure under various conditions
4. To understand different soil tests
5. To determine shear parameters of soil

UNIT I: HISTORY OF SOIL, FUNCTIONAL RELATIONSHIPS AND INDEX PROPERTIES (9 hours)

Origin, Formation and nature of soils: Introduction-origin of soils-formation of soils-basic soil types-major soil deposits of India-some typical soils-soil Particles-clay minerals-structure of a soil mass **Functional Relationships:** Introduction-three phase system-Preliminary Definitions-Functional Relations-and Applications of the functional relations **Index Properties:** Introduction-Specific gravity of solids-Practical size distribution-sieve analysis-Piratical size distribution curves-Relative density-consistency Indices based on Atterberg limits-Soil classification-field Identification of soils

UNIT II: PERMEABILITY, SEEPAGE THROUGH SOILS AND EFFECTIVE STRESS (9 hours)

Permeability: Darcy's law- Permeability – Factors affecting permeability – laboratory determination of coefficient of permeability –Permeability of layered soils-problems

Seepage through soils: Laplace Equation-stream and potential Functions-characteristics of flow nets-uses of Flownets- Flownets in non-homogeneous soil-problems.

Effective stress: Principle-nature-changes in effective stress in various conditions-seepage pressure-quick sand condition under various situations-piping-effects causes and preventions

UNIT III: STRESS DISTRIBUTION IN SOILS AND COMPACTION (9 hours)

Stress distribution in soils: Boussinesq's and Westergaard's theories for point loads and areas of different shapes –problems-contact pressure distribution beneath the footing.

Compaction: Introduction-soil compaction-Moisture-density Relationship-Standard proctor test--compaction of cohesion less soils-Field compaction Machinery for compaction

UNIT IV: CONSOLIDATION (9 hours)

Introduction-compressibility co-efficient-pressure-void ratio Relationship-Terzaghi's theory of one-dimensional consolidation-odometer test-effect of pressure range-settlement of a footing-Estimation of immediate and consolidation settlement-Field e-log P curve-pre-consolidation of soils

UNIT V: SHEAR STRENGTH OF SOILS (9 hours)

Mohr's stress circle-Mohr-Coulomb failure criterion-Laboratory tests for shear strength determination-Effective and total stress shear strength parameters-Shear strength characteristics of clays and sands.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Understand formation of soil and list out soil classification	PO1,PO2
CO2	Solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram	PO1,PO2,PO3
CO3	Estimate the stresses under any system of foundation loads solve practical problems related to consolidation settlement and time rate of settlement	PO1,PO2,PO3
CO4	Understand the procedure, applicability and limitations of various soil testing methods	PO1,PO2
CO5	Understand the practical site conditions and determine shear parameters	PO1,PO3

Text Books:

1. K.R.Arora,"Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, Delhi.
2. C.Venkataramiah, "Geotechnical Engineering", New Age International Pvt. Ltd, (2002).
3. Debashis Moitra, "Geotechnical Engineering", Universities Press (India) Private Limited.

Reference books:

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain,"Soil Mechanics and Foundations", Laxmi,publications Pvt. Ltd., 16th edn. New Delhi
2. Gopal Ranjan & ASR Rao, "Basic and Applied Soil Mechanics", New Age International Pvt .Ltd, New Delhi.
3. Das, B.M." Advanced Soil Mechanics", Taylor and Francis Group, London, Second edition, (2013).

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	2	3	-	-	-	-	-	-	-	-	-
CO.3	2	2	3	-	-	-	-	-	-	-	-	-
CO.4	3	2	-	-	-	-	-	-	-	-	-	-
CO.5	2	-	3	-	-	-	-	-	-	-	-	-
CO*	**2.4**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech I Semester

L	T	P	C
0	0	2	1

18CIV317: FLUID MECHANICS AND HYDRAULIC MACHINERY LABORATORY

Course Education objectives:

1. To understand the flow measurement in a pipe flow
2. To determine the energy loss in pipe flow
3. To study the characteristics of turbines
4. To study the characteristics of pumps
5. To measure the discharge in an open channel flow

LIST OF EXPERIMENTS:

1. Calibration of Venturimeter and 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 Rectangular Notch and 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. Demo on Pelton wheel turbine performance.
10. Demo on Kaplan turbine performance.
11. Efficiency test on centrifugal pump.
12. Efficiency test on Reciprocating pump.
13. Demo on Francis turbine performance.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Explain the practical knowledge about on handling various instruments including turbine, pumps and various flow measuring devices	**PO1**
CO2	Understand the concept of each equipment including turbine, pumps and various flow measuring devices	**PO2**
CO3	Describe the parameter of knowledge in the area of flow measurement and efficiency of pump and turbine	**PO3**
CO4	Conduct the experiment and interpret data for solving the design problems	**PO4**
CO5	Develop characteristics of pumps and turbines.	**PO5**
CO6	Follow the ethical principles while doing the experiments	**PO8**
CO7	Do the experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form pertaining to results of the experiments	**PO10**
CO9	Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.	**PO12**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3				-	-	-	-	-	-	-	-
CO.2		3			-	-	-	-	-	-	-	-
CO.3			3		-	-	-	-	-	-	-	-
CO.4				3	-	-	-	-	-	-	-	-
CO.5					3	-	-	-	-	-	-	-
CO.6					-	-	-	**3**	-	-	-	-
CO.7									**3**			
CO.8										**3**		
CO.9												**3**
CO*	**3**	**3**	**3**	**3**	**3**			**3**	**3**	**3**		**3**

III B.Tech I Semester

L	T	P	C
0	0	2	1

18CIV318: GEOTECHNICAL ENGINEERING LABORATORY

Course Educational Objectives:

1. To obtain the properties of soils by conducting experiments,
2. To understand the behavior of soil under various loads and conditions.
3. To Classify and evaluate the behavior of the soils subjected to various loads.

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Explain the practical knowledge about on handling of various soil testing instruments including CBR, Compaction etc	**PO1**
CO2	Understand the concept of including various soil testing instruments including CBR, Compaction etc	**PO2**
CO3	Describe the parameter of shear, compaction ,field density etc.	**PO3**
CO4	Conduct the experiment and interpret data for solving the field problems	**PO4**
CO5	Determine field marking for various engineering projects and Location of site etc.	**PO5**
CO6	Follow the ethical principles while doing the experiments	**PO8**
CO7	Do the experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form pertaining to results of the experiments	**PO10**
CO9	Continue updating their skill related to soil testing equipment and test procedure	**PO12**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3				-	-	-	-	-	-	-	-
CO.2		3			-	-	-	-	-	-	-	-
CO.3			3		-	-	-	-	-	-	-	-
CO.4				3	-	-	-	-	-	-	-	-
CO.5					3	-	-	-	-	-	-	-
CO.6					-	-	-	**3**	-	-	-	-
CO.7									**3**			
CO.8										**3**		
CO.9												**3**
CO*	**3**	**3**	**3**	**3**	**3**			**3**	**3**	**3**		**3**

III B.Tech I Semester

L T P C

0 0 2 1

18SAH311: COMMUNICATION AND SOFT SKILLS LAB

Course Educational Objectives:

1. To expose the students to variety of self-instructional, learner friendly modes of language learning.
2. To help the students cultivate the habit of reading passages from the computer monitor.
3. To enable them to learn better pronunciation through Stress, Intonation and Rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To initiate them into greater use of the computer in resume preparation, report writing.

LIST OF EXERCISES:

1. Pronunciation of English words using Phonetic sounds and Symbols.
2. Describing –Objects-People-Situations
3. Stress and Intonation
4. Oral Presentations
5. Functional English
6. Reading Comprehension
7. Vocabulary Building
8. Group Discussion
9. Resume writing and Report writing
10. Interview Skills

Course Outcomes:

On successful completion of the course, Students will be able to		**POs related to COs**
CO1	To remember and understand the different aspects of the English Language proficiency with emphasis on LSRW skills.	PO1
CO2	To analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking by group discussion.	PO2
CO3	Use of modern computing facilities and suitable software tools to improve the communication skills and elocution.	PO5
CO4	Follow the ethical principles to prepare the group tasks	PO8
CO5	Perform exercise individually and also a team to complete the task	PO9
CO6	To apply communication skills through various language learning activities.	P10
CO7	To create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.	P12

Text Books:

1. Lab manual provided by the department.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	-	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	-	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	3	-	-	-	-	-	-	-
CO.6	-	-	-	-	-	-	-	3	-	-	-	-
CO.7	-	-	-	-	-	-	-		3	-	-	-
CO.8	-	-	-	-	-	-	-	-	-	3	-	-
CO.9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	-	-	**3**	-	-	**3**	**3**	**3**	-	**3**

III B.Tech II Semester	L	T	P	C
	2	1	0	3

18CIV321 DESIGN OF STEEL STRUCTURES

Course Educational Objectives:

1. To study the Design aspects of Bolted connections and Welded connections.
2. To apply the design concepts like Tension members, Compression members.
3. To Study the Design Principles of Beams.
4. To Study the Design Principles of built–up compression members and column foundations
5. To understand the analysis and design of plate girder and its applications

UNIT I: BOLTED AND WELDED CONNECTIONS (9 hours)

Bolted Connections: Strength and efficiency of a joint, Lap Joint, Butt joint, Eccentric connections **Welded Connections:** Strength of welds, Butt and fillet welds, Design of fillet welds subjected to axial load, Design of fillet welds subjected to moment acting in the plane and at right angles to the plane of the joints, Beam to beam and beam to column connections.

UNIT II: TENSION AND COMPRESSION MEMBERS (9 hours)

Tension Members: Net effective sectional area for Angle and T-sections, Design of Tension members, Lug Angles. **Compression Members:** Effective length, Radius of gyration and Slenderness of compression members, Design Strength, Design of Axially loaded Compression members.

UNIT III: BEAMS (9 hours)

Bending, Shear and Bearing Strength, Design of Simple Beams (Laterally supported and unsupported beams), Design of Compound Beams, Design of connection of cover plates with the flanges of Beams

.

UNIT IV: BUILT–UP COMPRESSION MEMBERS AND COLUMN FOUNDATIONS (9 hours)

Built–up Compression Members: Design of Built–up Compression members, Design of Lacings and Battens, Design principles of eccentrically loaded Columns, Splicing of Columns.

Column Foundations: Design of slab Base and Gusseted Bases, Column Bases subjected Moment.

UNIT V: PLATE GIRDER (9 hours)

Design consideration – I S Code recommendations Design of plate girder-welded-Curtailment of flange plates stiffeners – splicing and connections

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Acquire knowledge about analysis and design of welded and bolted connection	PO1, PO2 ,PO3
CO2	Acquire knowledge about analysis and design of tension and compression members	PO1, PO2, PO3,
CO3	Acquire knowledge about analysis and design of beams	PO1, PO2, PO3,
CO4	Acquire knowledge about analysis and design of compression members and column foundations	PO1, PO2, PO3
CO5	Acquire knowledge about analysis and design of Plate Girder	PO1, PO2, PO3

Text books:

1. S. S. Bhavikatti,"Design of Steel Structures", I. K. International Publishing House Pvt. Ltd., 3rd Edition, 2010.
2. S. K. Duggal, "Limit State Design of Steel Structures", McGraw Hill, 2nd Edition, 2014.

Reference books:

1. N. Subramanian ,"Design of Steel Structures", Oxford University Press, 2010.
2. N. Krishna Raju, "Structural Design and Drawing", Universities Press, Hyderabad, 3rd Edition, 2009.
3. S. Ramachandra," Design of Steel Structures", Dhanpat Rai Publishing Company, 2nd Edition, 2007.
4. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Design of Steel Structures", Laxmi Publications, 2nd Edition, 2013**.**

Codes/Tables:

1. IS: 800–2007: General Construction in Steel – Code of Practice,
2. IS: 875– Part III: Code of Practice for Design Loads (Other than Earthquake) For Buildings and Structures,
3. IS: 1161-1998: Steel Tubes for Structural Purposes – Specifications,

Steel Tables, are to be permitted into the examination hall.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	1	1		-	-	-	-	-	-	-	-
CO.2	2	2	2		-	-	-	-	-	-	-	-
CO.3	1	3	3		-	-	-	-	-	-	-	-
CO.4	2	2	3		-	-	-	-	-	-	-	-
CO.5	2	3	2		-	-	-	-	-	-	-	-
CO*	**2**	**2.2**	**2.2**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech II Semester

L	T	P	C
2	1	0	3

18CIV322: Environmental Engineering- I

Course Educational Objectives:

1. To identify the sources water supply and Characterize water quality parameters.
2. To understand the conveyance from the source
3. To learn Principles behind the design of various conventional water treatment units
4. To learn Principles behind the advanced water treatment methods
5. To understand the various components involved in transmission of water from sources to distribution.

UNIT I: SOURCES OF WATER (9 hours)

Public water supply system – Planning, Objectives, Design period, Population forecasting; Water demand – Sources of water and their characteristics, Surface and Groundwater – Impounding Reservoir – Development and selection of source – Source Water quality – Characterization – Significance – Drinking Water quality standards. Protected water supply and water borne diseases

UNIT II: CONVEYANCE FROM THE SOURCE (9 hours)

Water supply – intake structures – Functions; Pipes and conduits for water – Pipe materials – Hydraulics of flow in pipes – Transmission main design – Laying, jointing and testing of pipes – appurtenances – Types and capacity of pumps – Selection of pumps and pipe materials.

UNIT III: WATER TREATMENT (9 hours)

Objectives – Unit operations and processes – Principles, functions, and design of water treatment plant units, aerators of flash mixers, Coagulation and flocculation – Clarifloccuator-Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - Residue Management –Construction, Operation and Maintenance aspects.

UNIT IV: ADVANCED WATER TREATMENT (9 hours)

Water softening – Desalination- R.O. Plant – demineralization – Adsorption - Ion exchange– Membrane Systems – RO Reject Management - Iron and Manganese removal - Defluoridation - Construction and Operation & Maintenance aspects – Recent advances - MBR process

UNIT V: WATER DISTRIBUTION AND SUPPLY (9 hours)

Requirements of water distribution – Components – Selection of pipe material – Service reservoirs – Functions – Network design – Economics – Analysis of distribution networks -Computer applications – Appurtenances – Leak detection. Principles of design of water supply in buildings – House service connection – Fixtures and fittings, systems of plumbing and types of plumbing.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Demonstrate knowledge on fundamentals of water demand and Quantity studies , Predict population forecasting study the characteristics of water and sources of water supply	PO1,PO2
CO2	Understand the knowledge about the various component involved in conveyance of water from source to treatment unit	PO1
CO3	Identify appropriate method and design water treatment units	PO3,PO1,PO6,
CO4	Understand the concept of advance water treatment unit to remove iron etc.	PO3,PO6
CO5	Understand the various water distribution systems and design procedure.	PO1,PO6,PO2

Textbooks:

1. Garg, S.K. Environmental Engineering, Vol.I Khanna Publishers, New Delhi, 2010.
2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2010.
3. Punmia, B.C.shok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi, 2014.

Reference books:

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
2. Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	-	-	-	-	-	-	-	-	-	-
CO.3	1	-	3	-	-	1		-	-	-	-	-
CO.4	-	-	2	-	-	1	-	-	-	-	-	-
CO.5	3	3	-	-	-	1	-	-	-	-	-	-
CO*	**2.5**	**2.5**	**2.5**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech II Semester

L	T	P	C
2	1	0	3

18CIV323: TRANSPORTATION ENGINEERING

Course Educational Objectives:

1. To Know about the history of highway development, surveys, alignment
2. To Study about the geometric design of highways
3. To Know about the pavement materials and design
4. To Know about the construction materials and practices
5. To Expose the students to Highway Maintenance and Drainage

UNIT I: HIGHWAY DEVELOPMENT AND PLANNING (9 hours)

Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys –Drawings and Reports.

UNIT II: HIGHWAY GEOMETRIC DESIGN (9 hours)

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

UNIT III: DESIGN OF PAVEMENTS (9 hours)

Types of Pavements – Differences between Flexible & Rigid pavements–Functions of pavement components – Design factors – Flexible pavement design methods –CBR method – Numerical examples – Design of Rigid Pavements – Wheel load stresses – Westergaard's stress equations – Stresses in rigid pavements – temperature stresses.

UNIT IV: HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE (9 hours)

Highway construction materials, properties, testing methods – CBR Test for subgrade - tests on aggregate & bitumen – Construction practice including modern materials and methods, Bituminous and Concrete road construction- Quality control measures - Construction machineries

UNIT V : HIGHWAY MAINTAINCE AND DRAINAGE (9 hours)

Need for highway maintaince- Pavement failures Flexible pavement failures and rigid pavement failure – Maintaince of highways –pavement evaluation – Importance of highway drainage –surface and subsurface drainage -cross drainage –road construction in water logged areas

Course Outcomes

On successful completion of the course the student will be able to,		POs related to COs
CO1	Acquire knowledge about the gradients patterns of road network , engineering surveys and apply them	PO1, PO2 ,PO3
CO2	Identify appropriate method and design OSD ISD SSD for roads and vertical and horizontal alignments	PO1, PO2, PO3, PO5
CO3	Identify appropriate method and design various types of pavements and advantages and disadvantages ,selecting suitable pavement based on conditions	PO1, PO2, PO3, PO5
CO4	Investigate different materials available , testing procedure , codal provisions and construction methods	PO1, PO2, PO4
CO5	Acquire knowledge about the Highway maintaince and causes and remedies for pavement failures drainage conditions	PO1, PO2 ,PO3

Text Books:

1. S.K.Khanna & C.E.G.Justo, "Highway Engineering "Nemchand & Bros., 7th edition (2000).
2. S.P.Chandola,"A Textbook of Transportation Engineering ", S.Chand Publications, New Delhi.

Reference books:

1. S.P.Bindra," Highway Engineering" , Dhanpat Rai & Sons. – 4th Edition (1981)
2. Dr.L.R.Kadyali ,"Traffic Engineering & Transportation Planning", Khanna publications – 6th Edition – 1997.
3. L.R.Kadiyali and Lal ,"Highway Engineering Design "- Khanna Publications
4. Fred L. Mannering Scott S. Was burn Walter ,"Principles of Highway Engineering and Traffic Analysis". John Wiley & Sons 2012.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	2	3		-	-	-	-	-	-	-	-
CO.2	2	3	3		2	-	-	-	-	-	-	-
CO.3	3	2	-		2	-	-	-	-	-	-	-
CO.4	2	3	-		-	-	-	-	-	-	-	-
CO.5	3	2	3		-	-	-	-	-	-	-	-
CO*	**2.4**	**2.5**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech II Semester	L	T	P	C
	2	1	0	3

18CIV324: GEOTECHNICAL ENGINEERING II

Course Educational Objectives:

1. To understand the principles of Soil exploration
2. To Develop deeper understanding of earth slope stability
3. To Develop understanding of choice of earth pressure theories
4. To Learn about advanced topics of foundation design and analyses
5. To Learn about pile foundations, caissons and well foundations

UNIT I: SOIL EXPLORATION (9 hours)

Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report

UNIT II: EARTH SLOPE STABILITY (9 hours)

Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions

UNIT III: EARTH PRESSURE THEORIES (9 hours)

Rankine‟s theory of earth pressure-cohesive and non-cohesive cases – earth pressures in layered soils – Coulomb's earth pressure theory-cohesive and non-cohesive soils **Retaining walls**: Types of retaining walls – stability of retaining walls.

UNIT IV: SHALLOW FOUNDATIONS AND ALLOWABLE BEARING PRESSURE (9 hours)

Shallow foundations: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s-Meyerhoff's and Skempton`s Methods Allowable bearing pressure: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

UNIT – V: PILE FOUNDATIONS, CAISSONS AND WELL FOUNDATIONS (9hours)

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

Caissons and Well Foundations: Types of caissons, Bearing capacity, Construction, Advantages and disadvantages, Well foundations - Shapes, Components, Sinking, Tilts and shifts

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Understand the soil exploration by various methods	PO2, PO1
CO2	Understand the analysis stability of slope by various methods.	PO1, PO2
CO3	Determine the earth pressure on retaining walls and analysis for stability	PO1, PO2
CO4	Get knowledge on bearing capacity, testing methods for shallow footings.	PO1,PO2
CO5	Determine the load carrying capacity, settlement of pile foundation	PO4, PO2

Text Books:

1. K.R.Arora, "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, Delhi, 2011.
2. C. Venkataramiah,"Geotechnical Engineering", New Age International Pvt. Ltd, (2002).

Reference books:

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain,"Soil Mechanics and Foundations", Laxmi, publications Pvt. Ltd., New Delhi
2. Gopal Ranjan & ASR Rao,"Basic and Applied Soil Mechanics", New Age International Pvt .Ltd, New Delhi.
3. Das, B.M," Advanced Soil Mechanics". Taylor and Francis Group, London, Second edition, (2013).
4. Debashis Moitra, "Geotechnical Engineering", Universities Press (India) Private Limited.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-		-	-	-	-	-	-	-	-
CO.2	3	3	-		-	-	-	-	-	-	-	-
CO.3	3	3	-		-	-	-	-	-	-	-	-
CO.4	2	2	-		-	-	-	-	-	-	-	-
CO.5	-	2		3	-	-	-	-	-	-	-	-
CO*	**2.75**	**2.6**		**3**		**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech II Semester	L	T	P	C
	2	1	0	3

18CIV325: STRUCTURAL ANALYSIS- II

Course Educational Objectives:

1. To study the concepts of Moment distribution
2. To study the concepts of Slope deflection Method
3. To study the concepts of Kani's methods of analysis of indeterminate frames
4. To study the concepts of Matrix methods of structural analysis with stiffness and flexibility matrices to analyze continuous beams, portal frames and trusses
5. To Construct the influence line diagram for the entire beam.

UNIT I: MOMENT DISTRIBUTION METHOD (9 hours)

Introduction-Fundamental propositions-moment distribution procedure- Analysis of continuous beams with and without settlement of supports using - Analysis of Single Bay Single Storey Portal Frames including side Sway - Shear force and Bending moment diagrams, Elastic curve.

UNIT II: SLOPE – DEFLECTION METHOD (9 hours)

Basic concepts-slope deflection equation derivation-SFD and BMD for fixed beams and 3 spans continuous beam with or without support settlement.

UNIT III: KANI'S METHOD (9 hours)

Introduction-terminology-Fundamental Equations-kani's iteration procedure for beams-kani's Procedure for Frames

UNIT IV: MATRIX METHOD OF ANALYSIS (9 hours)

Matrix Methods Of Analysis: Introduction to Flexibility and Stiffness matrix methods of analyses using 'system approach' up to three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods-Shear force and bending moment diagrams - Elastic curve-generalized coordinate systems-Flexibility matrix-stiffness matrix-relationship between Flexibility and stiffness metrics-flexibility method and stiffness method for two span continuous beams.

UNIT V: INFLUENCE LINES FOR INDETERMINATE BEAMS (9 hours)

Influence Lines For Indeterminate Beams: Introduction – influence line diagram for shear force and bending moment for two span continuous beam with constant and different moments of inertia - influence line diagram for shear force and bending moment for propped cantilever beams.

Course Outcomes:

	On successful completion of the course the student will be able to,	POs related to COs
CO1	Acquire the knowledge of analyzing a beam and portal frame by moment distribution method	PO1,PO2
CO2	Acquire the knowledge of analyzing a beam and portal frame by slope deflection method	PO1,PO2
CO3	Acquire the knowledge of analyzing a beam and portal frame by kani's method	PO1, PO2
CO4	To learn fundamentals about matrix method of structural analysis	PO1,PO2
CO5	Acquire knowledge about moving load and draw the ILD	PO1,PO2,

Text Books:

1. Bhavikatti, S.S," Structural Analysis Vol.1", Vikas Publishing House Pvt. Ltd., NewDelhi-4, 2016.
2. Bhavikatti, S.S, "Structural Analysis, Vol.2", Vikas Publishing House Pvt. Ltd., NewDelhi-4, 2013.
3. Reddy, C.S ,"Structural Analysis", Tata McGraw Hill, 2010.

Reference boks:

1. Hibbeler, R.C, "Structural Analysis", Pearson India, 2014.
2. William Weaver, Jr and James M. Gere" Matrix analysis of framed structures", Van Nostrand Reinhold, New York, 3rd edn. 1995.
3. Vaidyanathan, R & Perumal P," Structural Analysis, Vol.1 & 2", Laxmi Publications, New Delhi, 2004
4. Pandit G.S. and Gupta S.P,"Structural Analysis – A Matrix Approach" Tata McGraw Hill Publishing Company Ltd., 2006.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-		-	-	-	-	-	-	-	-
CO.2	3	3	-		-	-	-	-	-	-	-	-
CO.3	3	2	-		-	-	-	-	-	-	-	-
CO.4	2	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	3		-	-	-	-	-	-	-	-	-
CO*	**3**	**2.8**			-	-	-	-	-	-	-	-

III B.Tech II Semester

L	T	P	C
0	0	2	1

18CIV326: ENVIRONMENTAL ENGINEERING LAB

Course Educational Objectives:

1. To estimate PH, Chlorides, Sulphates and Nitrates in water.
2. To estimate BOD and COD of effluent.

LIST OF EXPERIMENTS:

1. Determination of pH and Turbidity.
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of B.O.D
9. Determination of C.O.D
10. Determination of Optimum coagulant dose.
11. Determination of Chlorine demand.
12. Presumptive coli form test.

Course outcomes:

On successful completion of the course, Students will be able to		**POs related to COs**
CO1	Explain the practical knowledge about on handling various equipment	**PO1**
CO2	Understand the concept of various equipment in the lab	**PO2**
CO3	Describe the parameter of physical ,chemical and biological of water and wastewater	**PO3**
CO4	Conduct the experiment and interpret data for solving the field problems	**PO4**
CO5	Determine characteristic of physical ,chemical and biological of water and wastewater and design the unit operation	**PO5**
CO6	Follow the ethical principles while doing the experiments	**PO8**
CO7	Do the experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form pertaining to results of the experiments	**PO10**
CO9	Continue updating their skill related to modern equipment and testing procedures	**PO12**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3				-	-	-	-	-	-	-	-
CO.2		3			-	-	-	-	-	-	-	-
CO.3			3		-	-	-	-	-	-	-	-
CO.4				3	-	-	-	-	-	-	-	-
CO.5					3	-	-	-	-	-	-	-
CO.6					-	-	-	**3**	-	-	-	-
CO.7									**3**			
CO.8										**3**		
CO.9												**3**
CO*	**3**	**3**	**3**	**3**	**3**			**3**	**3**	**3**		**3**

III B.Tech II Semester

L	T	P	C
0	0	2	1

18CIV327 : CONCRETE TECHNOLOGY LABORATORY

Course Educational Objectives:

1. To Understand the concept of CTM, compaction factor test etc.,
2. To describe the parameter: strength of concrete and properties of cement
3. To determine strength of concrete and do the mix design of concrete

LIST OF EXPERIMENTS

1. Normal consistency test of cement
2. Test for initial and final setting time of cement
3. Soundness test of cement
4. Specific gravity test of cement
5. Compressive strength test of cement
6. Test for fineness of cement by dry sieving
7. Bulking of sand test
8. Concrete mix design – IS 10262
9. Workability tests
10. Non Destructive Tests

Course Outcomes:

On successful completion of the course, Students will be able to		**POs related to COs**
CO1	Explain the practical knowledge about on CTM ,compaction factor test etc.,	**PO1**
CO2	Understand the concept of CTM ,compaction factor test etc.,	**PO2**
CO3	Describe the parameter strength of concrete and properties of cement	**PO3**
CO4	Conduct the experiment and interpret data for solving the field problems	**PO4**
CO5	Determine strength of concrete and do the mix design of concrete	**PO5**
CO6	Follow the ethical principles while doing the experiments	**PO8**
CO7	Do the experiments effectively as an individual and as a team member in a group.	**PO9**
CO8	Communicate verbally and in written form pertaining to results of the experiments	**PO10**
CO9	Continue updating their skill related to modern surveying equipment	**PO12**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3				-	-	-	-	-	-	-	-
CO.2		3			-	-	-	-	-	-	-	-
CO.3			3		-	-	-	-	-	-	-	-
CO.4				3	-	-	-	-	-	-	-	-
CO.5					3	-	-	-	-	-	-	-
CO.6					-	-	-	**3**	-	-	-	-
CO.7									**3**			
CO.8										**3**		
CO.9												**3**
CO*	**3**	**3**	**3**	**3**	**3**			**3**	**3**	**3**		**3**

III B.Tech II Semester

L	T	P	C
0	0	2	1

18CIV328 PROJECT SKILLS LAB

Course Educational Objectives:

1. To give an opportunity to the student to get hands on training in design and innovation.
2. To Compare and contrast the several existing solutions in the interested research area of students.
3. To Identify a research problem.
4. To Formulate and propose a research plan.
5. Reporting and presenting the findings of the work conducted.

The aim of the project skill lab is to deepen comprehension of principles by applying them to a new problem which may be the device / system / component / working mode to be created / fabricated may be decided in consultation with the supervisor and if possible with an industry. A project topic must be selected by the students in consultation with their supervisor. The students may be grouped into 3 to 5 and work under a project supervisor.

A project report to be submitted by the group and along with the model / system, which will be reviewed and evaluated for internal assessment by a Committee constituted by the Head of the Department. At the end of the semester examination the project work is evaluated based on oral presentation and the project report along with device / system / component / working model jointly by external and internal examiners constituted by the Head of the Department.

Course Outcomes:

On successful completion of course, the student will be able to		**POs related to COs**
CO1	Demonstrate in-depth knowledge on the project topic	**PO1**
CO2	Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.	**PO2**
CO3	Design solutions to the chosen project problem.	**PO3**
CO4	Undertake investigation of project problem to provide valid conclusions	**PO4**
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for project work	**PO5**
CO6	Apply project results for sustainable development of the society.	**PO6**
CO7	Understand the impact of project results in the context of environmental sustainability.	**PO7**

CO8	Understand professional and ethical responsibilities while executing the project work.	**PO8**
CO9	Function effectively as individual and a member in the project team	**PO9**
CO10	Develop communication skills, both oral and written for preparing and presenting project report.	**PO10**
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.	**PO11**
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.	**PO12**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	-	-	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	-	3	-	-	-	-	-	-	-	-
CO.5	-	-	-	-	3	-	-	-	-	-	-	-
CO.6	-	-	-	-	-	3	-	-	-	-	-	-
CO.7	-	-	-	-	-	-	3	-	-	-	-	-
CO.8	-	-	-	-	-	-	-	3	-	-	-	-
CO.9	-	-	-	-	-	-	-	-	3	-	-	-
CO.10	-	-	-	-	-	-	-	-	-	3	-	-
CO.11	-	-	-	-	-	-	-	-	-	-	3	-
CO.12	-	-	-	-	-	-	-	-	-	-	-	3
CO*	3	3	3	3	3	3	3	3	3	3	3	3

III B.Tech II Semester

L	T	P	C
0	1	0	1

18CIV329 ON-LINE COMPREHENSIVE TEST – II

Comprehensive online examinations will be conducted at the end of III year, II semester; it has 100 objective questions for 100 marks on the subjects studied in the semesters of III-I & III-II.

A student shall acquire 1 credit assigned to the comprehensive online examination only when he / she secure 40% or more marks. In case, if a student fails in comprehensive online examination, he shall reappear at the next supplementary examination when offered.

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18CIV411: TRAFFIC ENGINEERING

Course Educational Objectives:

1. To understand traffic**,** its properties, measurement, simulation and control
2. To explain Survey methods and data analysis techniques required by traffic engineers
3. To demonstrate Traffic control regulation and signal design.
4. To Define the functional area of an intersection and Identify key design elements for intersections..
5. To discuss the pollution due to traffic & its effect on environment

UNIT I: TRAFFIC PLANNING AND CHARACTERISTICS (9 hours)

Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow –PCU, peak hour factor -Traffic Stream Characteristics and Description Using Distributions: Measurement, Design of Isolated Traffic Signal by Webster method, Warrants for signalization. Design of Isolated Traffic Signal by Webster method, Warrants for signalization

UNIT II: TRAFFIC SURVEYS (9 hours)

Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including non-motorized transports – Methods and interpretation – Origin Destination Survey – Methods and Presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation –Statistical applications in traffic studies and traffic forecasting – Level of service – Concept, applications and significance.

Microscopic and Macroscopic Study of Traffic Stream Characteristics - Flow, Speed and Concentration

UNIT-III: TRAFFIC CONTROL, REGULATION SIGNAL COORDINATION

Traffic Signals –Types of Signals; Principles of Phasing; Timing Diagram;. Signal Coordination - Signal Co-ordination methods, Simultaneous, Alternate, Simple progression and Flexible progression Systems. **(9 hours)**

UNIT IV: INTERSECTION DESIGN (9 hours)

Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections- Channelization: Objectives –Traffic Islands and Design criteria-Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT V: TRAFFIC SAFETY AND ENVIRONMENT (9 hours)

Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures – Promotion and integration of public transportation – Promotion of non-motorized transport.

Course Outcomes

On successful completion of the course the student will be able to,		POs related to COs
CO1	Analyze traffic Characteristic and plan for traffic systems for various uses	PO1, PO2
CO2	Understanding about traffic studies and methods for carry out traffic studies	PO1 PO2,PO3
CO3	Develop Traffic control, regulation management Systems	PO1 ,PO4
CO4	Analysis and design intersection	PO1,PO2,PO3
CO5	Understand about traffic safety and environment hazards	PO1, PO2, PO3,PO8,

Text books:

1. Kadiyali.L.R, Traffic Engineering and Transport Planning, Khanna Publishers, Delhi, 2013
2. Salter. R.I and Hounsell N.B, Highway Traffic Analysis and design, Macmillan Press Ltd.1996.

Reference books:

1. Neufert: Architects Data by Wiley- Blackwell, 4 th Edition, Blackwell Publishing Ltd, 2012
2. Traffic Engineering - Theory & Practice , Louis J.Pignataro, Prentice Hall Publication.
3. Principles of Highways Engineering and Traffic Analysis , Fred Mannering & Walter Kilareski, John Wiley & Sons Publication.
4. Transportation Engineering - An Introduction , C.Jotin Khisty, Prentice Hall Publication.
5. Fundamentals of Transportation Engineering , C.S.Papacostas, Prentice Hall India.
6. I.T.E. Traffic Engineering Hand Book.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-		-	-	-	-	-	-	-	-
CO.2	2	3	3		-	-	-	-	-	-	-	-
CO.3	1	-		3	-	-	-	-	-	-	-	-
CO.4	2	3	3	-	-	-	-	-	-	-	-	-
CO.5	3	2	3	-	-	-	-	2	-	-	-	-
CO*	**2.2**	**2.75**	**3**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**

IV.B.Tech. I Sem.

L	T	P	C
2	1	0	3

18CIV412 ENVIRONMENTAL ENGINEERING-II

Course Educational Objective:

1. To Demonstrate the students to develop the ability to apply basic understanding of physical, chemical, and biological phenomena for sewage
2. To learn the design, operation and maintenance of Sewage treatment plants.
3. To understand sewage disposal and sludge management
4. To design the disposal method principles.
5. To explain sludge treatment and disposal.

UNIT I: PLANNING AND DESIGN OF SEWERAGE SYSTEM (9 hours)

Characteristics and composition of sewage - population equivalent -Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation – sewer appurtenances – corrosion in sewers – prevention and control – sewage pumping-drainage in buildings-plumbing systems for drainage - Rain Water harvesting.

UNIT II: PRIMARY TREATMENT OF SEWAGE (9 hours)

Objectives – Unit Operations and Processes – Selection of treatment processes –- Onsite sanitation - Septic tank- Grey water harvesting – Primary treatment – Principles, functions and design of sewage treatment units - screens - grit chamber-primary sedimentation tanks – Construction, Operation and Maintenance aspects.

UNIT III: SECONDARY TREATMENT OF SEWAGE (9 hours)

Objectives – Selection of Treatment Methods – Principles, Functions, - Activated Sludge Process and Extended aeration systems -Trickling filters– Sequencing Batch Reactor(SBR) – Membrane Bioreactor - UASB – Waste Stabilization Ponds – - Other treatment methods -Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.

UNIT IV: DISPOSAL OF SEWAGE (9 hours)

Standards for– Disposal - Methods – dilution – Mass balance principle - Self purification of river Oxygen sag curve – deoxygenation and reaeration - Streeter–Phelps model - Land disposal – Sewage farming – sodium hazards - Soil dispersion system.

UNIT V: SLUDGE TREATMENT AND DISPOSAL (9 hours)

Objectives - Sludge characterization – Thickening - Design of gravity thickener- Sludge digestion – Standard rate and High rate digester design- Biogas recovery – Sludge Conditioning and Dewatering – Sludge drying beds- ultimate residue disposal – recent advances.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Acquire the knowledge about to estimate sewage generation and design sewer system including sewage pumping stations	PO1,PO2
CO2	Identify the basic design of the unit operations and processes that are used in sewage treatment units	PO1,PO3
CO3	Understand the secondary biological treatment of sewage and design the unit	PO3,PO1
CO4	Understand the standard methods for disposal of sewage.	PO 1,PO 6
CO5	Acquire the knowledge about sludge treatment and disposal.	PO1 PO 6

Text books:

1. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers,New Delhi, 2015.
2. Duggal K.N., "Elements of Environmental Engineering" S.Chand and Co. Ltd., New Delhi, 2014.
3. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi Publications, 2010

Reference bookss:

1. Manual on Sewerage and Sewage Treatment Systems Part A,B and C, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
2. Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2010.
3. Syed R. Qasim "Wastewater Treatment Plants", CRC Press, Washington D.C.,2010
4. Gray N.F, "Water Technology", Elsevier India Pvt. Ltd., New Delhi, 2006.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	2							-	-	-	-
CO.2	1		3						-	-	-	-
CO.3	1		3						-	-	-	-
CO.4	1					2			-	-	-	-
CO.5	1					2			-	-	-	-
CO*	**1.1**	**2**	**3**			**2**			**-**	**-**	**-**	**-**

IV B.Tech I Semester	L	T	P	C
	2	1	0	3

18CIV413: ESTIMATION, COSTING AND VALUATION

Course Educational Objectives:

1. To learn core facts, concepts, principles, procedures in Estimation and Costing.
2. To study the various methods of approximate estimate and detailed estimate.
3. To learn how to take measurements and deductions for roads and irrigation projects.
4. To study specifications and rate analysis.
5. To determine value of a property

UNIT I: INTRODUCTION (9 hours)

Purpose of estimation – Rules and methods of measurement of works – Units of measurements for various items of works. long wall – short wall method – center-line method, approximate method. Types of estimates – Preliminary estimate – Plinth area estimate – Cube rate estimate – Detailed estimate – Revised estimate – Supplementary and revised estimate – Annual repair or maintenance estimate – Contingencies – L.S.Item.

Specification writing for the following items of works: Earth work excavation in foundation of a building – Plain cement concrete– R.C.C. – Brick masonry – Stone masonry – Plastering with C.M – White washing – Colour washing – Painting to steel and iron work – First class building – Second class building.

UNIT II: ESTIMATION OF BUILDINGS (9 hours)

Detailed Estimates of Buildings, **Reinforcement estimation:** Reinforcement – Bar bending and bar requirement schedule – Example problems on beams, lintel cum sunshade and one way slab.

UNIT III: EARTHWORK FOR ROADS AND CANALS (9 hours)

Earth work computations in banking and cutting for roads and canals-fully in excavation-partly in excavation and partly in embankment-Balancing depth. Example problems of canal and road partly in excavation and partly in embankment-quantity of earthworks.

UNIT IV: ANALYSIS OF RATES (9 hours)

Definition – Purpose of rates – Factors affecting rate analysis – Standard schedule of rates-**Preparation of rates for the following items of work for building:** Cement mortar (1:4) – Cement concrete (1:4:8) – Reinforced cement concrete: Lintels – Slabs – Beams – Columns in 1:1½:3 – Brick work using first class bricks in CM(1:6) – Stone masonry: C.R.S in CM (1:6) – Flooring – Plastering – Painting – White washing and colour washing – Painting for iron and wood work .

UNIT V: VALUATION (9 hours)

Definition and purpose of valuation – Different kinds of Properties for which valuation is required – Different methods of valuation – Cost of land – Factors affecting the value of

plot – Factors affecting the value of building – Rent Fixation – Mortgage – Depreciation – Valuation of residential building. Contracts and tenders: Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Acquire concept of detailed estimation and its measurements	PO1,PO2,PO3
CO2	Analyze and draw the bar bending details for two way slabs, beams and lintels.	PO1,PO2,PO3
CO3	Summarize various quantities of items required for construction of buildings, culverts and irrigation projects	PO1,PO2,PO3
CO4	Use the specifications and estimations for civil engineering works.	PO1,PO2,PO3
CO5	Determine value of a property.	PO1,PO2,

Text Books:

1. B.N. Dutta,"Text book of Estimating and Costing in Civil Engineering", UBS Publishers, New Delhi, 2017.
2. M.Chakraborthy,"Estimating,Costing,Specifications and valuation in Civil Engineering, Khanna Publications. New Delhi.

Reference Books:

1. Agarwal, Kumar," Civil Estimating, Costing, and Valuation in Civil Engineering" , Chaudary, Dhanpat Rai Publications.
2. V.V.Vazirani and S.P.Chandola ,"Estimating & Costing in Civil Engineering", Khanna publishers, New Delhi.
3. Mahajan, "Text book of Estimating and costing," UBS Publications.
4. G.S.Biridie," Estimation and costing", Dhanpat Rai Publications.
5. Rangwala, "Estimation and costing", UBS Publications.

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	1	1		-	-	-	-	-	-	-	-
CO.2	2	2	2		-	-	-	-	-	-	-	-
CO.3	1	2	3		-	-	-	-	-	-	-	-
CO.4	1	2	3		-	-	-	-	-	-	-	-
CO.5	3	1			-	-	-	-	-	-	-	-
CO*	**2**	**1.6**	**2.25**		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech I Semester

L	T	P	C
2	0	2	0

18AUD411 PROFESSIONAL ETHICS
(Common to ALL Branches)

Course Educational Objectives:

1. To develop the human values in work place, society and everywhere.
2. To understand the importance of engineering ethics with the mentors' theory on ethics
3. To inculcate codes of ethical values to the engineers in the society
4. To understand the ethical issues on safety, responsibilities and human rights in society.
5. To know the ethics issues on environmental, weapons, computers ethics & Moral leaderships.

UNIT - 1: HUMAN VALUES (6)

Morals, values and ethics – Integrity – Work Ethic –Honesty – courage – Empathy – Self-confidence – Character.

UNIT - 2: ENGINEERING ETHICS (6)

Senses of 'Engineering Ethics' – Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy – Kohlberg's theory – Gilligan's theory – Consensus and controversy – Models of professional roles – Theories about right action – Self-interest – Customs and religion – Uses of ethical theories – Valuing time – Co-operation – Commitment.

UNIT - 3: ENGINEERING AS SOCIAL EXPERIMENTATION (6)

Engineers as responsible experimenters – Codes of ethics – A balanced outlook on law – The challenger case study.

UNIT - 4: SAFETY, RESPONSIBILITY AND RIGHTS (6)

Safety and risk – Assessment of safety and risk – Risk benefit analysis – The Three Mile Island and Chernobyl case studies.

UNIT - 5: GLOBAL ISSUES (6)

Multinational corporations – Environmental ethics - Computer ethics – Weapons development – Engineers as managers – Engineers as expert witnesses and advisors – Moral leadership.

Course Outcomes:

After the completion of this course, a successful student is able to		POs related to COs
CO1	Develop the human values in work place, society and everywhere.	PO6,PO8,PO9, PO11,PO12
CO2	Understand the importance of engineering ethics with the mentors' theory on ethics	PO6,PO8,PO9, PO11,PO12
CO3	Inculcate codes of ethical values to the engineers in the society	PO6,PO8, PO12
CO4	Understand the ethical issues on safety, responsibilities and human rights in society.	PO6,PO8,PO9, PO12
CO5	Know the ethics issues on environmental, weapons, computers ethics & Moral leaderships	PO6,PO7,PO8,PO9

Text books:

1. A Textbook on Professional Ethics and Human Values, 1/e, 2006, Naagarazan R.S., New Age International (P) Ltd, Publishers, New Delhi.
2. Professional Ethics and Human Values, S. Dinesh Babu, Laxmi Publications (P) Ltd, New Delhi.

Reference books:

1. Engineering Ethics, 2004, M. Govindarajan, S. Natarajan, V.S.Senthil Kumar, Prentice - Hall of India, Pvt. Ltd., and New Delhi.
2. Engineering Ethics, 2004, Charles D. Fleddermann, Pearson Education/ Prentice-Hall, New Jersey (Indian reprint now available).
3. Engineering Ethics- Concepts and Cases, 2000, Charles E Harris, Michael S. Protchard and Michael J Rabins, Wadsworth Thompson Leaning, United States (Indian reprint now available).
4. Ethics in Engineering, Mike Martine and Roland Schinzinger, Tata McGraw- Hill Education, Pvt. Ltd.,Noida.
5. Ethics and the Conduct of Business, 2003, John R Boatright, Pearson Education, New Delhi.
6. Fundamentals of Ethics for Scientists and Engineers, 2001, Edmund G Seebauer and Robert L Barry, Oxford University press, Oxford.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	-	3	2	-	1	2
CO2	-	-	-	-	-	2	-	3	2	-	1	2
CO3	-	-	-	-	-	3	-	3	-	-	-	2
CO4	-	-	-	-	-	2	-	3	2	-	-	2
CO5	-	-	-	-	-	2	2	3	2	-	-	-
CO*	**-**	**-**	**-**	**-**	**-**	**2.2**	**2**	**3**	**2**	**-**	**1**	**2**

IV B.Tech I Semester

L	T	P	C
0	0	2	1

18CIV416 TRANSPORTATION ENGINEERING LAB

Course Educational Objectives:

1. Learn the principles and procedures of Highway materials and to get hands on experience by conducting the tests and evolving inferences.

LIST OF EXPERIMENTS

I. TESTS ON AGGREGATES

1. Specific Gravity
2. Gradation of Aggregate
3. Crushing Strength
4. Abrasion Value
5. Impact Value
6. Water Absorption
7. Flakiness and Elongation Indices

II. TESTS ON BITUMEN

1. Specific Gravity
2. Penetration
3. Specific Gravity
4. Softening Point
5. Ductility
6. Flash and fire points.
7. Viscosity

Course outcome:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Explain the practical knowledge on handling CTM machine and other relevant equipments	PO1
CO2	Understand the concept of CTM machine	PO2
CO3	Describe the parameter of strength of aggregate and physical properties of bitumen	PO3
CO4	Conduct the experiment and interpret data for solving the field problems	PO4
CO5	Determine strength of aggregate and bitumen to prepare new mix design pavement	PO5
CO6	Follow the ethical principles while doing the experiments	PO8
CO7	Do the experiments effectively as an individual and as a team member in a group.	PO9
CO8	Communicate verbally and in written form pertaining to results of the experiments	PO10
CO9	Determine Grade of aggregate and bitumen to prepare new mix design pavement	PO12

Text Books:

1. S.K. Khanna and C.E.G Justo, Highway Materials Testing Laboratory Manual, Nem Chand Bros. Roorkee
2. Lab manual on High way Engineering by Ajay.K.Duggal & Vijay .P.Puri, New Age Publications, New Delhi

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3				-	-	-	-	-	-	-	-
CO.2		3			-	-	-	-	-	-	-	-
CO.3			3		-	-	-	-	-	-	-	-
CO.4				3	-	-	-	-	-	-	-	-
CO.5					3	-	-	-	-	-	-	-
CO6					-	-	-	**3**	-	-	-	-
CO7									**3**			
CO8										**3**		
CO9												**3**
CO*	**3**	**3**	**3**	**3**	**3**			**3**	**3**	**3**		**3**

IV B.Tech I Semester	L	T	P	C
	0	0	2	1

18CIV417: COMPUTER AIDED ANALYSIS AND DESIGN LAB

CAD SOFTWARE:

STAAD PRO or Equivalent

Course Educational Objectives:

1. Study impart knowledge to students on structures by using STAAD..
2. Study the frame analysis and design
3. Study the structural slabs using STAAD.
4. Study Equivalent design loads for two-way slabs
5. Study design of simple towers.
6. Study the analysis of ground floor by using STAAD.
7. Study the column analysis and design by STAAD.

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. 3-D Frame Analysis and Design
3. One Way Slab Analysis & Design(G+1)
4. Two Way Slab Analysis & Design(G+2)
5. Design of wind load analysis and earthquake loads.
6. Design and analysis of ground floor
7. Column Analysis & Design

Text Book:

1. Sasha Prakash, M.N. and C.S. Suresh. Computer Aided Design Lab Manual.

Course outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Develop knowledge on design procedure for specific building components and programming knowledge for STADD PRO software.	**PO1**
CO2	Analysis of various types of force and its influences on building components	**PO2**
CO3	Design the model and develop building components.	**PO3**
CO4	Investigate the results of analyzing tool with theoretical calculation.	**PO4**
CO5	Create models and analys using STADD PRO software.	**PO5**
CO6	Follow ethical principles in designing, simulating and implementing various procedures used in software tools.	**PO8**
CO7	Do experiments effectively as an individual.	**PO9**
CO8	Communicate verbally and in written form, the understandings about the experiments.	**PO10**
CO9	Utilize the knowledge of the theory and principles of the new technologies and information systems in the design of products and processes.	**PO12**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2		-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	3	-	-	-	-
CO7	-	-	-	-	-	-	-	-	2	-	-	-
CO8	-	-	-	-	-	-	-	-	-	2	-	-
CO9	-	-	-	-	-	-	-	-	-	-	-	3
CO*	**3**	**3**	**3**	**2**	**3**	-	-	3	2	**2**	-	**3**

IV B.Tech II Semester	L	T	P	C
	2	1	0	3

18CIV421: PRESTRESSED CONCRETE

Course Educational Objectives:

1. To understand the behavior and performance of prestressed concrete structures.
2. To gain knowledge about Pre-stressing losses.
3. To gain knowledge about analysis and design of section for flexure
4. To gain knowledge about analysis and design of section for shear
5. To gain knowledge about analysis and design of prestressed tensile and compressive member

UNIT I: INTRODUCTION (9 hours)

Introduction – Basic principles of prestressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel –Methods of prestressing – Freyssinet, Magnel, Lee-McCall and Gifford Udall anchorage systems

UNIT II: LOSSES IN PRESTRESSED CONCRETE (9 hours)

Pre-stressing losses- Elastic shortening- Losses due to shrinkage- Loss due to creep –Loss due to friction – Loss due to curvature etc- IS code provision. Losses of prestress in post - tensioned and pre-tensioned members.

UNIT III: ANALYSIS OF SECTIONS FOR FLEXURE (9 hours)

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons. design of sections for flexure :- Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT IV: DESIGN OF SECTION FOR SHEAR (9 hours)

Shear and Principal Stresses – Design for Shear in beams. Composite section: Introduction – Analysis of stress – Differential shrinkage – General designs considerations. End block design

UNIT V: DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS (9 hours)

Deflections – Importance of control- influencing factors – short term deflections of uncracked member's prediction of long term.

Role of prestressing in members subjected to Tensile forces and compressive forces - Design of tension and compression members – Tanks, pipes and poles – Partial prestressing – Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing

Course Outcomes:

	On successful completion of the course the student will be able to,	POs related to COs
CO1	Acquire knowledge on methods of prestressing and principles	PO1, PO2
CO2	Develop knowledge about Pre-stressing losses.	PO1
CO3	Analyse the pre stressed beam with flexure	PO1,PO2
CO4	Analyze the pre stressed beam with shear condition	PO1, PO2,PO3
CO5	Design the pre stresses concrete member under tension and compression	PO1, PO2,PO3

Text Books:

1. Krishna Raju N ,"Prestressed concrete". Tata McGraw Hill Company, sixth edition, 2020.
2. Pandit.G.S. and Gupta.S.P," Prestressed Concrete", CBS Publishers and Distributers Pvt.Ltd., Second edition, 2014.

References books:

1. Lin T.Y. and Ned.H.Burns," Design of prestressed Concrete Structures", John Wiley and Sons,1982.
2. Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House, 2002.
3. Sinha.N.C. and Roy.S.K.,"Fundamentals of Prestressed Concrete" S.Chand and Co.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	1	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	-	-	-	-	-	-	-	-	-	-
CO.3	1	3	-	-	-	-	-	-	-	-	-	-
CO.4	1	2	3	-	-	-	-	-	-	-	-	-
CO.5	1	3	2	-	-	-	-	-	-	-	-	-
CO*	**1.8**	**2.25**	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech II Semester

L	T	P	C
2	1	0	3

18CIV422 ADVANCED STRUCTURAL DESIGN

Course Educational Objectives:

1. To able to design cantilever retaining wall structures.
2. To study the principles of bunkers, roof system, foundation and other important structures.
3. To study the different types of water tanks, bunkers and grid floor.
4. To study the water tanks resting on the ground level.
5. To study the analysis of grid floors.

UNIT – I **(9 hours)**.
Design and analysis of Grid floor.
UNIT – II **(9 hours)**
Design of circular and Rectangular Water tanks at Ground level and elevated with staging.
UNIT – III **(9 hours)**
Design of Flat slabs.
UNIT – IV **(9 hours)**
Analysis and Design of Circular concrete chimney.
UNIT – V **(9 hours)**
Design of concrete bunkers of circular shape – (excluding staging) – introduction to Silos.

Course Outcomes:

Upon completion of this course the student will be able to		**POs related to COs**
CO1	Aanalyze and design cantilever retaining wall with reference to Indian standards	PO1, PO2 ,PO3
CO2	Design and analyse the water retaining and storage structures	PO1, PO2 ,PO3
CO3	Evaluate the design of grid floors.	PO1, PO2 ,PO3
CO4	Design and analyze silos and chimneys	PO1, PO2 ,PO3
CO5	Evaluate the design of bunkers.	PO1, PO2 ,PO3

Text books:

1. Krishna Raju," Structural Design and Drawing (RCC and Steel), Universities Press, New Delhi
2. Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain "R.C.C Structures", Laxmi Publications, New Delhi.

Reference Books:-

1. M.L. Gambhir," Design Of RCC Structures" P.H.I. Publications, New Delhi.
2. P.C. Varghese," Advanced RCC", PHI Publications, New Delhi.
3. Sushil Kumar," R.C.C Designs", Standard Publishing House.
4. N.C. Sinha and S.K.Roy," Fundamentals of RCC", S.Chand Publications, New Delhi.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	2	3			-	-	-	-	-	-	-
CO.2	1	2	3			-	-	-	-	-	-	-
CO.3	1	2	3			-	-	-	-	-	-	-
CO.4	1	2	3			-	-	-	-	-	-	-
CO.5	1	2	3			-	-	-	-	-	-	-
CO*	1	2	3			-	-	-	-	-	-	-

IV B.Tech II Semester

L	T	P	C
0	0	20	10

18CIV425 PROJECT WORK

Course Educational Objectives:

1. Discovering potential research areas in the field of Civil Engineering.
2. Comparing and contrast the several existing solutions for the problem identified.
3. Formulating and propose a plan for creating a solution for the research plan identified.
4. Conducting the experiments as a team and interpret the results.
5. Reporting and presenting the findings of the work conducted.

The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design / fabrication / analysis for a specific application, a research project with a focus on an application needed by the industry / society, a computer project, a management project or a design and analysis project. A project topic must be selected by the students in consultation with their guides.

To train the students in preparing project reports and to face reviews and viva voce examination. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated jointly by external and internal examiners constituted by the Head of the Department based on oral presentation and the project report.

On successful completion of course, the student will be able to		**POs related to COs**
CO1	Demonstrate in-depth knowledge on the project topic	**PO1**
CO2	Identify, analyze and formulate complex problem chosen for project work to attain substantiated conclusions.	**PO2**
CO3	Design solutions to the chosen project problem.	**PO3**
CO4	Undertake investigation of project problem to provide valid conclusions	**PO4**
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for project work	**PO5**
CO6	Apply project results for sustainable development of the society.	**PO6**
CO7	Understand the impact of project results in the context of environmental sustainability.	**PO7**
CO8	Understand professional and ethical responsibilities while executing the project work.	**PO8**

CO9	Function effectively as individual and a member in the project team	**PO9**
CO10	Develop communication skills, both oral and written for preparing and presenting project report.	**PO10**
CO11	Demonstrate knowledge and understanding of cost and time analysis required for carrying out the project.	**PO11**
CO12	Engage in lifelong learning to improve knowledge and competence in the chosen area of the project.	**PO12**

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-
CO6	-	-	-	-	-	3	-	-	-	-	-	-
CO7	-	-	-	-	-	-	3	-	-	-	-	-
CO8	-	-	-	-	-	-	-	3	-	-	-	-
CO9	-	-	-	-	-	-	-	-	3	-	-	-
CO10	-	-	-	-	-	-	-	-	-	3	-	-
CO11	-	-	-	-	-	-	-	-	-	-	3	-
CO12	-	-	-	-	-	-	-	-	-	-	-	3
CO	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**

Core Elective – I

IV B.Tech I

L	T	P	C
3	0	0	3

18CIV414A (CE-I) AIR POLLUTION AND CONTROL ENGINEERING

Course Educational Objectives:

1. To provides the knowledge about the various sources of Air pollution and its effects on human beings , Vegetation and Materials.
2. To Analyse various the air pollutant dispersion models
3. To provide knowledge about control methods and details of control equipments
4. To demonstrate Various sources of Noise polltion and control measures
5. To Identify the major sources of noise pollution, effects and control measures

UNIT I: SOURCES AND EFFECTS OF AIR POLLUTANTS (9 hours)

Air Pollution – Definitions, Scope- Significance and Episodes- Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary- point and Non-Point- Line and Areal Sources of air pollution- stationary and mobile sources. Effects of Air pollutants on man-material and vegetation- Global effects of air pollution – Green House effect- Heat Islands- Acid Rains- Ozone Holes etc. Lapse Rates- Pressure Systems- Winds and moisture plume behavior and plume Rise Models- Gaussian Model for Plume Dispersion

UNIT II: DISPERSION OF POLLUTANTS (9 hours)

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SOx; NOx; CO; HC etc., air-fuel ratio- Computation and Control of products of combustion- Meteorology and plume Dispersion- properties of atmosphere- Heat- Pressure- Wind forces- Moisture and relative Humidity- Influence of Meteorological phenomena on Air Quality wind rose diagrams.

UNIT III: AIR POLLUTION CONTROL (9 hours)

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment – gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

UNIT IV : AIR QUALITY MANAGEMENT (9 hours)

Air quality standards – Air quality monitoring – Preventive measures – Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement

UNIT V: NOISE POLLUTION (9 hours)

Introduction -Sources of noise pollution – Effects – Assessment – Standards – Control methods – Prevention- Environmental Impact Assessment and Air quality.

Course Outcomes:

On successful completion of the course the student will be able to		POs related to Cos
CO 1	Identify the major sources of air pollution and understand their effects on health and environment.	PO1, PO7
CO 2	Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models	PO2, PO3
CO 3	Design the control techniques for particulate and gaseous emissions	PO3, PO1
CO 4	Understand the standards of air quality and legal framework	PO1, PO6
CO 5	Identify the major sources of noise pollution, effects and control measures	PO1, PO7

Text Books:

1. M. N. Rao and H. V. N. Rao," Air pollution",– Tata McGraw Hill Company.
2. K.V.S.G. Murali Krishna ,"Air pollution and control", Kaushal Publishers.

Reference Books:

1. S.Padmanabham murthy," Enivronmental meteorology" , I.K.International Pvt Ltd,New Delhi.
2. BSN.Raju ,Fundamentals of air pollution, Oxford and IBH Pubishers,India.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2			-	-	-	2	-	-	-	-	-
CO.2	-	2	2	-	-	-	-	-	-	-	-	-
CO.3	2		2	-	-	-	-	-	-	-	-	-
CO.4	1			-	-	3	-	-	-	-	-	-
CO.5	2			-	-	-	2	-	-	-	-	-
CO*	**1.75**	**2**	**2**	-	-	3	2	-	-	-	-	-

IV B.Tech I Semester

L	T	P	C
2	1	0	3

8CIV414B (CE-I) BRIDGE ENGINEERING

Course Educational Objectives:

1. To explain the loading standards
2. To study the design of deck slab bridge.
3. To study the design of the T-beam bridge
4. To study the design of the plate girder bridge and rocker and roller bearings
5. To explain features, forces acting on piers and abutments

UNIT I: INTRODUCTION TO LOADING STANDARDS (9 hours)
Highway Bridge Loading Standards- Impact Factor- Railway Bridge Loading Standards (B.G. ML Bridge) Various Loads in Bridges. IRC Bridge loading standards.

UNIT II: DECK SLAB BRIDGE (9 hours)
Introduction – Effective Width Method of Analysis Design of Deck Slab Bridge (Simply Supported) Subjected to Class AA Tracked Vehicle Only.

UNIT III: BEAM AND SLAB BRIDGE (T-BEAM BRIDGE) (9 hours)
General Features – Design of Interior Panel of Slab – Pigeauds Method – Design of a T-Beam Bridge Subjected to Class AA Tracked Vehicle Only.

UNIT IV: DESIGN OF PLATE GIRDER BRIDGE AND BEARINGS (9 hours)
Plate Girder Bridge: Introduction – Elements of a Plate girder and their Design. Design of a Deck Type Welded Plate Girder.
Bridge bearings: General Features – Types of Bearings – Design Principles of Steel Rocker & Roller Bearings.

UNIT V: INTRODUCTION TO PIERS & ABUTMENTS (9 hours)
General Features – Bed Block – Materials Piers & Abutments Types Of Piers – Forces Acting On Piers – Stability Analysis of Piers – General Features of Abutments –Forces Acting On Abutments – Stability Analysis of Abutments.

Course Outcomes:

Upon completion of the course, the students will be able to		POs related to COs
CO1	Understand the loading standards	PO1, PO2
CO2	Design the deck slab bridge	PO1, PO2, PO3, PO5
CO3	Design the T-beam bridge	PO1, PO2, PO3, PO5
CO4	Design the plate girder bridge and rocker and roller bearings	PO1, PO2, PO4
CO5	Understand the Stability analysis of pier and abutment	PO1, PO4,

Text books:

1. Ponnu Swami," Bridge Engineering", Tata Mcgraw Hill Company, New Delhi
2. N. Krishnam Raju," Design of Bridges", Oxford & IBH, Publishing Company Pvt.Ltd. Delhi.

Reference Books:

1. B.C. Punmia, Ashok Kumar Jain and Arun KumarJain, "Design of Steel Structures", Laxmi Publications, New Delhi.
2. D.J.Victor," Essentials of Bridge Engineering", Oxford IBH Publishers Ltd
3. T.R.Jagadish & M.A.Jayaram," Design of Bridges Structure", Prentice Hall of India Pvt., Delhi.
4. Relevant – IRC & Railway Bridge Codes.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3				-	-	-	-	-	-	-
CO.2	1	2	2		1	-	-	-	-	-	-	-
CO.3	1	2	2		1	-	-	-	-	-	-	-
CO.4	2	2		1		-	-	-	-	-	-	-
CO.5	2			1		-	-	-	-	-	-	-
CO*	**1.6**	**2.25**	**2**	**1**	**1**	-	-	-	-	-	-	-

IV B.Tech I Semester

L	T	P	C
2	1	0	3

18CIV414C (CE-I) TALL STRUCTURES

Course Educational Objectives:

1. Understand the design philosophy of tall buildings,
2. The loading and behavior of structural systems.
3. Enlighten the students on modern techniques available for the Analysis of tall buildings.
4. Implement design philosophies for the development of high rise structures.
5. Perform stability analysis using various methods for tall buildings.

UNIT I: DESIGN CRITERIA AND MATERIALS (9 hours)

Design Philosophy - Modern concepts – Materials used – Types of concrete-High Performance Concrete, Fiber Reinforced Concrete, Light weight concrete, Self-Compacting Concrete, Glass, High strength steel.

UNIT II: LOADING (9 hours)

Gravity Loading – Dead load, Live load – Live load reduction techniques, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods.

UNIT III: BEHAVIOUR OF STRUCTURAL SYSTEMS (9 hours)

Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, in filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, out rigger braced Hybrid systems.

UNIT IV: ANALYSIS (9 hours)

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3Danalysis, Evaluation of frequency of vibration of structures – Buckling analysis of tall structures.

UNIT V: DESIGN PARAMETERS (9 hours)

Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance. Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads.

Course outcomes:

Upon completion of this course, the student will be able to		POs related to COs
CO1	understanding on the behavior of tall buildings subjected to Lateral building	PO1, PO2
CO2	know about the principles of designing safer tall structures as per the existing codes	PO1, PO2, PO3, PO5
CO3	Analyze the behavior of tall buildings subjected to lateral loading.	PO1, PO2, PO3, PO5
CO4	choose computerized general three dimensional analysis for high rise building	PO1, PO2, PO4
CO5	judge the effects of differential effects like creep, temperature on buildings	PO1, PO4,

Text books:

1. Bryan Stafford Smith and Alex Coull, Tall Building Structures, Analysis and Design, John Wiley and Sons, Inc., 1991.
2. Taranath B.S, Structural Analysis and Design of Tall Buildings, McGraw Hill, 1988.

Reference Books:

1. Coull, A. and Smith Stafford's, Tall Buildings, Pergamon Press, London, 1997.
2. LinT.Y. And Burry D.Stotes, Structural Concepts and Systems for Architects and Engineers, John Wiley, 1994.
3. Lynn S.Beedle Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.
4. Wolfgang Schuler, High Rise Building Structures, John Wiley & Son, New York, 1977

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	3				-	-	-	-	-	-	-
CO.2	1	2	2		1	-	-	-	-	-	-	-
CO.3	1	2	2		1	-	-	-	-	-	-	-
CO.4	2	2		1		-	-	-	-	-	-	-
CO.5	2			2		-	-	-	-	-	-	-
CO*	**1.4**	**2.33**	**2**	**1.5**	**1**	-	-	-	-	-	-	-

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18CIV414D (CE -I) PRINCIPLES OF WATER QUALITY MANAGEMENT

Course Educational Objectives:

1. To explain the importance of water quality management and fundamentals of ground water flow.
2. To introduce the concept of urban storm water quality management and ground water modelling techniques
3. To provide the knowledge about ground water flow
4. To explain various sources of ground water pollution and its impacts
5. To discuss ground water remediation.

UNIT 1 : POLLUTION OF SURFACE WATER BODIES AND IMPACT (9 hours)

Introduction- importance of water quality management-Pollution of surface water bodies – Rivers, Reservoirs and Lakes –The impacts on the natural water bodies -Sampling procedures for the estimation of characteristics. Pollution effects, pollution control techniques.

UNIT 2 : WATER QUALITY MODELING (9 hours)

Modeling the fate of pollutant in natural water- Fundamentals of process and mechanisms Conventional Streeter-Phelps BOD-DO models- Critical deficit and time required to reach the critical deficit, Types of water quality effects.

UNIT 3 : FUNDAMENTALS OF GROUND WATER FLOW (9 hours)

Introduction -Fundamentals of ground water flow – variations of ground water levels, fluctuations due to Evapo-transpiration- Meteorological phenomena – Ground water saturation harmful effects.

UNIT 4 : GROUNDWATER POLLUTION AND MANAGEMENT (9 hours)

Groundwater pollution and management – Sources of ground water pollution and their effects – municipal, industrial- agricultural and miscellaneous- ground water basin investigations- Ground water modeling techniques.

UNIT 5 : URBAN STORM WATER QUALITY MANAGEMENT (9 hours)

Introduction to Urban storm water quality management - Groundwater remediation – Groundwater recharging- recharging methods.

Course Outcomes:

On successful completion of the course the student will be able to Course		POs related to COs
CO1	Explain about various sources of water pollution and its impacts	PO1, PO2,PO6,PO7,PO8
CO2	Demonstrate the water quality mathematical modeling	PO1 PO6,PO7,PO8
CO3	Acquire the knowledge on ground water flow	PO3, PO1 PO6,PO7,PO8
CO4	Demonstrate various sources of ground water pollution and its impacts	PO3, PO6,PO7,PO8
CO5	Explain about ground water remediation.	PO1 PO6,PO7,PO8

Text Books:

1. James,A ,"An introduction to Water quality modeling", 2nd edn, Weiley.
2. Peter krenkal, Water quality management, 2nd edition, Elsevier.

Reference Books:

1. D. K. Todd and Larry W. ," Ground Water Hydrology", 3rd edition Weiley.
2. Chopra, S.C, "Surface water quality modeling", Waveland press.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	2		-	-	1	1	1	-	-	-	-
CO.2	1			-	-	1	1	1	-	-	-	-
CO.3	1		3	-	-	1	1	1	-	-	-	-
CO.4			2	-	-	1	1	1	-	-	-	-
CO.5	2			-	-	1	1	1	-	-	-	-
CO*	**1.5**	**2**	**2.5**	-	-	1	1	1	-	-	-	-

IV B.Tech I Semester	L	T	P	C
	3	0	0	3

18CIV414E (CE-I) REMOTE SENSING AND GIS

Course Educational Objectives:

1. To know the basics, importance, analysis and applications of RS and GIS
2. To study the various types of operating systems of RS and GIS
3. To know the applications of RS and GIS
4. To Gain experience in the applications of remote sensing and GIS to solving problems in the environmental and life sciences;
5. To Gain experience in the use of image processing and GIS software.

UNIT I: INTRODUCTION TO REMOTE SENSING (9 hours)

Concept and scope of remote sensing: Definitions, Process and Characteristics of Remote Sensing System, Advantages and limitations.

Concept of electromagnetic radiation (EMR): Wavelength-frequency-energy relationship of EMR, EMR Spectrum and its properties, EMR wavelength regions and their applications, Spectral signatures.

UNIT II: PLATFORMS AND SENSORS (9 hours)

Introduction: Sensor materials, Sensor System - Framing and Scanning System, Whiskbroom scanners, Push-broom scanners.

Types and characteristics of sensor: Imaging and non-imaging sensors, Active and passive sensors, Resolution of Sensors - Spectral, Spatial, Radiometric & Temporal, Scale, Mapping unit, Multi-band concepts and False Colour Composites.

Remote sensor platforms and satellite orbits: Ground, Airborne and Space borne Platforms, Orbital Characteristics – Coverage, Passes, Pointing Accuracy, Geostationary, Sun synchronous, shuttle orbit.

Energy interaction in the atmosphere and with earth surface features: Scattering, absorption, transmission, atmospheric windows Spectral Reflectance Curve, Concept of signatures.

UNIT III: REMOTE SENSING APPLICATIONS (9 hours)

Scope of Remote Sensing Applications - Potentials and Limitations. Applications in land use and land cover analysis. Resource evaluation - Soils, forest and agriculture. Water Resource Applications- Mapping, monitoring of surface water bodies, tanks, lakes/reservoirs. Environmental applications.

UNIT IV: GEOGRAPHIC INFORMATION SYSTEM (9 hours)

Basic Concepts: Definition of GIS, Components of GIS, Variables - points, lines, polygon, Functionality of GIS, Areas of GIS application, Advantage and Limitation of GIS

UNIT V: GIS DATA (9 hours)

Spatial and Attribute Data, Information Organization and Data Structures – Raster and Vector data structures, Data file and database

Creating GIS Database: GIS Software's, file organization and formats, Geo-database, Database model, Rectification, Digitization and Map Composition

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Explain the principles and applications of Remote Sensing and various types of platforms used in Remote Sensing.	PO2, PO3,PO1
CO2	Understand the principles of remote sensing and digital image processing;	PO1
CO3	Understand the principles of geographic information systems (GIS)	PO1, PO4, PO2
CO4	Gain experience in the applications of remote sensing and GIS to solving problems in the environmental and life sciences;	PO1, PO3
CO5	Gain experience in the use of image processing and GIS software	PO3

Text Books:

1. M. Anji Reddy," Text Book of Remote Sensing and Geographic Information System" , BS Publication.
2. Lo C.P. & Yeung A.K.W,"Concepts and Techniques of GIS", Prentice-Hall of India, New Delhi, 2004

Reference Books:

1. B.Bhatta,"Remote sensing and Geographic Information System", Oxford Publications.
2. Siddiqui, M.A., Sharda Pustak Bhavan,"Introduction to Geographical Information System", Allahabad, 2006
3. Paul J, Longman,"Principles of Remote Sensing", Curran, London, 1985.
4. Data User Handbook, NRSA, IRS, Hyderabad

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	2	2									
CO.2	3											
CO.3	1	2		2								
CO.4	1		2									
CO.5			2									
CO*	**1.5**	**2**	**2**	**2**								

IV B.Tech I Semester

L	T	P	C
2	1	0	3

18CIV414F (CE-1): PREFABRICATED STRUCTURES

Course Educational Objectives:

1. To impart knowledge to students on modular construction.
2. To industrialized construction and design of prefabricated elements and construction methods.
3. To study of cross section based on efficiency of material.
4. To study Equivalent design loads for considering abnormal effects.
5. To study design of abnormal loads.

UNIT I: INTRODUCTION (9 hours)

Need for prefabrication – Principles – Materials – Modular coordination – Standardization – Systems – Production – Transportation – Erection-Prefabrication techniques

UNIT II: PREFABRICATED COMPONENTS (9 hours)

Behavior of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls-prefabrication methods

UNIT III: DESIGN PRINCIPLES (9 hours)

Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

UNIT IV: JOINT IN STRUCTURAL MEMBERS (9 hours)

Joints for different structural connections – Dimensions and detailing – Design of expansion joints-types joints in structural elements.

UNIT V: DESIGN FOR ABNORMAL LOADS (9 hours)

Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., – Importance of avoidance of progressive collapse

Course outcomes:

Upon completion of this course, the student will be able to:		POs related to COs
CO1	Explain about need, principles of prefabricated elements	PO1, PO2
CO2	Analyse the components of prefabricated elements	PO3,PO2
CO3	Demonstrate the design principles	PO1, PO2, PO3, PO5
CO4	Explain the design of expansion joints.	PO1, PO2, PO4
CO5	Design for abnormal effects like earthquakes, cyclones, etc.	PO1, PO4,

TEXTBOOKS:

1. Bruggeling A.S. G and Huyghe G.F. "Prefabrication with Concrete", A.A. Balkema Publishers,USA,1991.
2. Lewitt,M. " Precast Concrete- Materials, Manufacture, Properties And Usage", Applied Science Publishers , London And New Jersey, 1982.
3. Bachmann, H. and Steinle, A. "Precast Concrete Structures", Ernst & Sohn, Berlin, 2011.

REFERENCES:

1. Koncz T., "Manual of precast concrete construction", Vol. I, II and III, Bauverlag, GMBH, 1976.
2. "Handbook on Precast Concrete Buildings", Indian Concrete Institute, 2016.
3. "Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3			-	-	-	-	-	-	-	-
CO.2	-	2	3		-	-	-	-	-	-	-	-
CO.3	1	1	2		3	-	-	-	-	-	-	-
CO.4	1	2		3	-	-	-	-	-	-	-	-
CO.5	2	-		3	-	-	-		-	-	-	-
CO*	**1.5**	**2**	**2.5**	**3**	**3**	**-**	**-**		**-**	**-**	**-**	**-**

Core Elective – II

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18CIV415A (CE II) RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING

Course Educational Objectives:

1. To explain functions of various Components like Rails, Sleepers, Ballast
2. To explain railway stations & yards and geometric design of railway track
3. To Obtain knowledge on harbours, docks , break water , jetties, landing stages and wharves.
4. To expose the students to planning, design, construction and maintenance and planning and design principles of Airports
5. Design airport Elements Like runway, taxiway etc.

UNIT – I: INTRODUCTION TO RAILWAY ENGINEERING (9 hours)

Permanent way components – Cross Section of Permanent Way – Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density

Tunneling:

Definition – types of tunneling – Drainage in tunnels – ventilation of tunnels – lining of tunnels –underground railways – tube railways –maintenance of rail way tunnels

UNIT – II: STATIONS AND YARDS (9 hours)

Introduction-purposes of a railway station – selection of a site for a railway station – types of railway station ,Platforms – Definition of a yard – types of yards – level crossing- signaling systems and inter locking – staff quarters – goods traffic at way side stations

Geometric Design of Railway Track : Gradients- Grade Compensation- Cant and Negative Super elevation Cant Deficiency – Degree of Curve – Crossings and Turn outs

UNIT – III: HARBOURS , DOCKS AND BREAK WATER (9 hours)

Introduction – Natural Harbours – Artificial Harbours – Size of Harbours – Open Berths – Docks, Shape of Docks and Basins – Design and Construction of Basin or Dock Walls – Dock Entrances and Entrance Locks – Classification of Breakwaters – Upright Wall Breakwater – Mound With Super structure Water Breaker – Mound Breakwaters. **Jetties, Landing Stages And Wharves:** Jetties – Piled and Open Jetties – Piled and Cylinder Jetties – Scrled Cylinder Jetties – Scrled Cylinders in Jetties – Spring Fenders – Dolphins – Floating Landing Stages – Wharves – Masonry or Mass Concrete Walls.

UNIT - IV : AIRPORT PLANNING (9 hours)

Air transport characteristics-airport classification-air port planning: objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, Typical airport layouts, Case studies, Parking and circulation area.

UNIT - V: AIRPORT DESIGN (9 hours)

Runway Design: Orientation, Wind Rose Diagram - Runway length - Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings and lighting.

Course Outcomes:

Upon completion of this course, the students will be able to		POs related to COs
CO1	Acquire knowledge on the railways and tunneling engineering	PO1, PO2
CO2	Acquire knowledge on railway stations and yards	PO1, PO2
CO3	Obtain knowledge on harbours , docks and break water and jetties, landing stages and wharves	PO1, PO4
CO4	Obtain knowledge on airport planning	PO1
CO5	Design airport Elements Like runway, taxiway etc.	PO3, PO2

Textbooks:

1. C.Venkatramaiah ,"Transportation Engineering-Vol-2 Railways, Airports, Docks and Harbours, Bridges and Tunnels", Universities Press (India) Private Limited, Hyderabad, 2015
2. Khanna.S.K. Arora.M.G and Jain.S.S," Airport Planning and Design", Nemachand and Bros, Roorkee, 1994

Reference Books:

1. Mundrey J S,"Railway Track Engineering", McGraw Hill Education (India) Private Ltd, New Delhi, 2013
2. Subramanian K.P," Highways, Railways, Airport and Harbour Engineering", Scitech Publications (India), Chennai, 2010
3. Satish Chandra and Agarwal M.M, "Railway Engineering", 2nd Edition, Oxford University Press, New Delhi, 2013.
4. Saxena Subhash, C.and Satyapal Arora ,"A Course in Railway Engineering" , DhanapatRai and Sons, Delhi, 1998.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	2										
CO.2	2	3										
CO.3	2			3								
CO.4	2											
CO.5		2	2									
CO*	**2**	**2.33**	**2**	**3**								

IV.B.Tech. I Sem. (Core Elective-II)	L	T	P	C
	3	0	0	3

18CIV415B **(CE-II): ENVIRONMENTAL ENGINEERING MATERIALS**

Course Educational Objectives:

1. To Study the Green construction materials.
2. To Study the Concrete chemistry about Environmental Engineering.
3. To Study the composite materials.
4. To Study the Admixtures and special uses of cements.
5. To Study the X-ray Diffraction and SEM Analysis of materials.

UNIT 1: INTRODUCTION (9 hours)

Introduction to sustainable construction materials. life cycle assessment and its application to Green construction materials. benefits of green construction materials. is to be considered in the selection of green construction materials. the difference between transitional and green construction materials. Selection incrementally and economically balance building materials. Green house materials, green house techniques.

UNIT 2: CONCRETE CHEMISTRY (9 hours)

Portland cement and its major constituent to page cement paste in concrete to hydration reaction of Portland cement. durability general aspects, alkali silica reaction sulphate attack, delayed ettringite formations and other forms of attack. effect of acids and alkalis of cement concrete. energy efficient buildings materials Green Roof materials. Types of concrete chimneys, types of structures in concrete chimneys.

UNIT 3: COMPOSITE MATERIALS (9 hours)

Blast furnace slag, fly ash, bottom Ash, natural pozzolanes, silica fume, rice husk ash and other industrial solid wastes amenable for admixtures. effects of these admixtures on motor and concrete properties. fibre reinforced composites and ceramic composites. Land scaping materials. doors and window green materials.

UNIT 4: ADMIXTURES AND SPECIAL USES OF CEMENTS. (9 hours)

Organic retarders and accelerators, air entraining agents and grinding aids, water reduces and super plastic very high strength cement based materials.

UNIT 5: X-RAY DIFFRACTION AND SEM ANALYSIS OF MATERIAL

Fundamentals principles of X-Ray diffraction and sem analysis x-ray diffraction of cement composite and other admixture waste materials. X-ray analysis. **(9 hours)**

Course Outcomes:

Upon completion of this course, the students will be able to		POs related to Cos
CO1	Attain the basic knowledge on the sustainable construction materials	PO1, PO2
CO2	Understand the major constituent to page cement paste in concrete to hydration reaction of Portland cement	PO1, PO2, PO3, PO5
CO3	Understand the Blast furnace slag, fly ash, bottom Ash, natural pozzolanes, silica fume, rice husk ash and other industrial solid wastes	PO1, PO2, PO3, PO5
CO4	Understand the Organic retarders and accelerators, air entraining agents and grinding aids, water reduces and super plastic	PO1, PO2, PO4
CO5	Describe and discuss Fundamentals principles of X-Ray diffraction and sem analysis x-ray diffraction of cement	PO1, PO4,

Text Books:

1. Taylor, H.F.W(1997). Cement chemistry, Thomas telford, 2nd Edition, New York.
2. M.R.Rixom, chemical Admixtures for concrete (New York : E&F.N.Spon.,1986).

Reference Books:

1. SK Duggal, Building materials, New age publications,2nd edition,2016,India.
2. Rangawala,Engineering materials,charotar publications,43rd edition,2017.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	1										
CO.2	1	1	2		2							
CO.3	1	1	2		2							
CO.4	1	2		2								
CO.5	2			2								
CO*	**1.6**	**1.25**	**2**	**2**	**2**							

IV B.Tech I Semester	L	T	P	C
	2	1	0	3

18CIV415C (CE-II) STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

Course Educational Objectives:

1. To understand the behaviour of dynamic loading SDOF system.
2. To study the effect of free and forced Vibration of undamped and damped MDOF systems.
3. To understand Elements of earthquake engineering.
4. To understand effect of earthquake on different types of structures.
5. To understand concepts of earthquake resistant design, Planning considerations & Estimation of Earthquake Parameters.

UNIT I: SINGLE DEGREE OF FREEDOM SYSTEM (9 hours)

Definition of degree of freedom – Idealization of structure as Single Degree of Freedom (SDOF) System – Formulation of equation of motion for various SDOF system – D-Alembert's Principles– Effect of damping – Free and forced vibration of damped and un damped structures – Response To harmonic forces and periodic forces.

UNIT II: MULTI DEGREE OF FREEDOM SYSTEM (9 hours)

Formulation of equation of motion for multi degree of freedom (MDOF) system – Evaluation of Natural frequencies and modes – Eigen values and Eigen vectors – Response to free and forced Vibration of un-damped and damped MDOF systems – Modal superposition methods.

UNIT III: INTRODUCTION TO EARTHQUAKE ENGINEERING (9 hours)

Elements of Engineering Seismology – Definitions-Introduction to Seismic hazard-Earthquake Phenomenon – Seism tectonics – Seismic Instrumentation –. Types of earthquakes and design of earthquake. Types of zones according to type of earth.

UNIT IV: EARTHQUAKE EFFECTS ON STRUCTURES (9 hours)

Effect of earthquake on different types of structures – Behavior of RCC, Steel and prestressed Concrete Structures under earthquake loading – Pinching Effect – Bouchinger Effects – Evaluation of Earthquake forces IS Code 1893: 2016 – Response Spectra – Lessons learnt from past earthquakes.

UNIT V: CONCEPTS OF EARTHQUAKE RESISTANT DESIGN (9 hours)

Causes of damage – Planning considerations/Architectural concept (IS 4326–1993) – Guidelines for Earthquake resistant design – Earthquake resistant design of masonry buildings– Design consideration – Guidelines – Earthquake resistant design of R.C.C. buildings – Lateral Load analysis – Design and detailing (IS 13920:2016). Characteristics of Strong Earthquake Motion – Estimation of Earthquake Parameters

Course Outcomes:

Upon completion of this course, the students will be able to		POs related to Cos
CO1	H Analyze structures subjected to dynamic loading SDOF system.	PO1, PO2
CO2	Develop knowledge about equation of motion for multi degree of freedom (MDOF) system and Vibration.	PO1,PO2,PO3
CO3	Analyze the importance of earthquake engineering elements.	PO1, PO2, PO3, PO5
CO4	Acquire knowledge about numerous effect of earthquake on different types of structures	PO1, PO2, PO4
CO5	Acquire knowledge about concepts of earthquake resistant design, Planning considerations & Estimation of Earthquake Parameters.	PO1, PO4,

Text books:

1. Mario Paz, "Structural Dynamics – Theory and Computations", Fourth Edition, CBS Publishers, 1997.
2. Agarwal.P and Shrikhande.M, "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd., 2007.

Reference Books:

1. Clough.R.W, and Penzien.J, "Dynamics of Structures", Second Edition, McGraw Hill International Edition, 1995.
2. Jai Krishna, Chandrasekaran.A.R.and Brijesh Chandra, "Elements of Earthquake Engineering", South Asia Publishers, 1994.
3. Anil K Chopra, "Dynamics of structures – Theory and applications to Earthquake Engineering", Prentice Hall Inc., 2007.
4. Moorthy.C.V.R., "Earthquake Tips", NICEE, IIT Kanpur, 2002

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2										
CO.2	1	2	2									
CO.3	1	2	2		2							
CO.4	1	2		2								
CO.5	1			2								
CO*	**1.4**	**2**	**2**	**2**	**2**							

IV B.Tech I Semester	L	T	P	C
	3	0	0	3

18CIV415D (CE II) QUALITY CONTROL AND SAFETY MANAGEMENT IN CONSTRUCTION

Course Educational Objectives:

1. To create a complete understanding on quality planning, quality assurance, quality control and safety management.
2. To explain the quality policy
3. To demonstrate means of quality control
4. To explain various construction failure aspects
5. To explain construction activity

UNIT I: QUALITY MANAGEMENT SYSTEMS (9 hours)

Types of organizations-Inspection. control and enforcement -Quality Management Systems and method -Responsibilities and authorities In quality assurances and quality Control- Architects, engineers, contractors, and special consultants, Quality circle. Quality control assurance-quality control statistical process.

UNIT II: QUALITY POLICY (9 hours)

Quality policy -Objectives and methods in Construction Industry -Consumers satisfaction, Economics-Time of Completion -Statistical tolerance -Taguchi's concept of quality -Codes and Standards -Documents -Contract and construction programming -Inspection procedures -Processes and products -Total QA -IQC program and cost implication. Quality control basics and systems.

UNIT III: OBJECTIVES (9 hours)

Objectives -Regularity agent, owner, design, contract and construction oriented objectives, methods -Techniques and needs of QA/QC -Different aspects of quality -Appraisals, Factors Influencing construction quality.

UNIT IV: FAILURE ASPECTS (9 hours)

Critical, major failure aspects and failure mode analysis -Stability methods and tools, optimum design –Reliability testing- reliability coefficient and reliability prediction -Selection of new materials -Influence of drawings detailing, specification, standardization -Bid preparation- Reliability Based Design.

UNIT V: CONSTRUCTION ACTIVITY (9 hours)

Construction activity, environmental safety. Social and environmental factors- Natural causes and speed of Construction -Life cycle costing- Reliability and Probabilistic methods-Value engineering and value analysis.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Demonstrate the elements of quality planning and the implication	PO1,PO2
CO2	Explain objectives and advantage of quality assurance	PO6,PO8
CO3	Demonstrate means of quality control	PO6
CO4	Explain construction failure aspects	PO6,PO8
CO5	Demonstrate construction activity	PO6,PO8

Textbooks:

1. James, J.O Brian, "Construction Inspection Handbook -Quality Assurance and: Quality Control", Van Nostrand, New York, 2009.
2. Kwaku, A., Tenah, Jose. M. Guevara, "Fundamentals of Construction Management and Organization", Reston Publishing Co., Inc., Virginia, 2005.

Reference Books:

1. John V. Grimaldi. (1996). "Safety Management." AITBS Publishers & Distributors, New Delhi, India.
2. Safety Management in Construction Industry- A manual for project managers, NICMAR, Mumbai
3. Juran Frank, J.M. and Gryna, F.M. " Quality planning and Analysis ", Tata McGraw Hill, 1982.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	2										
CO.2						3		2				
CO.3						3						
CO.4						3		3				
CO.5						3		3				
CO*	**2**	**2**				**3**		**2.67**				

IV B.Tech I Semester	L	T	P	C
	3	0	0	3

18CIV415E (CE-II) DISASTER MANAGEMENT & MITIGATION

Course Educational Objectives:

1. To explain the disaster phenomenon and disaster preparedness.
2. To demonstrate the roles and responsibilities of different agencies.
3. To explain the disaster management techniques
4. To explain concept of disaster mitigation strategies
5. To demonstarte the different case studies on disaster management

UNIT I: INTRODUCTION TO DISASTER PREPAREDNESS (9 hours)

Disaster Management- Prevention-Preparedness and Mitigation-Disaster Preparedness-Concept & Nature-Disaster Preparedness Plan-Disaster Preparedness for People and Infrastructure · Community based Disaster Preparedness Plan. Mitigation process-disaster managemnt techniques, disaster managemnet aspects.

UNIT II: ROLES& RESPONSIBILITIES OF DIFFERENT AGENCIES (9 hours)

Roll of Information-Education-Communication & Training-Role and Responsibilities of Central-State-District and local administration-Role and Responsibilities of Armed Forces-Police-Para Military Forces-Role and Responsibilities of International Agencies-NGOs-Community Based Org. (CBO s), disaster management quality control.

UNIT III: TECHNOLOGIES FOR DISASTER MANAGEMENT (9 hours)

Role of IT in Disaster Preparedness-Remote Sensing-GIS and GPS-Use and Application of Emerging Technologies-Application of Modern Technologies for the Emergency communication-Application and use of ICST for different disasters

UNIT IV: DISASTER MITIGATION (9 hours)

Meaning and concept-Disaster Mitigation Strategies-Emerging Trends in Disaster Mitigation · Mitigation management-Role of Team and Coordination

UNIT V: DISASTER MANAGEMENT (9 hours)

Applications and case studies and field works-Landslide Hazard Zonation-Case Studies-Earthquake Vulnerability Assessment of Buildings and Infrastructure-Case Studies-Drought Assessment-Case Studies-Coastal Flooding-Storm Surge Assessment-Floods-Fluvial and Pluvial Flooding-Case Studies-Forest Fire-Case Studies-Man Made disasters-Case Studies-Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Explain the disaster phenomenon and disaster preparedness	PO1
CO2	Demonstrate the roles and responsibilities of different agencies	PO6
CO3	Analyze the techniques for disaster management	PO2
CO4	Demonstrate the disaster mitigation strategies	PO6 PO7
CO5	Apply the knowledge gained to manage the disasters.	PO1, PO12

Text Books:

1. Bryant Edwards (2005): Natural Hazards, Cambridge University Press, U.K.
2. Roy, P.S. (2000): Space Technology for Disaster management: A Remote Sensing & GIS Perspective, Indian Institute of Remote Sensing (NRSA) Dehradun.

Reference Books:

1. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, RajatPublication.
2. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
3. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June2003
4. Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2					-	-	-	-	-	-	-
CO.2						3	-	-	-	-	-	-
CO.3		3				-	-	-	-	-	-	-
CO.4						3	2	-	-	-	-	-
CO.5	2							-	-	-	-	2
CO*	**2**	**3**		**2**		**3**	**2**	**-**	**-**	**-**	**-**	**2**

IV B.Tech I Semester	`L	T	P	C
	3	0	0	3

18CIV415F (CE-II): URBAN AND REGIONAL PLANNING

Course Educational Objectives:

1. To demonstrate the knowledge on planning process
2. To Formulate plans for urban and rural development
3. To Plan and analyze socio economic aspects of urban and rural planning
4. To Analyze and design the plan for urban and rural development
5. Development of legislation and management urban system

UNIT I: BASIC ISSUES (9hours)

Definition of Human settlement, Urban area, Town, City, Urbanization, Suburbanization, Urban sprawl, Peri-urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanization at International, National, Regional and State level. types pf urban basic quality techniques , process of regional planning.

UNIT II: PLANNING PROCESS (9 hours)

Principles of Planning – Types and Level of Plan, Stages in Planning Process – Goals, Objectives, Delineation of Planning Areas, Surveys and Questionnaire Design, cycle of planning process.

UNIT III: DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION (9hours)

Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights, Special Economic Zones-Development of small town and smart cities-case studies, detailed harmful effects of planning, control of urban process.

UNIT IV: PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS (9 hours)

Site Analysis, Layout Design, Planning Standards, Project Formulation – Evaluation, Plan Implementation, Constraints and Implementation, Financing of Urban Development Projects.

UNIT V: LEGISLATION DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM (9hours)

Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

Course Outcomes:

Upon completion of this course the student will be able to		POs related to COs
CO1	Explain basic issues in urban planning	PO1, PO2
CO2	Demonstrate the process for urban planning	PO1, PO2 ,
CO3	Formulate plans for urban and rural development and	PO1, PO2
CO4	Analyze and design the plan for urban and rural development	PO1, PO2 ,PO3,PO4
CO5	Development of legislation and management urban system	PO1, PO2 ,

Text books:

1. Urban Development and Management , Goel, S.L, Deep and Deep publications, New Delhi 2002

Reference Books:

1. Thooyavan, K.R., "Human Settlements – A Planning Guide to Beginners", M.A Publications, Chennai, 2005
2. Singh V.B," Revitalized Urban Administration in India", Kalpaz publication, Delhi, 2001
3. Edwin S.Mills and Charles M.Becker," Studies in Urban development" A World Bank publication, 1986
4. CMDA, Second Master Plan for Chennai, Chennai 2008

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3	-	-	-	-	-	-	-	-	-	-
CO.2	1	3	-	-	-	-	-	-	-	-	-	-
CO.3	2	3	-	-	-	-	-	-	-	-	-	-
CO.4	1	1	3	3	-	-	-	-	-	-	-	-
CO.5	2	3	-	-	-	-	-	-	-	-	-	-
CO*	1.6	2.6	3	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Core Elective – III

IV B.Tech II Semester

L	T	P	C
2	1	0	3

18CIV423A (CE-III): CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT

Course Educational Objectives:

1. To demonstrate fundamentals of construction technology
2. To understand the necessity of construction equipment and equipment planning
3. To explain project management concepts
4. To analyse the construction project using network techniques
5. To analyse the time estimate and time computation construction project

UNIT I: FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY (9 hours)

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations

Preparatory Work And Implementation: Site layout – Infrastructure Development Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – False work and Temporary Works.

UNIT II: CONSTRUCTION EQUIPMENT MANAGEMENT (9 hours)

Equipment Management- Introduction, Differences between men and manpower, Extent of Mechanisation, Equipment planning, Selection of equipment, Forward planning, Purchase of Equipment, Specifications for ordering equipment. Maintenance Management – Introduction, Objectives, Functions, Maintenance planning, Maintenance control, Types of maintenance. Equipment cost – Operating cost – Cost Control of Equipment - Depreciation Analysis – Replacement of Equipment- Replacement Analysis - Safety Management

UNIT III: PROJECT MANAGEMENT AND BAR CHARTS (9 hours)

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

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

UNIT IV: NETWORK ANALYSIS (9 hours)

CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for TE and TL - Start and

finish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

UNIT V: TIME ESTIMATES & TIME COMPUTATIONS (9 hours)

Introduction – Uncertainties: Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problems. Probability of meeting scheduled date Problems

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Demonstrate fundamentals of construction technology	PO1
CO2	Understand the necessity of construction equipment and equipment planning	PO3,PO2
CO3	Explain project management concepts	PO1,PO2,PO11
CO4	Analyse the construction project using network techniques	PO2 PO4
CO5	Develop the network for construction projects and examine the critical path	PO3,PO2

Text Books:

1. Subir K.Sarkar and Subhajit Saraswati,"Construction Technology", Oxford Higher Education- Univ.Press, Delhi.
2. Dr.B.C.Punmia, K.K.Khandelwal,"Project Planning and Control with PERT and CPM", Lakshmi Publications New Delhi.
3. Jha," Construction project management", Pearson publications, New Delhi

Reference Books:

1. P.R.Bhave, "Optimal design of water distribution networks", Narosa Publishing house 2003.
2. P.K.Joy,"Total Project management, the Indian context- - Mac Millan Publishers India Limited.

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	1	-	-	-		-	-	-	-	-	-	-
CO.2	-	2	3	-		-	-	-	-	-	-	-
CO.3	2	2	-	-		-	-	-	-	-	1	-
CO.4	-	2	-	2		-	-	-	-	-	-	-
CO.5	-	2	2			-	-	-	-	-	-	-
CO*	**1.5**	**2**	**2.5**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**

IV B.Tech II Semester	L	T	P	C
	3	0	0	3

18CIV423B (CE-III): ENVIRONMENTAL IMPACT ASSESMENT

Course Educational Objectives:

1. To impart knowledge on different concepts of Environmental Impact Assessment and methodologies
2. To explain about the Assessment of Impact of development Activities on Vegetation and wildlife, environmental
3. To identify impact of air, water and land due to developmental activities
4. To explain the procedures for environmental audit and some case studies.
5. To demonstrate EIA using case studies

UNIT – I: INTRODCTION TO EIA (9 hours)

Basic concept of **EIA** : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters. E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

UNIT- II ASSESSMENT OF IMPACT OF DEVELOPMENT ACTIVITIE (9 hours)

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT- III : **ASSESSMENT OF IMPACT SIGNIFICANCE (9 hours)**

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures.

UNIT – IV: **ENVIRONMENTAL AUDIT (9 hours)**

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report, Post Audit activities.

UNIT V: CASE STUDIES (9 hours)

EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – Wastewater Treatment Plants- Waste Processing and Disposal facilities – Mining Projects

.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Understand the basic concept of EIA and types	PO1,PO6,PO7
CO2	Analyze and Select the appropriate EIA methodology	PO1,PO2,PO6,PO7
CO3	Understand the impact of soil ,air and water due to developmental activities	PO3,PO1,PO6,PO7
CO4	Demonstrate the environmental audit procedure	PO3,PO6,PO7
CO5	Learn some case studies and ability prepare of EIA report	PO1,PO6,PO7

Text books:

1. Canter, R.L (1995), Environmental impact Assessment, , 2nd Edition, McGraw Hill Inc., New Delhi.
2. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everett, Richard A. Carpenter, and S.L. Tu. (1997),"Environmental Impact Assessment for Developing Countries in Asia", Volume 1 – Overview, Asian Development Bank.

Reference Books:

1. Becker H. A., Frank Van clay (2003), "The International handbook of social impact assessment: conceptual and methodological advances", Edward Elgar Publishing.
2. Barry Sadler and Mary McCabe (2002),"Environmental Impact Assessment Training Resource Manual" , United Nations Environment Programme.
3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I and II", Blackwell Science, New York, 1998.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1		-	-	-	2	2	-	-	-	-	-
CO.2	2	3	-	-	-	1	1	-	-	-	-	-
CO.3	1	-	3	-	-	2	2	-	-	-	-	-
CO.4	-	-	2	-	-	2	2	-	-	-	-	-
CO.5	1	-		-	-	3	3	-	-	-	-	-
CO*	**1.25**	**3**	**2.5**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**

IV B.Tech II Semester	L	T	P	C
	2	1	0	3

18CIV423C (CE-III):FINITE ELEMENT METHODS

Course Educational Objectives:

1. To apply the Rayleigh- Ritz method of functional approximation
2. To apply the basic concepts and laws of equilibrium equations for one dimensional element
3. To apply the basic concepts and laws of equilibrium equations for two dimensional elements
4. To gain basic knowledge about generation of elements for iso parametric
5. To gain basic knowledge about axi symmetric analysis

UNIT I: INTRODUCTION AND PRINCIPLES OF ELASTICITY (9 hours)

Concepts of FEM – Steps involved – Merits and demerits – Energy principles – Discretization – Rayleigh- Ritz method of functional approximation Equilibrium equations – Strain displacement relationships in matrix form – Constitutive relationships for plane-stress, plane- strain and axi – symmetric bodies of revolution with axi – symmetric loading.

UNIT II: ONE- DIMENSIONAL ELEMENT (9 hours)

Stiffness matrix for bar element – shape functions for one dimensional element– One dimensional problem.

UNIT III: TWO - DIMENSIONAL ELEMENT (9 hours)

Different types of elements for plane –stress and plane –strain analysis – Displacement models - Generalized coordinates – shape functions – Convergent and compatibility requirements – Geometric invariance – Natural coordinate system – Area and Volume coordinates.

UNIT IV: GENERATION OF ELEMENTS AND ISO-PARAMETRIC FORMULATION (9 hours)

Generation of element stiffness and nodal load matrices for 3- noded triangular element and 4- noded rectangular elements. Concepts of isoperimetric elements for 2d analysis-formulation of CST elements-4- noded and 8- noded iso -parametric quadrilateral elements – lagrangian and serendipity elements.

UNIT V: AXI- SYMMETRIC ANALYSIS AND SOLUTION TECHNIQUES (9 hours)

Basic principles- Formulation of 4- noded iso – parametric axi- symmetric element. Numerical integration – Static condensation – Assembly of elements and solution techniques for static loads.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Understand the Basic principles of Finite Element Methods.	PO1,PO2, PO3
CO2	Analyze Conditions for plane stress and plane strain	PO1, PO3
CO3	Explain the basic concepts of FEM.	PO1, PO2, PO4
CO4	Apply the FEM Knowledge on practical problems	PO1, PO3
CO5	Experimental analysis of various field and research projects	PO2, PO3

Text books:

1. Finite element Analysis –Theory and programming, 2/e , 1994, C.S. Krishna murthy, Tata McGraw – Hill Education Pvt. Ltd, Noida.
2. Finite element Analysis, 2/e , 1993, S.S. Bhavikatti, New age International (P) Ltd, Publishers, New Delhi.

Reference books:

1. G. Ramamurthy," Applied Finite Element Analysis (2010) , I.K. International publishing House Pvt. Ltd, and New Delhi.
2. H. Lakshminarayana, "Finite Element Analysis: Procedures in Engineering", 2004, University press (India) Private Ltd., Hyd.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	2	2		-	-	-	-	-	-	-	-
CO.2	1		3		-	-	-	-	-	-	-	-
CO.3	1	2		3	-	-	-	-	-	-	-	-
CO.4	2		3		-	-	-	-	-	-	-	-
CO.5		**3**	2		-	-	-	-	-	-	-	-
CO*	**1.5**	**2.33**	**2.5**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech II Semester	L	T	P	C
	3	0	0	3

18CIV423D (CE-III): INTELLIGENT TRANSPORTATION SYSTEMS

Course Educational Objectives:

1. To develop an understanding of system engineering processes
2. To describe the concepts of system architecture and their evolution
3. To explain the capability of key technologies
4. To demonstrate the impact of technology on different modes and movement
5. To explain how to evaluate technologies, applications and services

UNIT- I : FUNDAMENTALS OF ITS (9 hours)

Definition of ITS, the historical context of ITS from both public policy and market economic perspectives, Types of ITS; Historical Background, Benefits of ITS.

UNIT- II : SENSOR TECHNOLOGIES AND DATA REQUIREMENTS OF ITS (9 hours)

Importance of telecommunications in the ITS. Information Management, Traffic Management Centers (TMC).Application of sensors to Traffic management; Traffic flow sensor technologies; Transponders and Communication systems; Data fusion at traffic management centers; Sensor plan and specification requirements; Elements of Vehicle Location and Route Navigation and Guidance concepts; ITS Data collection techniques – Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), GIS, video data collection.

UNIT- III : ITS USER NEEDS AND SERVICES AND FUNCTIONAL AREAS (9 hours)

Introduction, 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).

UNIT – IV : ITS ARCHITECTURE (9 hours)

Regional and Project ITS architecture; Concept of operations; ITS Models and Evaluation Methods; Planning and human factor issues for ITS, Case studies on deployment planning and system design and operation; ITS and safety, ITS and security, ITS as a technology deployment program, research, development and business models, ITS planning.

UNIT – V : ITS APPLICATIONS (9 hours)

Traffic and incident management systems; ITS and sustainable mobility, travel demand management, electronic toll collection, ITS and road-pricing.; Transportation network operations; commercial vehicle operations and intermodal freight; public transportation applications; ITS and regional strategic transportation planning, including regional architectures: ITS and changing transportation institutions 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.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Demonstrate the Basic and different ITS user services	PO1,PO3
CO2	Select appropriate ITS technology depending upon site specific conditions	PO3,PO2
CO3	Design and implement ITS components	PO5,PO2
CO4	Explain the ITS **a**rchitecture	PO2 PO4
CO5	Understand the ITS applications: Traffic and incident management systems	PO3,PO2

Text Books:

1. Sussman, Joseph," Perspectives on Intelligent Transportation Systems (ITS)". New York, NY: Springer, 2010.
2. Mashrur A. Chowdhury, and Adel Sadek,"Fundamentals of Intelligent Transportation Systems Planning " , Artech House, Inc., 2003.

Reference Books:

1. ITS Hand Book 2000: Recommendations for World Road Association (PIARC) by Kan Paul Chen, John Miles.
2. Sussman, J. M, "Perspective on ITS" , Artech House Publishers, 2005.
3. National ITS Architecture Documentation, US Department of Transportation, 2007

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	-	3	-		-	-	-	-	-	-	-
CO.2	-	2	3	-		-	-	-	-	-	-	-
CO.3	-	2	-	-	2	-	-	-	-	-	-	-
CO.4	-	2	-	2		-	-	-	-	-	-	-
CO.5	-	2	2			-	-	-	-	-	-	-
CO*	**1**	**2**	**2.6**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech II Semester	L	T	P	C
	3	0	0	3

18CIV423E (CE-III) GROUND WATER ENGINEERING

Course Educational Objectives:

1. To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,
2. To know about well hydraulics
3. To understand concept for groundwater management and modelling
4. To understand the Ground water quality and consservation.
5. To know about design principles of well

UNIT I: HYDROGEOLOGICAL PARAMETERS (9 hours)

Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation– Ground water table fluctuation and its interpretations – Groundwater development and Potential in India – GEC norms.

UNIT II: WELL HYDRAULICS (9 hours)

Objectives of Groundwater hydraulics – Darcy's Law - Groundwater equation – steady state flow - Dupuit Forchheimer assumption - Unsteady state flow - Theis method - Jacob method -Slug tests - Image well theory – Partial penetrations of wells.

UNIT III: GROUNDWATER MANAGEMENT (9 hours)

Need for Management Model – Database for groundwater management –groundwater balance study – Introduction to Mathematical model – Conjunctive use – Collector well and Infiltration gallery.

UNIT IV: GROUNDWATER QUALITY AND CONSERVATION (9 hours)

Ground water chemistry - Origin, movement and quality - Water quality standards – Health and aesthetic aspects of water quality - Saline intrusion – Environmental concern and Regulatory requirements. Artificial recharge techniques – Remediation of Saline intrusion– Ground water management studies – Protection zone delineation, Contamination source inventory, remediation schemes - Ground water Pollution and legislation.

UNIT V: WELL DESIGN (9 hours)

Water Well Design and Well Drilling: Well Screen, Development and Completion of Well, Rotary Drilling and Rotary Percussion Drilling, maintenance of Wells.

Course Outcomes:

Upon completion of this course, the student will be able to:		POs related to COs
CO1	Understand aquifer properties and its dynamics	PO1.PO2,PO3,PO6,PO7
CO2	exposure towards well design and practical problems of groundwater aquifers.	PO2,PO3,PO6,PO7
CO3	Ac acquire the knowledge on ground water management	PO2,PO3,PO5,PO6,PO7
CO4	Understand the importance of groundwater quality and consservation concepts.	PO2,PO3,PO5,PO6,PO7
CO5	Understand the concept of well design principle	PO2,PO3,PO5,PO6,PO7

Text books:

1. Raghunath H.M.,"Ground Water Hydrology" , New Age International (P) Limited, New Delhi, 2010.
2. Rama krishnan, S Ground Water, , K.J. Graph arts, Chennai, 1998.
3. Garg, S.P. (1993) "Groundwater and Tube Wells", Oxford and IBH Publishing , New Delhi

Reference books:

1. Fitts R Charles Groundwater Science, , Elsevier, Academic Press, 2002.
2. Todd D.K," Ground Water Hydrology", John Wiley and Sons, New York, 2000.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	1	2	2			1	1	-	-	-	-	-
CO.2		3	3			1	1	-	-	-	-	-
CO.3		2	2		1	1	1	-	-	-	-	-
CO.4		2	2		1	1	1	-	-	-	-	-
CO.5		2	2		1	1	1		-	-	-	-
CO*	**1**	**2.2**	**2.2**		**1**	**1**	**1**		**-**	**-**	**-**	**-**

IV B.Tech II Semester	L	T	P	C
	3	0	0	3

18CIV423F (CE-III): ENVIRONMENTAL MANAGEMENT SYSTEM

Course Educational Objectives

1. To explain about Environmental Management Systems (EMS).
   To explain introduction and implementation of ISO 14001
2. To enable the students to Develop Engineered systems for resources, energy recovery & material recovery
3. To enable the students to Develop Engineered systems carry out Environmental Audit.
4. To provide knowledge about various environmental acts

UNIT I: INTRODUCTION TO ENVIRONMENTAL MANAGEMENT SYSTEMS (EMS) (9 hours)

Introduction to Environmental Management System basic definitions and terms, Framework for Environmental Management Systems, Approach for developing an Environmental Management System.

UNIT II: INTRODUCTION AND IMPLEMENTATION OF ISO 14001 (9 hours)

The introduction and implementation of ISO 14001: environmental policy, planning, implementation and operation, checking, management review, etc.

UNIT III: APPLICATIONS OF EMS (9 hours)

Applications EMS in terms of Process flow chart, effluent Generation, composition and treatment of effluents from following industries – sugar, pulp and paper, electroplating, dairy, oil refineries, etc.

UNIT IV: INTRODUCTION TO ENVIRONMENTAL AUDITING (9 hours)

Introduction to Environmental Auditing, Category “A” & “B” types of projects. Procedures and Guidelines to conduct Environmental Audit.

UNIT IV: ENVIRONMENTAL ACT (9 hours)

Water act –air act –environmental protection act-salient features –other environmental acts

Course Outcomes:

On successful completion of the course the student will be able to,		**POs related to COs**
CO1	Describe, develop and interpret methods of the Environmental Management Systems according to ISO 14001 standards.	PO1, PO2
CO2	Critically evaluate methods and possibilities within Environmental Management Systems from a systems perspective.	PO1,PO2
CO3	Evaluate the application of EMS in various industries	PO1,PO2, PO3
CO4	Conduct Environmental Auditing for various Industries/Projects	PO3, PO6
CO5	Describe the various environmental act and salient features	PO1, PO2, PO3

Text Books:

1. ISO 14001 Certification - Environmental Management Systems: A Practical Guide for Preparing Effective Environmental Management Systems (Prentice Hall) 10 Aug 1995 by W. Lee Kuhre.
2. M. N Rao ,"Waste Water Treatment", Oxford and IBH Publishing Co. Pvt. Ltd, 2007.
3. Peavy, H.S, D.R. Rowe & T. George "Environmental Engineering, New York: McGraw Hill, 1987.

Reference Books:

1. Christopher Sheldon and Mark Yoxon, "Installing Environmental management Systems – a step by step guide" Earthscan Publications Ltd, London, 1999.
2. ISO 14001/14004: Environmental management systems – Requirements and Guidelines – International Organization for Standardization, 2004
3. ISO 19011: 2002, "Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi, 2002
4. Paul L Bishop 'Pollution Prevention: Fundamentals and Practice', McGraw- Hill international, Boston, 2000.
5. Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan, January 2001

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	3	-	-	-	-	-	-	-	-	-	-
CO.3	1	2	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	2	-	-	2	-	-	-	-	-	-
CO.5	1	2	3	-	-	-	-	-	-	-	-	-
CO*	**1.66**	**2.25**	**2.66**		**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**

Core Elective – IV

IV B.Tech II Semester

L	T	P	C
2	0	2	3

18CIV424A (CE-IV) : COMPUTER APPLICATIONS IN CIVIL ENGINEERING

Course Educational Objectives:

1. To explain the operational features of computer program and their use in engineering computations
2. To Create user-defined functions in Excel
3. Analysis of shear force, bending moment and their application to solve Civil Engineering problems
4. To Construct, interpret and solve simple optimization problems (using Excel Solver)
5. To explain the basic commands of auto cad and 2D features in building planning.

UNIT I: INTRODUCTION (9 hours)

Determination of Bending Moment Diagram, Deflections for different loading conditions for a Simply Supported Beam and Cantiliver Beam. Determination of fixed end moments for different loading conditions of a fixed beam. Calculation of Influence line diagrams at any section of a Simply Supported Beam.

UNIT II : INTRODUCTION AND APPLICATION TO SOIL (9 hours)

Estimation of Run off for a Catchment. Estimation of Friction factor for Laminar and Turbulent flows, Minor losses in pipe flow. Conversion of Angles from WCB to RB. Classification of Soils. Determination of coefficient of permeability, Degree of Consolidation and Shear Strength.

UNIT III : APPLICATION PROBLEMS IN HYDRAULICS (9 HOURS)

Application of problems in Hydraulics such as Hardy cross method in the Analysis of pipe network, Computation of water surface profiles in open channel flows. Estimation of Settlement of foundations in Cohesive Soil, Stability Analysis of Slopes. Estimation Earth Pressures in Cohesive and Cohesionless soils.

UNIT IV: **APPLICATION PROBLEMS (9 hours)**

Application of problems in Environmental engg., Transportation Engg. Design of Slabs using I.S. Code method. Analysis and Design of Beams by using Limit state method. Design of columns subjected to axial load and Uni-axial Moment. Design of Isolated Footing. Design of rolled steel columns, built up columns, Beams and built up Beams.

UNIT V : ANALYSIS AND DESIGN (9 hours)

Basic AUTO CAD Commands, Introduction to AUTO LISP Programming. Analysis and Design of R.C. Building Frames by using Staad - III, Analysis and Design of Grid Floors by using Staad – III. Preparation of Contour Maps and Alignment fixing of Roads by using AUTO CIVIL. Quantity estimation of Civil Engineering Structures and Construction Management.

Course Outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Describe about shear force and bending moment diagrams for different loading and support conditions by using Excel	PO1,PO2
CO2	Analyze the losses in pipe flows using open foam	PO2
CO3	Demonstrate knowledge on fundamentals on soil behavior using Plaxis	PO1,PO2
CO4	Apply the Design methods of beams and columns using SAP	PO3,PO5
CO5	Acquire the knowledge on basic AutoCAD commands in civil engineering structures.	PO1,PO12

Text Books:

1. C.S. Krishnamurthy & S. Rajeev, "Computer aided design, software and analytical tools", Narosa Publishing House Private Limited
2. S.K. Parikh ,"Computer applications in Civil Engineering".

Reference Books:

1. V.L. Shah," Computer aided design in Reinforced concrete (program for R C elements) ".
2. Gupta K ,"Computer applications in Civil Engineering",Narosa Publication,India.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3	-	-	-	-	-	-	-	-	-	-
CO.2	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	2	3	-	-	-	-	-	-	-	-	-	-
CO.4			3	-	2	-	-	-	-	-	-	-
CO.5	2			-	-	-	-	-	-	-	-	2
CO*	**2**	**3**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

IV B.Tech II Semester	L	T	P	C
	3	0	0	3

18CIV424B(CE-IV): REPAIR AND REHABILITATION OF STRUCTURES

Course Educational Objectives:

1. To discuss quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures,
2. To explain the aspects of quality of concrete
3. To know the special concreting methods in repairing works
4. To study the techniques for repairing of structures.
5. To study the demolition techniques and procedures.

UNIT I: MAINTENANCE AND REPAIR STRATEGIES (9 hours)

Maintenance-Repair and Rehabilitation-Facets of Maintenance-importance of Maintenance- Various aspects of Inspection-Assessment procedure for evaluating damaged structure-causes of deterioration.

UNIT II: STRENGTH AND DURABILITY OF CONCRETE (9 hours)

Quality assurance for concrete – Strength-Durability and Thermal properties of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion -Effects of cover thickness.

UNIT III: SPECIAL CONCRETES (9 hours)

Polymer concrete-Sulphur infiltrated concrete-Fiber reinforced concrete-High strength concrete- High performance concrete-Vacuum concrete-Self compacting concrete-Geopolymer concrete- Reactive powder concrete-Concrete made with industrial wastes.

UNIT IV: TECHNIQUES FOR REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES (9 hours)

Non-destructive Testing Techniques-Epoxy injection-Shoring-Underpinning-Corrosion protection techniques–Corrosion inhibitors-Corrosion resistant steels-Coatings to reinforcement cathodic protection. Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, and earthquake.

UNIT V: DEMOLITION TECHNIQUE (9 hours)

Demolition techniques - Engineered demolition methods - Case studies.

Course Outcomes:

On successful completion of the course the student will be able to		POs related to COs
CO1	Students have the knowledge on causes of deterioration and assessment of distressed structures,	PO1,PO2
CO2	Students have the knowledge on strength and durability of concrete	PO1,PO2
CO3	Students have the knowledge on various special concrete and apply to repairing structure	PO1,PO2
CO4	Understand and apply rehabilitation and retrofitting process. repairing of structures and demolition procedures	PO1,PO2,PO3
CO5	Understand various demolition techniques	PO1,PO2,PO3

Text Books:

1. Shetty.M.S.,"Concrete Technology – Theory and Practice", S.Chand and Company, 2008.
2. P.C.Varghese, "Repair and Rehabilitation & Minor works of building Maintenance", Prentice Hall India Pvt Ltd 2014.

Reference Books:

1. Design and Construction Failures Dov Kominetzky.M.S, Galgotia Publications Pvt.Ltd 2001
2. Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures Ravishankar. K., Krishnamoorthy.T.S, Allied Publishers, 2004.
3. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3	-	-	-	-	-	-	-	-	-	-
CO.2	2	3	-	-	-	-	-	-	-	-	-	-
CO.3	2	3	-	-	-	-	-	-	-	-	-	-
CO.4	2	3	3	-	-	-	-	-	-	-	-	-
CO.5	2	3	3	-	-	-	-	-	-	-	-	-
CO*	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech II Semester	L	T	P	C
	3	0	0	3

18CIV424C (CE-IV) : GROUND IMPROVEMENT TECHNIQUES

Course Educational Objectives:

1. To gain knowledge on the problems posed by the problematic soils
2. To study dewatering and stabilization techniques
3. To provide knowledge about densification of granular and cohesive soils.
4. The remedies to build the various structures in problematic soils will be imparted to the students
5. To gain knowledge about expansive soils

UNIT I-: INTRODUCTION (9 hours)

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

UNIT II: DEWATERING AND STABILISATION (9 hours)

Methods Of De-Watering- Sumps And Interceptor Ditches- Single, Multi Stage Well Points - Vacuum Well Points- Horizontal Wells-Foundation Drains- Blanket Drains-Criteria For Selection Of Fill Material Around Drains –Electro-Osmosis. Methods Of Stabilization-Mechanical-Cement- Lime-Bituminous- Chemical Stabilization With Calcium Chloride, Sodium Silicate And Gypsum

UNIT III: DENSIFICATION METHODS IN GRANULAR AND COHESIVE SOILS (9 hours)

In – Situ Densification Methods in Granular Soils: – Vibration At The Ground Surface, Impact At The Ground Surface, Vibration At Depth, Impact At Depth.

In – Situ Densification Methods In Cohesive Soils: – Preloading Or Dewatering, Vertical Drains – Sand Drains, Sand Wick Geo drains – Stone And Lime Columns – Thermal Methods.

UNIT IV: REINFORCED EARTH WALLS (9 hours)

Principles – Components of Reinforced Earth – Factors Governing Design of Reinforced Earth Walls – Design Principles of Reinforced Earth Walls.

Geosynthetics: Geotextiles- Types, Functions and Applications – Geogrids And Geomembranes – Functions And Applications.

Grouting: Grouting Methods- Ascending, Descending And Stage Grouting- Hydraulic Fracturing In Soils And Rocks- Post Grout Test.

UNIT V: EXPANSIVE SOILS (9 hours)

Problems Of Expansive Soils – Tests For Identification – Methods Of Determination Of Swell Pressure. Improvement Of Expansive Soils – Foundation Techniques In Expansive Soils – Under Reamed Piles.

Course outcomes:

On successful completion of the course the student will be able to,		POs related to COs
CO1	Understand Identification soil types.	PO1,PO5
CO2	Gets knowledge on dewatering and stabilization soil using geo textile and mechanical method.	PO1,PO5
CO3	Get to know densification of soil methods	PO1,PO5
CO4	Get knowledge on grouting techniques	PO1,PO5
CO5	Get knowledge on expansion soil through tests for identification	PO1,PO2

Text Books:

1. Haussmann M.R," Engineering Principles of Ground Modification", McGraw-Hill International Edition, 1990
2. Dr.P.Purushotham Raj, "Ground Improvement Techniques" , Laxmi Publications, New Delhi / University Science Press, New Delhi

Reference Books:

1. Blackie Academic and Professional by Moseley M.P "Ground Improvement", Boca Taton, Florida, USA, 1993.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A, John, "Ground Control and Improvement "Wiley and Sons, New York, USA, 1994.
3. Robert M. Koerne,"Designing with Geosynthetics", Prentice Hall New Jercy,USA
4. Nihar Ranajan Patra," Ground Improvement Techniques", Vikas Publications, New Delhi.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2				3	-	-	-	-	-	-	-
CO.2	2				3	-	-	-	-	-	-	-
CO.3	2				3	-	-	-	-	-	-	-
CO.4	2				3	-	-	-	-	-	-	-
CO.5	2	3			-	-	-	-	-	-	-	-
CO*	**2**	**3**			**3**	-	-	-	-	-	-	-

IV year II semester

L	T	P	C
3	0	0	3

18CIV424D (CE –IV): MUNICIPAL SOLID WASTE MANAGEMENT

Course Educational Objective:

1. To make the students conversant with the types, sources, generation, storage, collection, transport, processing of solid waste.
2. To provide knowledge about source reduction ,waste storage of municipal solid waste
3. To make the students conversant with the collection, transport, of solid waste.
4. To make the students conversant with the processing and disposal of solid waste.
5. To provide knowledge about Bio medical waste management and disposal

UNIT I: SOURCES AND CHARACTERISTICS (9 hours)

Sources and types of municipal solid wastes- Public health and environmental impacts of improper disposal of solid wastes- sampling and characterization of wastes - factors affecting waste generation rate and characteristics - Elements of integrated solid waste management – Requirements and salient features of Solid waste management rules (2016) –- Role of public and NGO‟s- Public Private participation – Elements of Municipal Solid Waste Management Plan.

UNIT II: SOURCE REDUCTION, WASTE STORAGE & RECYCLING (9 hours)

Waste Management Hierarchy - Reduction, Reuse and Recycling - source reduction of waste – On-site storage methods – Effect of storage, materials used for containers – segregation of solid wastes – Public health and economic aspects of open storage – case studies under Indian conditions – Recycling of Plastics and Construction/Demolition wastes.

UNIT III: COLLECTION AND TRANSFER OF WASTES (9 hours)

Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of waste collection systems; Transfer stations – location, operation and maintenance; options under Indian conditions – Field problems-solving.

UNIT IV: PROCESSING OF WASTES AND DISPOSAL (9 hours)

Objectives of waste processing – Physical Processing techniques and Equipment; Resource recovery from solid waste composting and bio methanation; Thermal processing options – case studies under Indian conditions. Land disposal of solid waste-Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor – Dumpsite Rehabilitation

UNIT V: BIO MEDICAL WASTE MANAGEMENT (9 hours)

Biomedical Waste management – sources, treatment and disposal Hazardous Waste Management- Introduction, Sources, Classification, Physico-chemical, Chemical and Biological Treatment of hazardous waste, regulations.

Course Outcomes:

On successful completion of the course the student will be able to		POs related to COs
CO1	Understand the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.	PO1, PO2
CO2	Analyze MSW and apply techniques reduce, reuse and recycling of solid waste.	PO1,PO2
CO3	Analyze and design systems for storage, collection, transport, processing and disposal of municipal solid waste.	PO3, PO1,PO2
CO4	Understand the processing of solid waste and energy recovery	PO3, PO6
CO5	Understand the bio medical waste management	PO1,PO2,PO3

Text books:

1. William A. Worrell, P. Aarne Vesilind (2012)"Solid Waste Engineering", Cengage Learning, 2012.
2. John Pitchel (2014),"Waste Management Practices-Municipal, Hazardous and industrial", CRC Press, Taylor and Francis, New York.
3. Manser A.G.R. and Keeling A," Practical Handbook of Processing and Recycling of Municipal solid Wastes", A, Lewis Publishers, CRC Press, 1996

Reference Books:

1. CPHEEO "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organization , 2014, Government of India, New Delhi.
2. George Tchobanoglous and Frank Kreith ,Handbook of Solid waste management", 2002," , McGraw Hill, New York.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	3	-	-	-	-	-	-	-	-	-	-
CO.3	1	2	3	-	-	-	-	-	-	-	-	-
CO.4	-	-	2	-	-	2	-	-	-	-	-	-
CO.5	1	2	3	-	-	-	-	-	-	-	-	-
CO*	**1.66**	**2.25**	**2.66**		**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech II Semester	L	T	P	C
	2	0	2	3

18CIV424E (CE-IV):DESIGN AND DRAWING OF IRRIGATION STRUCTURES

Course Educational Objectives:

1. To study the Design and drawing of surplus weir
2. To study the Design and drawing of Tank sluice with tower head
3. To study the Design and drawing of Trapezoidal notch fall
4. To study the Design and drawing of Canal regulator
5. To study the Design and drawing of Type III siphon aqueduct and sloping glacis weir.

UNIT I **(9 hours)**
Design and drawing of the-Surplus weir

UNIT II **(9 hours)**
Design and drawing of the Tank sluice with tower head

UNIT III **(9 hours)**
Design and drawing of the Trapezoidal notch fall

UNIT IV **(9 hours)**
Design and drawing of the- Canal regulator

UNIT V **(9 hours)**
Design and drawing of the Type III Siphon aqueduct and Direct Sluice

Final Examination pattern: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

Text books:

1. C. Satyanarayana Murthy ,"Water Resources Engineering - Principles and Practice" , New age international publishers, New Delhi, 2003.
2. B.C. Punmia, Pande B.B. Lal, Ashok Kumar Jain and Arun Kumar J "Irrigation and Water Power Engineering ", 16th Edition, Laxmi Publications, 2011.

Reference books:

1. S.K. Garg,"Irrigation Engineering and Hydraulic Structures" ,23rd Edition, Standard Book House, 2010.

Course Outcomes:

After completion of the course, a successful student will be able to:		**POs related to COs**
CO1	Design and develop an irrigation structure as per the suitability of a site.	PO1, PO2
CO2	Exposure to the design and drawing of various irrigation structures.	PO1, PO3
CO3	Ability to meet the requirements of irrigation design engineers in large and small• consulting firms, and at all levels of government and Private sectors	PO1, PO2
CO4	Design and drawing of type-III aqueduct	PO1, PO2
CO5	Design and drawing of Direct sluice	PO1, PO4

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	2	2										
CO.2	1		3									
CO.3	2	2										
CO.4	2	2										
CO.5	2			3								
CO*	**1.8**	**2**	**3**	**3**								

IV B.Tech II Semester	L	T	P	C
	3	0	0	3

18CIV424F(CE-IV): WATER RESOURCE ENGINEERING

Course Educational Objectives:

1. To introduce the students to the concept of soil-plant characteristics and their water requirements.
2. To study the concepts of ground water engineering
3. To gain basic knowledge about gravity dams and earth dams.
4. To gain basic knowledge about spillways and water power engineering
5. To get knowledge about river engineering system

UNIT I: CANAL REGULATION WORKS AND CROSS DRAINAGE WORKS (9 hours)

Canal Regulation Works: Canal falls-Necessity and location of falls-Types of falls; classification of falls-Cistern design-Roughening devices-Design of Sarada type fall. Canal regulators- Off-take alignment-Head regulators and Cross-regulators-Design of Cross-Regulator and Distributary head regulator.

Cross Drainage Works: Introduction-Types of Cross drainage works- Selection of suitable type of cross drainage work-Classification of aqueducts and Siphon aqueducts.

UNIT II: DIVERSION HEAD WORKS AND DAMS (9 hours)

Diversion Head Works: Types of diversion head works- Diversion and Storage head works-weirs and Barrages- Layouts of diversion head works-Components- Causes and failure of hydraulic structures on permeable foundations-Blighs creep theory- Khosla's theory- Determination of uplift pressure, impervious floors using Blighs and Khoslas theory-Exit gradient.

Dams: Introduction- Classification according to use- Classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages- Physical factors governing selection of type of dam-Selection of site for a dam.

UNIT III: GRAVITY DAMS AND EARTH DAMS (9 hours)

Gravity Dams: Introduction-Forces acting on a gravity dam- Combination of loading for design- Modes of failure-Stability requirements- Principal and shear stresses- Stability analysis-Elementary profile of a gravity dam-Practical profile of a gravity dam- Limiting height of a gravity dam- High and low gravity dams- Design of gravity dams–single step method- Galleries- Stability analysis of non–overflow section of Gravity dam.

Earth Dams: Introduction- Types of earth dams- Causes of failure of earth dams-Criteria for safe design of earth dams- Section of an earth dam- Design to suit available materials- Seepage control measures-Slope protection. Seepage through earth dam – Graphical method

UNIT IV: SPILLWAYS AND WATER POWER ENGINEERING (9 hours)

Spillways: Introduction- Types of spillways- Profile of ogee spillway- Energy dissipation below spillways for relative positions of jump height curve and tail water curve- Stilling basins- Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons- Spillway crest gates-Types and description only.

Water Power Engineering: Development of Hydro power in India- Classification of hydel plants- runoff river plants, storage plants and pumped storage plants- low, medium and high head schemes - Investigation and planning- components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing .draft tube and tail race- assessment of available power- definition of gross head ,operating head ,effective head- Flow duration curve- Power duration curve- Load duration curve- Load curve -primary power and secondary power- installed capacity, dependable capacity- firm power, secondary power- power factor ;load factor, capacity factor ,utilization factor and Diversity factor.

UNIT V: RIVER ENGINEERING (9 hours)

River Engineering: Classification of rivers-Meandering- Causes of meandering- Basic factors controlling process of meandering- Aggrading type of river- Degrading type of River- River training- objectives, Classification of river training works- Types of River training works- Guide banks, Marginal embankments, Groynes or spur, levees, bank protection, pitched islands.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Dmonstrate knowledge and skills on Planning, design, operation and management of canal system.	PO1, PO2
CO2	Acquire knowledge on diversion head works and dams.	PO1
CO3	Explain about Basic components of gravity dams and earth dams	PO1
CO4	Acquire knowledge on various components of spillways,design principles	PO1, PO4
CO5	Demonstrate knowledge and skills on river engineering works	PO1

Textbooks:

1. Dilip Kumar Majumdar, “Irrigation Water Management”, Prentice-Hall of India, New Delhi, 2008.
2. Punmia B.C., et. al; Irrigation and water power Engineering, Laxmi Publications, 16th Edition, New Delhi, 2009
3. Garg S. K., “Irrigation Engineering and Hydraulic structures”, Khanna Publishers, 23rd Revised Edition, New Delhi, 2009

References:

1. Duggal, K.N. and Soni, J.P., “Elements of Water Resources Engineering”, New Age International Publishers, 2005

2. Linsley R.K. and Franzini J.B, “Water Resources Engineering”, McGraw-Hill Inc, 2000
3. Chaturvedi M.C., “Water Resources Systems Planning and Management”, Tata McGraw-Hill Inc., New Delhi, 1997.
4. Michael A.M., Irrigation Theory and Practice, 2nd Edition, Vikas Publishing House Pvt. Ltd., Noida, Up, 2008
5. Asawa, G.L., “Irrigation Engineering”, NewAge International Publishers, New Delhi, 2000.
6. Basak, N.N, "Irrigation Engineering", Tata McGraw Hill Publishing Co. New Delhi,1999

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-		-	-	-	-	-	-	-	-
CO.2	3				-	-	-	-	-	-	-	-
CO.3	3				-	-	-	-	-	-	-	-
CO.4	3		-	1	-	-	-	-	-	-	-	-
CO.5	3			-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Open Elective – I

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OMEC321 INDUSTRIAL ROBOTICS (OPEN ELECTIVE-I)

Course Educational Objectives:

1. To know the robot drive systems and internal grippers and external grippers
2. To understand the image processing and analysis of image data
3. To learn Robot motion analysis and control.
4. To study the robot language structure and programming
5. To explain the various applications of robots in industry

UNIT – 1: FUNDAMENTALS OF ROBOTIC TECHNOLOGY AND DRIVE SYSTEM (9)

Introduction – Robot anatomy – Robot configuration and motions – Robot specifications – Pitch, yaw, roll, joint notations, speed of motion, pay load – Work volume. **Robot Drive System:** Pneumatic, hydraulic drives, mechanical and electrical drives – Servo motors and stepper motor. **Grippers:** Mechanical, pneumatic and hydraulic grippers, magnetic grippers and vacuum grippers – Two fingered and three fingered grippers – Internal and external grippers.

UNIT – 2: ROBOT SENSORS AND MACHINE VISION (9)

Robot Sensors: Position of sensors – Range sensors – Proximity sensors – Touch sensors – Wrist sensors – Compliance sensors – Slip sensors. **Machine Vision**: Camera – Frame grabber – Sensing and digitizing image data – Signal conversion – Image storage and lighting techniques – Image processing and analysis – Data reduction – Edge detection – Segmentation feature extraction – Object recognition.

UNIT – 3: ROBOT MOTION ANALYSIS AND CONTROL (11)

Robot Kinematics: Manipulator kinematics – Position representation – Forward and reverse transformation – Adding orientation – Homogeneous transformations – D-H notation – Forward and inverse kinematics. **Robot Dynamics:** Differential transformation – Compensating for gravity – Robot arm dynamics. **Trajectory Planning:** Trajectory planning and avoidance of obstacles – Path planning – Skew motion – Joint integrated motion – Straight line motion.

UNIT – 4: ROBOT PROGRAMMING (9)

Robot Programming: Lead through programming – Robot language structure – Motion commands of move, speed control, workplace, path, frames, end effecter operation, sensor operation and react statement – Program sequence and subroutine – Teach pendant programming – VAL II programming.

UNIT – 5: ROBOT APPLICATIONS AND IMPLEMENTATION PRINCIPLES (7)

Robot Applications: Material transfer and machine loading / unloading – Processing applications in spray coating – Assembly and inspection automation – Future applications of robot in mines, under water and space. **Implementation Principles:** Selection of robots in industry applications – Economic analysis of the robot.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Understand the robot drive systems and internal grippers and external grippers.	**PO1**
CO2	Recognize the image data and analysis the image processing	**PO1, PO12**
CO3	Understand the basic concepts of robot motion and analysis	**PO1,PO2,PO3**
CO4	Know the robot language structure and robot programming.	**PO1,PO2, PO3, PO12**
CO5	Explain the applications of robots in industries and Safety considerations in workplace	**PO1,PO11, PO12**

Text Books:

1. Industrial Robotics: Technology, Programming and Applications, Mikell P Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G Odrey and Ashish Dutta 2/e, 2012, Tata McGraw-Hill Education Pvt. Ltd.,
2. Robotics: Control, Sensing, Vision and Intelligence, K.S. Fu, R.C.Gonzales and C.S.G.Lee, 1/e, 2008, Tata McGraw-Hill Education Pvt. Ltd., Noida.

References:

1. Introduction to Robotics: Analysis, Control, Applications, 3/e, 2020, Saeed B.Niku, Wiley India Pvt, Ltd., New Delhi.
2. Robotics Technology and Flexible Automation, S.R.Deb and Sankha Deb, 2/e, 2010, Tata McGraw-Hill Education Pvt. Ltd., Noida.
3. Robots and Robotics - Principles, Systems, and Industrial Applications, Mark R Miller & Rex Miller 2017, McGraw-Hill Education.
4. Introduction to Robotics: Mechanics and Control, John J. Craig, 3/e, 2008, Pearson Education, New Delhi.
5. Robotics: Fundamental Concepts and Analysis, Ashitava Ghosal, 1/e, 2006, Oxford University Press, New Delhi.
6. Robotics and Industrial Automation, Rajput R.K, 2008, S.Chand Publications, New Delhi.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	-	-	-	-	-	-	-	-	-	1
CO.3	3	2	1	-	-	-	-	-	-	-	-	-
CO.4	3	2	1	-	-	-	-	-	-	-	-	1
CO.5	3	-	-	-	-	-	-	-	-	-	1	1
CO*	**3**	2	1	-	-	-	-	-	-	-	1	1

III B.Tech II Semester **L T P C**

3 0 0 3

18OMEC322 POWER PLANT TECHNOLOGY (OPEN ELECTIVE-I)

Course Educational Objectives:

1. To understand the working principles of steam power plants and analyzes its performance.
2. To know the working principles of diesel and gas turbine power plant
3. To clarify the working of nuclear power plant and safety measures
4. To recognize the sources of renewable energies and hydroelectric power generation techniques.
5. To learn the economics, Energy management and environmental issues of power generation.

UNIT – 1: STEAM POWER PLANT (9)

Rankine cycle – Layout of modern coal power plant – Super critical boilers, FBC Boilers, turbines, condensers, steam and heat rate – Subsystems of thermal power plants – Fuel and ash handling – Draught system – Feed water treatment – Binary cycles and cogeneration systems.

UNIT – 2: DIESEL AND GAS TURBINE POWER PLANT (9)

Diesel Power Plant: Introduction – IC Engines, types, construction – Plant layout with auxiliaries – Fuel supply system, air starting equipment, lubrication and cooling system – Super charging. **Gas Turbine Power Plant**: Introduction – Classification – Construction – Layout with auxiliaries – Principles of working of closed and open cycle gas turbines – Combined cycle power plants and comparison.

UNIT – 3: NUCLEAR POWER PLANT (9)

Basics of nuclear engineering– Fuels and nuclear reactions – Layout and subsystems – Reflectors – Pressurized water reactor (PWR) – Boiling water reactor (BWR) – CANada Deuterium- Uranium reactor (CANDU) – Gas cooled and liquid metal fast breeder reactor – Heavy water reactor – Working and comparison – Safety measures for nuclear power plants.

UNIT – 4: HYDROELECTRIC POWER PLANT AND RENEWABLE ENERGY SOURCE (9)

Hydroelectric Power Plant: Water power – Hydrological cycle – Hydrographs – Storage and pondage – Classification of dams and spill ways – Hydroelectric typical plant layout and components – Pumped storage power plants – Selection of turbines.

Renewable Energy Sources: Principle, construction and working of wind, tidal, solar photo voltaic, solar thermal, geo thermal, biogas and fuel cell systems.

UNIT – 5: ENERGY MANAGEMENT, ECONOMICS AND ENVIRONMENTAL ISSUES (9)

Energy Management: Power tariff types – Load distribution parameters – load curve – Comparison of site selection criteria, relative merits and demerits – Capital and operating cost of different power plants. **Environmental Issues:** Effluents from power plants – Impact on environment – Pollutants – Pollution standards – Methods of Pollution control – Control of waste disposal and recovery – Waste disposal options for coal and nuclear power plants.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Understand the working principles of steam power plants and analyze performance	PO1,PO2,PO3, PO6, PO7, PO12
CO2	Understand the working principles of diesel and gas turbine power plant	PO1,PO3, PO6, PO7,PO12
CO3	Explain the working of nuclear power plant with safety measures	PO1,PO2,PO3, PO6, PO7, PO12
CO4	Explain the working power generation technologies from various renewable energy sources and hydroelectric power generation system	PO1,PO2,PO3, PO6, PO7, PO12
CO5	Describe environmental issues of power generation.	PO1,PO2,PO3, PO6, PO7, PO12

Text books:

1. Power Plant Engineering, P.K.Nag, 4/e, 2014, McGraw-Hill Education Pvt. Ltd., New Delhi.
2. Power Plant Engineering, R.K Hegde, 1/e, 2015, Pearson Education, India.

Reference books:

1. Power Plant Technology, M. M. El-Wakil, 1/e, 2010, Tata McGraw-Hill, New Delhi.
2. A Course in Power Plant Engineering, Arora and S. Domkundwar, 6/e, 2012, Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
3. Introduction to Power Plant Technology, G.D.Rai, 3/e, 2012, Khanna Publishers, New Delhi.

4. Power Plant Engineering, G.R. Nagpal and S.C. Sharma, 16/e, 2004, Khanna Publisher, New Delhi.
5. A Text Book of Power Plant Engineering, R.K.Rajput, 5/e, 2016, Laxmi Publications (P) Ltd., New Delhi.
6. Power Generation Handbook, Philip Kiameh, 2/e, 2013, Tata McGraw-Hill, New Delhi.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	2	-	-	1	1	-	-	-	-	1
CO.2	3	-	2	-	-	1	1	-	-	-	-	1
CO.3	3	2	1	-	-	1	1	-	-	-	-	1
CO.4	3	2	1	-	-	1	1	-	-	-	-	1
CO.5	3	2	1	-	-	1	3	-	-	-	-	2
CO*	**3**	**2**	**1.4**	-	-	**1**	**1.2**	-	-	-	-	**1.5**

III B.Tech II Semester **L T P C**

3 0 0 3

18OMEC323 MECHATRONICS SYSTEM (OPEN ELECTIVE-I)

Course Educational Objectives:

1. To recognize the fundamentals of Mechatronics, Control Systems, Transducers and Sensors
2. To understand the functions of Mechanical, Electrical, Hydraulic, and Pneumatic Actuators.
3. To express the Basic system models and Controllers used in Mechatronic systems
4. To realize the applications of microprocessors and Programmable Peripheral Interface
5. To recognize the Elements of programmable logic controller in mechatronic system

UNIT – 1: MECHATRONICS, SENSORS AND TRANSDUCERS (9)

Introduction: Integrated design issues in mechatronics – Mechatronics key elements – Applications in mechatronics – Introduction to mechatronics systems and measurement systems. **Control Systems:** Open loop, closed loop, automatic control, block diagram, pneumatic control and hydraulic control systems. **Transducers:** Actuating mechanisms – Electro-mechanical, resistance, variable inductance, capacitive, piezoelectric, photoelectric, thermo electric and Hall Effect transducers – Strain gauge. **Sensors:** Proximity, pneumatic, light, tactile and smart sensors – Load cells – Digital encoders – Selection of sensors.

UNIT – 2: ACTUATIORS (9)

Mechanical Actuator: Gear drive, belt drive, chain drive and bearings. **Electrical Actuator:** Mechanical and solid state switches – Construction and working principle of stepper motor and servo motor. **Hydraulic Actuators:** Hydraulic systems – Pumps, regulator, compressors and valves – Linear and rotary actuator. **Pneumatic Actuators:** Pneumatic systems – Valves – Linear and rotary actuator.

UNIT – 3: SYSTEM MODELS AND CONTROLLERS (9)

System Models: Basic system models – Mechanical system buildings – Electrical system buildings – Fluid system buildings – Thermal system buildings – Rotational-translational systems – Electro mechanical systems – Hydraulic mechanical systems. **Controller:** Control, two step, proportional and derivative mode – Combination of PD, PI and PID – PID and digital controllers – Concepts in adaptive control systems.

UNIT – 4: MICROPROCESSORS AND PROGRAMMABLE PERIPHERAL INTERFACE (9)

Microprocessors: Architecture of 8085 – Pin Configuration – Addressing Modes – Instruction set, Timing diagram of 8085 – Concepts of 8051 microcontroller with block diagram. **Programmable Peripheral Interface:** Architecture of 8255 – Keyboard interfacing – LED display – Interfacing – ADC and DAC interface – Temperature control – Stepper motor control – Traffic control interface.

UNIT– 5: PROGRAMMABLE LOGIC CONTROLLER & MECHATRONIC SYSTEMS (9)

Programmable Logic Controller: Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC. **Mechatronic Systems:** Design process of engine management system, automatic camera, automatic washing machine, pick and place robot, automatic car park barrier, wireless surveillance balloon, uninterruptible power supply, coin counter and electrically controlled robotic arm.

Course Outcomes:

On successful completion of the course, Students will be able to		**POs related to COs**
CO1	Understand the fundamentals of Mechatronics, Control Systems, Transducers and Sensors	**PO1, PO2**
CO2	Illustrate the functions of Mechanical, Electrical, Hydraulic, Pneumatic Actuators in mechatronics systems	**PO1, PO2, PO3**
CO3	demonstrate the Basic system models and Controller used in Mechatronic systems	**PO1, PO2**
CO4	Understand the applications of microprocessors and and Programmable Peripheral Interface	**PO1, PO2**
CO5	Know the Elements of programmable logic controller in mechatronic system	**PO1, PO2, PO3**

Text Books:

1. Mechatronics: Electronic control systems in mechanical and electrical engineering, William Bolton, 6/e, 2019, Pearson Education, India.
2. A Textbook of Mechatronics, R.K.Rajput, 4/e, 2007, S. Chand & Co.

Reference Books:

1. Mechatronics Systems Design, Devdas Shetty and Richard A. Kolk, 2/e, 2011, Cengage Learning.

2. Mechatronics, Principles and Applications, Godfrey Onwubolu, 1/e, 2005, Elsevier Butterworth-Heinemann.
3. Introduction to Mechatronics and Measurement Systems, David G. Alciatore and Michael B. Histand, 4/e, 2014, Tata McGraw Hill Education.
4. Mechatronics: A Foundation Course, Clarence W. de Silva, 1/e, 2010, CRC Press, Taylor & Francis Group
5. Mechatronics with Experiments, Sabri Cetinkunt, 2/e, 2015, John Wiley & Sons Ltd
6. Mechatronics : Principles, Concepts and Applications, Nitaigour Premchand Mahalik, 1/e, 2003, Tata McGraw Hill Education.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	3	2	1	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	2	-	-	-	-	-	-	-	-	-	-
CO.5	3	2	1	-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**1**	-	-	-	-	-	-	-	-	-

III B.Tech II semester

L	T	P/D	C
3	0	0	3

18OCSE321 OBJECT ORIENTED PROGRAMMING

Course Educational Objectives:

1: To study the syntax, semantics and features of Java Programming Language.

2: To understand the principles of packages and inheritance.

3: To develop Java application programs using exceptions and interfaces.

4: To gain knowledge on multithreading and applets

5: To create GUI applications & perform event handling.

UNIT – 1 BASICS OF JAVA (9)

History of Java - Java Buzzwords - Overview of Java - Data Types - Variables - Arrays - Operators - Control Statements – Introducing Classes &Objects - Constructors - Methods - Access Control – this Keyword - Garbage Collection - Overloading Methods and Constructors - Parameter Passing - Recursion – Reading input-Command Line Arguments – Buffer Reader – Scanner.

UNIT – 2 STRING HANDLING, INHERITANCE AND PACKAGES (9)

String Handling-Using String Class – String Buffer Class
Inheritance-Basics of Inheritance-Using super-Creating a multilevel hierarchy-Method overriding- Dynamic method dispatch - Using abstract classes -Using final.
Packages-Defining - Creating and Accessing a Package - Understanding CLASSPATH – Importing Packages - Exploring Packages.

UNIT – 3 INTERFACES AND EXCEPTION HANDLING (8)

Interfaces- Differences between Classes and Interfaces - Defining an Interface – Implementing.
Interface - Applying Interfaces - Variables in Interfaces and Extending Interfaces.
Exception Handling- Introduction – Exception Types – Uncaught Exception – Using Try and Catch – Multiple Catch clauses – Nested Try Statements – Throw – Throws – Finally – Built-in Exceptions – Creating Own Exception Subclass – Checked and Unchecked Exceptions.

UNIT – 4 MULTITHREADING AND APPLETS (10)

Multithreading -Differences between Multithreading and Multiprocessing - Thread Life Cycle - Creating Threads - Synchronizing Threads.
Applets- Concepts of Applet - Differences between Applet and Application - Life Cycle of an Applet

- Types of Applets - Creating Applet - Passing Parameters to Applet – Using Graphics Class.

UNIT – 5 EVENT HANDLING AND AWT AND SWINGS (9)

EVENT HANDLING AND AWT - Delegation Event Model - Event Classes - Sources of Events - Event Listeners - Handling Mouse and Keyboard Events - Adapter Classes - Inner Classes - The AWT Class Hierarchy - AWT Controls : Label – Button – TextField - CheckBox - Layout Managers.
Swings - Limitations of AWT – Components - Containers - Exploring Swing - JApplet - JFrame and JComponent - JLabel and Imageicon –JTextfield - JButton - JCheck Box - JRadioButton - JCombobox - JTabbedpane - JScrollpane - JTable.

Course Outcomes:

On Successful completion of this course student will be able to :

Course Outcomes		POs related to COs
CO1	Understand the basic principles of object oriented programming	PO1, PO2, PO3, PO4, PO5, PO12
CO2	Develop Java programs with the concepts of inheritance and packages	PO1, PO2, PO3, PO4, PO5, PO12
CO3	Build Java applications using exceptions and interfaces	PO1, PO2, PO3, PO4, PO5, PO12
CO4	Use multithreading and applet concepts in developing the object oriented programming	PO1, PO2, PO3, PO5
CO5	Develop the interactive Java programs using event handling and swings	PO1, PO2, PO3, PO5

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	2	2	-	-	-	-	-	-	2
CO.2	3	3	3	3	3	-	-	-	-	-	-	2
CO.3	3	3	2	3	3	-	-	-	-	-	-	2
CO.4	3	3	2	-	3	-	-	-	-	-	-	-
CO.5	3	3	2	-	3	-	-	-	-	-	-	-
CO*	**3**	**3**	**2.4**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

Text Books:

1. Java; The complete reference, Herbert schildt, 11th editon, TMH.
2. Beginning Java2 JDK , Ivor Horton's, 5 th Edition, WILEY Dream Tech.

Reference Books:

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John wiley& sons.
2. An Introduction to OOP, T. Budd, second edition, Pearson education.
3. Introduction to Java programming ,Y. Daniel Liang, 6 th edition, Pearson education.
4. An introduction to Java programming and object oriented application development, R.A. Johnson- Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, 7 th Edition, Pearson Education.

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OCSE322 OPERATING SYSTEMS

Course Educational Objectives:

1. To understand main components of OS, System structures and the operations performed by OS as a resource manager.
2. To Study process concurrency and synchronization.
3. To Analyze the different memory management techniques.
4. To gain knowledge about concepts of input/ output systems and storage management
5. To manage different file systems, protection and security to the systems

UNIT – 1 : OPERATING SYSTEMS OVERVIEW (10)

Introduction - What Operating system do - Operating system operations - Process management - Memory management - Storage management - Protection and Security - Distributed Systems - Special purpose systems.
System structures : Operating system services - user operating system interface - System calls - Types of system calls - Operating system design and implementation - Operating system structure - Operating system generation - System boot.

UNIT - 2 : PROCESS MANAGEMENT AND CONCURRENCY (8)

Process Management: Process concepts – threads - scheduling-criteria – algorithms and their evaluation - Thread scheduling.
Concurrency : Process synchronization - the critical- section problem - Peterson's Solution - synchronization Hardware – semaphores - classic problems of synchronization - monitors.

UNIT – 3 : MEMORY MANAGEMENT (9)
Memory Management and Virtual Memory : Logical & physical Address Space – Swapping - Contiguous Allocation – Paging - Structure of Page Table – Segmentation - Virtual Memory - Demand Paging - Performance of Demanding Paging - Page Replacement - Page Replacement Algorithms - Allocation of Frames - Thrashing.

UNIT – 4 : PRINCIPLES OF DEADLOCK AND MASS-STORAGE STRUCTURE & I/O SYSTEMS (9)

Principles of deadlock - system model - deadlock characterization - deadlock prevention - detection and avoidance - recovery form deadlock.
Mass-storage structure - overview of Mass – storage structure - Disk structure - disk attachment - disk scheduling - swap-space management - RAID structure - stable-storage implementation - Tertiary storage structure.

UNIT - 5 : FILE SYSTEM INTERFACE (9)

File system Interface- the concept of a file - Access Methods - Directory structure - File system mounting - file sharing – protection - File System implementation - File system structure - file system implementation - directory implementation - allocation methods - free-space management - efficiency and performance.
Protection and Security - Goals of protection - Principles of protection - Access matrix - The security problem - program threats - System and network threats.

Course Outcomes:

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

Course Outcomes		**POs related to COs**
CO1	Analyze operating system operations ,system design and implementation	PO1, PO2
CO2	Implement Thread scheduling , solutions to synchronize problems	PO1, PO4,
CO3	Apply memory management techniques, virtual memory concepts	PO1,PO3,PO4
CO4	Manage process execution without deadlock, mass storage structure	PO1,PO4
CO5	Understand file system interface, protection and security in System and Network	PO1, PO2, PO4

CO-PO Mapping

CO\PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	2	-	-	3	-	-	-	-	-	-	-	-
CO.3	3	-	3	3	-	-	-	-	-	-	-	-
CO.4	3	-	-	3	-	-	-	-	-	-	-	-
CO.5	2	3	-	3	-	-	-	-	-	-	-	-
CO*	**2.6**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Text Books:

1. Operating System Principles,8th Edition, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley Student Edition.
2. Operating systems - Internals and Design Principles, 6th Edition,W. Stallings, Pearson.

References books:

1. Modern Operating Systems, 3rd Edition ,Andrew S Tanenbaum PHI.
2. Operating Systems A concept - based Approach, 2nd Edition, D. M. Dhamdhere, TMH.
3. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
4. Operating Systems, 2nd Edition,A. S. Godbole, TMH
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, S, Haldar and A. A. Arvind, Pearson Education.
7. Operating Systems, R. Elmasri, A. G. Carrick and D. Levine, McGraw Hill.

18OCSE323	WEB PROGRAMMING	L	T	P/D	C
		3	0	0	3

Course description and objectives:

On completion of this course, a student will be
1: familiar with client server architecture and able to develop a web application using java technologies.
2: gain the skills and project-based experience needed for entry into web application and development careers.

UNIT I INTRODUCTION TO HTML (9)

HTML Common tags- Block Level and Inline Elements, Lists, Tables, Images, Forms, Frames; Cascading Style sheets, CSS Properties;

Java Script: Introduction to Java Script, Objects in Java Script, Dynamic HTML with Java Script

UNIT II JAVA DATA BASE CONNECTIVITY (9)

JDBC: Data Base, Database Schema, A Brief Overview Of The JDBC Process, JDBC Driver Types, JDBC Packages, Database Connection, Associating The JDBC-ODBC Bridge With Database, Creating, Inserting, Updating And Deleting Data In Database Tables, Result Set, Metadata.

UNIT III WEB SERVERS AND SERVLETS (11)

Tomcat web server, Introduction to Servlets: Servlets, the Advantage of Servlets over "Traditional" CGI, Basic Servlet Structure, Simple Servlet Generating Plain Text, Compiling and Installing the Servlet, Invoking the Servlet, Lifecycle of a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Context Parameters, Handling Http Request & Responses, Using Cookies-Session Tracking, Servlet with JDBC.

UNIT IV INTRODUCTION TO JSP (8)

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing, JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Declaring Variables and Methods , Sharing Data Between JSP pages, Users Passing Control and Data between Pages, JSP application design with JDBC, JSP Application Design with MVC.

UNIT V INTRODUCTION TO PHP (8)

Basics of PHP, Functions, Error Handling, Interaction between PHP and MySQL, Database using Forms,Using PHP to manipulate and Retrieve Data in MySQL.

Course Outcomes:

On successful completion of the course, students will be able to		POs related to Cos
CO1	Write a well formed / valid XML document.	PO1, PO2, PO3, PO5
CO2	Connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.	PO1, PO2, PO3, PO5
CO3	Develop a dynamic webpage by the use of java script and DHTML.	PO1, PO2, PO3
CO4	Write a server side java application called Servlet to catch form data sent from client, process it and store it on database.	PO1, PO2, PO3, PO5
CO5	Write a server side java application called JSP to catch form data sent from client and store it on database	PO1, PO2, PO3, PO5

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	3	-	3	-	-	-	-	-	-	-
CO.2	2	3	3	-	3	-	-	-	-	-	-	-
CO.3	2	3	3	-	3	-	-	-	-	-	-	-
CO.4	2	3	3	-	3	-	-	-	-	-	-	-
CO.5	3	3	-	2	3	-	-	-	-	-	-	-
CO*	**2.4**	**2.8**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

TEXT BOOKS:

1 Jon Duckett “Beginning Web Programming with HTML, XHTML, and CSS (Wrox Programmer to Programmer)
2 Marty Hall and Larry Brown “Core Servlets and Java Server pages Vol. 1: Core Technologies”, Pearson.

REFERENCE BOOKS:

1 DanWoods and Gautam Guliani,”Open Source for the Enterprise: Managing Risks, Reaping Rewards”, O’Reilly, Shroff Publishers and Distributors, 2005.
2 Sebesta,”Programming world wide web” Pearson.

3 Dietel and Nieto,"Internet and World Wide Web – How to program",PHI/Pearson Education Asia.
4 Murach,"Murach's beginning JAVA JDK 5", SPD
5 Wang,"An Introduction to web Design and Programming",Thomson

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OEEE321 SCADA SYSTEM AND APPLICATIONS

Course Educational Objectives:

1. To understand the fundamentals of SCADA.
2. To analyze the SCADA Components, Communication, Monitoring and Control
3. To analyze the application of SCADA in power System
4. Understand the Energy efficient motors and power factor improvement.
5. Know the concept Energy Measuring Instruments.

UNIT – 1: INTRODUCTION TO SCADA (9)

Evolution of SCADA, SCADA definitions, SCADA Functional requirements and Components, SCADA Hierarchical concept, SCADA architecture, General features, SCADA Applications, Benefits.

UNIT – 2: SCADA SYSTEM COMPONENTS (9)

Remote Terminal Unit (RTU), Interface units, Human- Machine Interface Units (HMI), Display Monitors/Data Logger Systems, Intelligent Electronic Devices (IED), Communication Network, SCADA Server, SCADA Control systems and Control panels.

UNIT – 3: SCADA COMMUNICATION (10)

SCADA Communication requirements, Communication protocols: Past, Present and Future, Structure of a SCADA Communications Protocol, Comparison of various communication protocols, IEC61850 based communication architecture, Communication media like Fiber optic, PLCC etc. Interface provisions and communication extensions, synchronization with NCC, DCC.

UNIT – 4: SCADA MONITORING AND CONTROL (8)

Online monitoring the event and alarm system, trends and reports, Blocking list, Event disturbance recording. Control function: Station control, bay control, breaker control and disconnector control.

UNIT – 5: SCADA APPLICATIONS IN POWER SYSTEM (9)

Applications in Generation, Transmission and Distribution sector, Substation SCADA system Functional description, System specification, System selection such as Substation configuration, IEC61850 ring configuration, SAS cubicle concepts, gateway interoperability list, signal naming concept. System Installation, Testing and Commissioning.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Explain the fundamentals of SCADA.	**PO1, PO2.**
CO2	Describe the system components of SCADA	**PO1,PO2**
CO3	Elucidate the SCADA communication	**PO1,PO2**
CO4	Acquire knowledge on the monitoring and control of SCADA	**PO1,PO2**
CO5	Describe the applications of SCADA in power system.	**PO1**

Text Books:

1. Stuart A. Boyer: SCADA-Supervisory Control and Data Acquisition, Instrument Society of America Publications, USA.

Reference Books:

1. Gordon Clarke, Deon Reynders: Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems, Newness Publications, Oxford, UK, 2004.
2. William T. Shaw, Cybersecurity for SCADA systems, PennWell Books, 2006

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	-	-	-	-	-	-	-	-	-	-	-
CO*	**2.8**	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OEEE322 :SERVICING OF ELECTRICAL APPLIANCES

Course Educational Objectives:

1. To learn the servicing of various Electrical appliances.
2. To understand the importance of Earthing for safe operation
3. To Know the concept of different electrical appliances
4. To understand the concept of Protection devices
5. To know the concept of Electrical Safety

UNIT – 1: INTRODUCTION (9)

Introduction to electrical appliances-Importance of electrical wiring – Principle of domestic wiring- Wiring system using casing & capping, PVC, and concealed system-wiring connections: tube light wiring, staircase wiring, house wiring.

UNIT – 2: TESTING AND FAULT IDENTIFICATION OF LOW POWER APPLIANCES (9)

Maintenance and repair of domestic equipments - electric iron box- - ceiling fan - electric kettle, Heater/immersion heater-washing machine- grinder-mixer.

UNIT – 3: SERVICING OF HIGH POWER APPLIANCES (9)

Testing of different electrical appliances-geyser-hot plates-pumps– induction stove-refrigerator etc.

UNIT – 4: PROTECTION DEVICES AND TESTING EQUIPMENTS (9)

Study of fuses- Contactors-Circuit Breakers- Relays - Measurement of voltage, current and resistance using multi meter and Clamp meter - Usage of continuity tester- line tester - test lamp.

UNIT – 5: PRACTICE ON EARTHING AND ELECTRICAL SAFETY (9)

Basic principles of earthing-different methods of earthing-importance of earthing-fundamental of safe installation of equipments – precautions & prevention of electrical shock- Types of Shocks - first Aid.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Understand the fundamental concepts of Electrical appliances.	**PO1,PO2,PO3,PO12**
CO2	Apply the concept to trace and identify the fault in low power appliances.	**PO1,PO2,PO3,PO12**
CO3	Apply the concept to trace and identify the fault in power appliances	**PO1,PO2,PO3,PO12**
CO4	Illustrate the concept of protective devices and measuring instruments.	**PO1,PO2,PO3,PO12**
CO5	Understand the importance of earthing for safe operations and Analyze any electrical connection and rectify the fault	**PO1,PO2,PO3,PO12**

Text Books:

1. Troubleshooting and Repairing Commercial Electrical Equipment by David Herres, Mc Graw Hill Publications, 2013
2. Elements of Induction Heating design and control application by S. Zinn, S. L. Semiatin, ASM International Publications.

Reference Books:

1. Elstan A. Fernandez, Marine Electrical technology.
2. Electrical Safety, Fire Safety Engineering and Safety Management by S. Rao, R.K. Jain, H.L. Saluja

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	2	-	-	-	-	-	-	-	-	2
CO.2	3	2	2	-	-	-	-	-	-	-	-	2
CO.3	3	2	2	-	-	-	-	-	-	-	-	2
CO.4	3	2	2	-	-	-	-	-	-	-	-	2
CO.5	3	2	2	-	-	-	-	-	-	-	-	2
CO*	**3**	**2**	**2**	-	-	-	-	-	-	-	-	**2**

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OEEE323 POWER SYSTEM REFORMS

Course Educational Objectives:

1. To study fundamentals of power system deregulation and restructuring.
2. To study available transfer capability.
3. To study congestion management
4. To study various electricity pricing methods.
5. To study operation of power system in deregulated environment.

UNIT – 1: OVER VIEW OF KEY ISSUES IN ELECTRIC UTILITIES (9)

Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange– Market operations – Market Power – Standard cost – Transmission Pricing – Congestion Pricing – Management of Inter zonal/Intra zonal Congestion.

UNIT – 2: AVAILABLE TRANSFER CAPABILITY (ATC) (9)

Structure of OASIS – Processing of Information – Transfer capability on OASIS – Definitions Transfer Capability Issues – ATC – TTC – TRM – CBM calculations – Methodologies to calculate ATC.

UNIT – 3: CONGESTION MANAGEMENT (9)

Introduction to congestion management – Methods to relieve congestion

UNIT – 4: ELECTRICITY PRICING (9)

Introduction – Electricity price volatility electricity price indexes – Challenges to electricity pricing – Construction of forward price curves – Short–time price forecasting.

UNIT – 5: POWER SYSTEM OPERATION IN COMPETITIVE ENVIRONMENT (9)

Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a GENCO.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Will understand importance of power system deregulation and restructuring.	**PO1,PO2,PO3**
CO2	Able to compute Available Transfer Capability**.**	**PO1,PO2,PO3,**
CO3	Will understand transmission congestion management.	**PO1,PO2, PO3**
CO4	Able to compute electricity pricing in deregulated environment.	**PO1,PO2,PO3**
CO5	Will be able to understand power system operation in deregulated environment.	**PO1,PO2,PO3**

Text Books:

1. Kankar Bhattacharya, Math H.J. Boller, JaapE.Daalder, 'Operation of Restructured Power System' Kluver Academic Publisher – 2001.
2. Mohammad Shahidehpour, and Muwaffaqalomoush, – "Restructured electrical Power systems" Marcel Dekker, Inc. 2001

Reference Books:

1. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England.
2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	2	-	-	-	-	-	-	-	-	-
CO.2	3	2	2	-	-	-	-	-	-	-	-	-
CO.3	3	2	2	-	-	-	-	-	-	-	-	-
CO.4	3	2	2	-	-	-	-	-	-	-	-	-
CO.5	3	2	2	-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**2**	-	-	-	-	-	-	-	-	-

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OECE321 MACHINE VISION SYSTEM

Course Educational Objectives:

1. To introduce theory, applications and techniques of machine vision to students
2. Provide the students with an understanding of the problems involved in the development of machine vision systems.
3. Introduces the "low-level" algorithms of image processing that are necessary for the "mid-level" vision or feature extraction.
4. To describe and analyze the pattern recognition, and 3D analysis and modeling of objects and scenes.
5. Tolay emphasis on the practical integration of machine vision systems, and the related applications in real time.

UNIT – 1: INTRODUCTION (9)

Human vision – Machine vision and Computer vision – Benefits of machine vision - Block diagram and function of machine vision system implementation of industrial machine vision system – Physics of Light – Interactions of light – Refraction at a spherical surface – Thin Lens Equation.

UNIT – 2: IMAGE ACQUISITION (9)

Scene constraints – Lighting parameters – Lighting sources, Selection – Lighting Techniques – Types and Selection – Machine Vision Lenses and Optical Filters, Specifications and Selection – Imaging Sensors – CCD and CMOS, Specifications – Interface Architectures – Analog and Digital Cameras – Digital Camera Interfaces – Camera Computer Interfaces, Specifications and Selection – Geometrical Image formation models – Camera Calibration, line and progressive scan.

UNIT – 3: IMAGE PROCESSING` (9)

Machine Vision Software – Fundamentals of Digital Image – Image Acquisition Modes – Image Processing in Spatial and Frequency Domain – Point Operation, Thresholding, Grayscale Stretching – Neighborhood Operations, Image Smoothing and Sharpening – Edge Detection – Binary Morphology.

UNIT – 4: IMAGE ANALYSIS (9)

Feature extraction – Region Features, Shape and Size features – Texture Analysis – Template Matching and Classification – 3D Machine Vision Techniques – Decision Making.

UNIT – 5: MACHINE VISION APPLICATIONS (9)

Machine vision applications in manufacturing, electronics, printing, pharmaceutical, textile, applications in non-visible spectrum, metrology and gauging, OCR and OCV, vision guided robotics – Field and Service Applications –

Agricultural, and Bio medical field, augmented reality, surveillance, bio-metrics, automobile industries, Food packaging industry, research and aeronautics.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Formulate the concepts of machine vision system and its applications	**PO1, PO2**
CO2	Determine the geometrical image formation model and analyze the lighting effects for image acquisition	**PO1,PO2**
CO3	Demonstrate various the image acquisition and processing techniques in spatial and frequency domain	**PO1, PO2,PO3**
CO4	Analyze the digital image for feature extraction and 3D vision techniques for decision making.	**PO1, PO2,PO3, PO4**
CO5	Apply machine vision concepts and visual sensing technologies in real time applications	**PO1, PO2**

Text Books:

1. Handbook of Machine Vision, First Edition, Alexander Hornberg,2006, Wiley VCH.
2. Machine Vision Theory, Algorithms and Practicalities, Davis E.R., 2005, Elsevier.

Reference Books:

1. Understanding and Applying Machine Vision, NelloZuech,,2000,Marcel Decker.
2. Introductory Techniques For 3D Computer Vision, first Edition.,EmanueleTrucco, Alessandro Verri,
3. Digital Image Processing Using MATLAB, Rafael C.Gonzales, Richard.E.Woods, 2014, Mc. Graw Hill Education.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	2
CO.2	2	3	-	-	-	-	-	-	-	-	-	2
CO.3	2	3	2	-	-	-	-	-	-	-	-	2
CO.4	3	2	2	2	-	-	-	-	-	-	-	2
CO.5	3	2	-	-	-	-	-	-	-	-	-	2
CO*	**2.6**	**2.4**	**2**	**2**	-	-	-	-	-	-	-	**2**

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OECE322 FOUNDATION OF NANO-ELECTRONICS

Course Educational Objectives:

1. To learn the basic fundamentals of Nano electronics
2. To better understand the of the Nano-micro fabrication.
3. To classify the different Nano materials depending on the properties.
4. To Understand the phenomena using the characterization techniques
5. To provide a foundation for the device fabrication and various applications in the field of sensors technology, optoelectronics, communication and nanotechnology etc.

UNIT – 1: INTRODUCTION TO TUNNELING (9)

Tunnel junction and applications of tunneling, Tunneling Through a Potential Barrier, Metal-Insulator, Metal-Semiconductor, and Metal-Insulator-Metal Junctions, Coulomb Blockade, Tunnel Junctions, Tunnel Junction Excited by a Current Source.

UNIT – 2: TUNNELING DEVICES (9)

Field Emission, Gate—Oxide Tunneling and Hot Electron Effects in nano MOSFETs, Theory of Scanning Tunneling Microscope, Double Barrier Tunneling and the Resonant Tunneling Diode.

UNIT – 3: LITHOGRAPHY TECHNIQUES (9)

Introduction to lithography- Contact, proximity printing and Projection Printing, Resolution Enhancement techniques, Positive and negative photo resists, Electron Lithography, Projection Printing. Lithography based on Surface Instabilities: Wetting, De-wetting, Adhesion, Limitations, Resolution and Achievable / line widths, Lift off process, Bulk Micro machining.

UNIT – 4: MEMS DEVICES (9)

Introduction to MEMS and NEMS, working principles, micro sensors, micro actuation-thermal actuation, piezoelectric actuation and electrostatic actuation–micro gripers, motors, valves, pumps, accelerometers, fluidics and capillary electrophoresis, active and passive micro fluidic devices, Pizoresistivity, Pizoelectricity and thermoelectricity.

UNIT – 5: NANO ELECTRONIC DEVICES (9)

Scaling of physical systems – Geometric scaling & Electrical system scaling. The Single-Electron Transistor: The Single- Electron Transistor Single-Electron Transistor Logic, Other SET and FET Structures, Carbon Nanotube Transistors (FETs and SETs), Semiconductor Nanowire FETs and SETs, Molecular SETs and Molecular Electronics. Graphenes, fullerenes- Structure and Properties.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	To understand and analyze the fundamental physics of nano electronics	**PO1**
CO2	Discuss various Properties of electrons in nanostructures	**PO1,PO2**
CO3	Describe deep insight to fabrication and characterization techniques in Nanostructures.	**PO1,PO2**
CO4	Familiarize with concepts of electronics transportation in nanostructures, understanding the working principles of MEMS and NEMS	**PO1**
CO5	Demonstrate the working of various nano electronics devices	**PO1,PO2,PO3**

Text Books:

1. Stephen D. Senturia, "Microsystem Design, Springer Verlag", 2001.
2. Marc Madou, "Fundamentals of microfabrication & Nano Technology", Taylor and Francis, 2011.
3. T. Fukada & W.Mens, "Micro Mechanical system Principle & Technology", Elsevier, 1998.
4. Julian W.Gardnes, Vijay K. Varda, "Micro sensors MEMS & Smart Devices", 2001.

Reference Books:

1. Nano Terchnology and Nano Electronics – Materials, devices and measurement Techniques by WR Fahrner – Springer.
2. Nano: The Essentials – Understanding Nano Scinece and Nanotechnology by T.Pradeep; Tata Mc.Graw Hill.
3. Nanoelectronics and Nanosystems – From Transistor to Molecular and Quantum Devices by Karl Goser, Peter Glosekotter, Jan Dienstuhl
4. Quantum-Based Electronic Devices and Systems by M. Dutta and M.A. Stroscio, World Scientific.
5. Micro sensors MEMS& Smart Devices, Julian W.Gardnes, Vijay K. Varda, 2001

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	-
CO.2	3	2	-	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	-	-	-	-	-	-	-	-	-	-	-
CO.5	3	2	2	-	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**2**	-	-	-	-	-	-	-	-	-

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OECE323 MEDICAL ELECTRONICS

Course Educational Objectives:

1. To gain knowledge and analyze the various physiological parameters.
2. To understand the respiratory, Blood pressure, temperature measurements etc.
3. To study about the various assist devices used in the hospitals.
4. To gain knowledge about equipment used for various diagnostic and therapeutic techniques.
5. To know the recent trends in tele medicine and laser in medicine.

UNIT – 1: ELECTRO-PHYSIOLOGY AND BIO-POTENTIAL RECORDING (9)

The origin of Bio-potentials; biopotential electrodes, biological amplifiers, ECG, EEG, EMG,PCG, lead systems and recording methods, typical waveforms and signal characteristics.

UNIT – 2: BIO-CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT (9)

PH, PO2, PCO2, colorimeter, Auto analyzer, Blood flow meter, cardiac output, respiratory measurement, Blood pressure, temperature, pulse, and Blood cell counters.

UNIT – 3: ASSIST DEVICES (9)

Cardiac pacemakers, DC Defibrillator, Dialyzer, Heart lung machine.

UNIT – 4: PHYSICAL MEDICINE AND BIOTELEMETRY (9)

Diathermies- Shortwave, ultrasonic and microwave type and their applications, Surgical Diathermy Telemetry principles, frequency selection, biotelemetry, radio pill, electrical safety.

UNIT – 5: RECENT TRENDS IN MEDICAL INSTRUMENTATION (9)

Thermograph, endoscopy unit, Laser in medicine, cryogenic application, Introduction to telemedicine.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Distinguish and analyze the various physiological parameters and its recording methods, signal characteristics.	**PO1,PO2**
CO2	Describe the respiratory, Blood pressure, temperature measurements etc.	**PO1,PO2,PO5**
CO3	Analyze function of various assist devices used in the hospitals.	**PO1,PO2, PO5**
CO4	Demonstrate knowledge about equipment used for physical medicine and the various recently developed diagnostic and therapeutic techniques.	**PO1,PO2, PO5**
CO5	Extend knowledge on recent trends in tele medicine and laser in medicine.	**PO1,PO2, PO5**

Text Books:

1. Leslie Cromwell, ―Biomedical instrumentation and measurement‖, Prentice Hall of India, New Delhi, 2007.
2. John G.Webster,‖ Medical Instrumentation Application and Design‖, 3rd Edition, Wiley India Edition, 2007.

Reference Books:

1. Khandpur, R.S., ―Handbook of Biomedical Instrumentation‖, TATA McGraw-Hill, New Delhi, 2003.
2. Joseph J.Carr and John M.Brown, ―Introduction to Biomedical equipment Technology‖, John Wiley and Sons, New York, 2004.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	2	-	-	-	-	-	-	-
CO.3	3	3	-	-	2	-	-	-	-	-	-	-
CO.4	3	3	-	-	2	-	-	-	-	-	-	-
CO.5	3	3	-	-	2	-	-	-	-	-	-	-
CO*	**3**	3	-	-	2	-	-	-	-	-	-	-

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OSAH321 MATHEMATICAL MODELLING - ANALYSIS AND APPLICATIONS

Course Educational Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. To learn the need and techniques of mathematical modeling, to design mathematical models through trigonometry and calculus.
3. To understand, familiarize the knowledge of the significance of ordinary differential equations of second order based mathematical models through linear.
4. To explore the practical utility of mathematical models through linear programming including transportation and assignment models.
5. To learn the concepts of Partial differential equations and its nature. To explore the knowledge on practical utility of mathematical models through mass balance equations and momentum balance equations

UNIT – 1: INTRODUCTION (9)

The technique of mathematical modeling – Classification of mathematical models – Some characteristics of mathematical models – Mathematical modeling through trigonometry, calculus – Limitations of mathematical modeling.

UNIT – 2: MATHEMATICAL MODELLING THROUGH ORDINARY DIFFERENTIAL EQUATIONS OF SECOND ORDER (9)

Mathematical Modeling of planetary motions, circular motion and motion of satellites – Mathematical Modeling through linear differential equations of second order.

UNIT – 3: MATHEMATICAL MODELING THROUGH LINEAR PROGRAMMING (9)

Mathematical modeling through linear programming – Graphical method – Simplex method – Transportation – Assignment models.

UNIT – 4: MATHEMATICAL MODELING THROUGH DIFFERENCE EQUATIONS (9)

The need for mathematical modeling through difference equations: some simple models – Basic theory of linear difference equations with constant coefficients – Solution by Z-transformation – Mathematical modeling through difference equations in probability theory.

UNIT – 5: MATHEMATICAL MODELING THROUGH PARTIAL DIFFERENTIAL EQUATIONS (9)

Mass-Balance Equations: The first method of getting PDE models – Momentum-balance equations: The second method of obtaining PDE Models – Nature of partial differential equations.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Acquire knowledge in necessity and techniques of mathematical modeling, to develop analytical and designing skills in mathematical models through trigonometry and calculus.	PO1,PO2,PO3 PO4
CO2	Demonstrate knowledge in Ordinary differential equations of second order, mathematical modeling through differential equations, and Develop analytical skills in modeling geometrical problems through Ordinary differential equations of second order	PO1,PO2,PO3 PO4
CO3	Demonstrate knowledge in Linear programming and various techniques including Graphical method and Simplex method. Develop analytical and designing skills in modeling and solving Transportation and assignment models	PO1,PO2,PO3 PO4
CO4	Acquire knowledge in difference equations, theory of difference equations with constant coefficients. Develop designing and analytical skills in modeling and solving mathematical models difference equations in probability theory.	PO1,PO2,PO3 PO4
CO5	Acquire knowledge in partial differential equations and develop designing and analytical skills in modeling and solving mathematical models through Mass-Balance equations and Momentum-Balance equations	PO1,PO2,PO3 PO4

Text Books:

1. Mathematical Modelling, J.N. Kapur, New Age International (P) Limited Publishers, New Delhi
2. Advanced Engineering Mathematics, Kreysig, , John Wiley, NewYork, 1999.

Reference Books:

1. Principles of Mathematical Modelling (2004)-Clive L. Dyne, Elsevier Publication
2. Mathematical Modelling – A case study approach , R Illner, C Sean Bohun, S McCollum, T van Roode, AMS publication, 2005
3. Mathematical Modelling , D N P Murthy, N W Page, E Y Rodin, Pergamon Press,1990
4. OR Theory & Applications, J.K. Sharma , Mac Milian India Ltd., 1998
5. Mathematical Modelling(A Comprehensive Introduction), Gerhard Dangelmayr and Michael Kirby, Prentice Hall,New Jersey

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	2	-	-	-	-	-	-	-	-
CO.2	3	3	3	2	-	-	-	-	-	-	-	-
CO.3	3	3	3	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	3	2	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**3**	2	-	-	-	-	-	-	-	-

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OSAH322 BUSINESS COMMUNICATION AND CAREER SKILLS

Course Educational Objectives:

1. To enhance the communication skills.
2. To enable students to understand the nuances of corporate communication
3. To develop the writing skills for business purposes
4. To develop the presentation skills for corporate situations.
5. To enable students to manage interviews successfully.

UNIT – 1: NATURE AND SCOPE OF COMMUNICATION (9)

Introduction: Functions of Communication – Roles of a Manager – Communication Basics –Communication Networks – Informal Communication – Interpersonal Communication –Communication Barriers.

UNIT – 2: CORPORATE COMMUNICATION (9)

Introduction: What is Corporate Communication? – Corporate Citizenship and Social Responsibility – Corporate Communication Strategy – Crisis Management/Communication – Cross-Cultural Communication.

UNIT – 3: WRITING BUSINESS DOCUMENTS (9)

Introduction: Importance of Written Business Communication, Types of Business Messages – Five Main Stages of Writing Business Messages – Business Letter Writing - Email writing skills – Effective Business Correspondence – Common Components of Business Letters – Strategies for Writing the Body of a Letter- Business Communication and different cultures.

UNIT – 4: CAREERS AND RESUMES (9)

Introduction – Career Building – Business Presentations and Speeches – Resume Formats – Traditional, Electronic and Video Resumes – Sending Resumes – Follow-up Letters – Online Recruitment Process.

UNIT – 5: INTERVIEWS (9)

Introduction – Fundamental Principles of Interviewing – General Preparation for an Interview – Success in an Interview – Types of Interviewing Questions – Important Non-verbal Aspects – Types of Interviews – Styles of Interviewing.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Explain the concept of communication, its methods and types.	PO10, PO12
CO2	Demonstrate knowledge of Corporate Communication	PO10, PO11
CO3	Apply written and oral communication techniques in preparing and presenting various documents in technical writing.	PO10,PO11, PO12
CO4	Exhibit the presentation skills in business situations	PO10,PO12
CO5	Apply verbal and nonverbal aspects in the most appropriate way in interviews	PO10, PO12

Text Book:

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

Reference Books:

2. Neera Jain and Sharma Mukherji, Effective Business Communication, Tata Mc Graw-Hill Education, Pvt. Ltd., New Delhi, 2012.
3. Courtland L.Bovee et al., Business Communication Today, Pearson, New Delhi, 2011.
4. Krizan, Effective Business Communication, Cengage Learning, New Delhi, 2010.
5. R.K. Madhukar, Business Communication, Vikas Publishing House Pvt. Ltd., New Delhi, 2005.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	-	-	-	-	-		-			3	-	2
CO.2	-	-	-	-	-		-			3	2	-
CO.3	-	-	-	-	-		-			3	2	2
CO.4	-	-	-	-	-		-			3	-	2
CO.5	-	-	-	-	-		-			3	-	2
CO*	-	-	-	-	-		-			**3**	**2**	**2**

III B.Tech II Semester

L	T	P	C
3	0	0	3

18OSAH323 LASERS AND FIBER OPTICS

Course Educational Objectives:

1. To acquire knowledge on fundamentals of LASERS
2. To study the working of different types of LASERS
3. To develop knowledge on applications of LASERS in various fields
4. To gain knowledge in fundamentals of Optical fiber, construction, types and attenuations
5. To develop knowledge on applications of Optical fibers in various fields

UNIT – 1: LASER INTRODUCTION (9)

Introduction- Spontaneous and stimulated emission of radiation- Properties of lasers (monochromacity, directionality, coherence and brightness) - Conditions for laser action: population inversion- Pumping and different pumping mechanisms- Einstein coefficients and relation among the coefficients.

UNIT – 2: TYPES OF LASERS (9)

Types of Lasers: Nd-YAG laser- He:Ne laser- Semiconductor laser(GaAs)- Argon Ion Laser-CO2 Laser.

UNIT – 3: APPLICATIONS OF LASERS (9)

Lasers in Holography- Laser in fusion reaction- Lasers in Raman spectroscopy- Lasers in industry -Lasers in isotope separation- Lasers in medicine.

UNIT – 4: OPTICAL FIBERS (9)

Introduction- Construction of fiber – Working principle of optical fiber (total internal reflection)- Propagation of light through the fibers- Numerical aperture , Acceptance angle and Acceptance cone -Fiber types: Refractive index profile and ray propagation- Step and graded index fibers -Attenuation in fibers: Attenuation coefficient and different loss mechanisms.

UNIT – 5: APPLICATIONS OF FIBERS (9)

Fiber optic communication system(block diagram)- Sensing applications of fibers: Pressure sensor, Liquid level sensor, Displacement sensor, Chemical sensor – Optical fibers in medicine (endoscopes) - Optical fibers in computer networks (block diagram).

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Acquire the basic knowledge on LASERS	**PO1, PO12**
CO2	Understand different types of LASERS	**PO1, PO12**
CO3	Develop knowledge on different applications of LASERS	**PO1, PO12**
CO4	Acquire the basic knowledge on Optical Fibers	**PO1,PO12**
CO5	Develop knowledge on different applications of Optical Fibers	**PO1,PO12**

Reference Books:

1 .Lasers Theory and Applications By K.Thyagarajan and A.K.Ghatak: Macmillan India Limited, New Delhi.,

2.Lasers And non-Linear Opics, second edition, By BBLaud. NewAge International(P) limited,Publishers,New Delhi,

3. An Introduction to Fiber Optic Systems ,Second Edition,By John Powers,Richard D Irwin ,a Times Mirror Higher education,Inc Company,USA,

4. Physics for Engineers - M.R.Srinivasan , New Age International, 2009

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	-	1
CO.2	3	-	-	-	-	-	-	-	-	-	-	1
CO.3	3	-	-	-	-	-	-	-	-	-	-	1
CO.4	3	-	-	-	-	-	-	-	-	-	-	1
CO.5	3	-	-	-	-	-	-	-	-	-	-	1
CO*	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	1

Open Electives – II

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OMEC411:QUALITY CONTROL AND RELIABILITY ENGINEERING (OPEN ELECTIVE-II)

Course Educational Objectives:

1. To understand the concepts of quality, TQM, and statistical process control
2. To learn TQM principles and impact in continuous process improvement.
3. To study the online quality control system in an organization
4. To learn the concepts of offline quality control systems in an organization.
5. To study concepts of Reliability and Estimation

UNIT – 1: QUALITY CONCEPTS AND STATISTICAL PROCESS CONTROL (9)

Quality Concepts: Need for quality – Evolution of quality – Definition of quality – Dimensions of quality – Basic concepts and definition of TQM – Contributions of Deming, Juran and Crosby. **Statistical Process Control:** Inspection – Quality Control – Quality assurance – Customer orientation – Internal & External Customer – Life cycle Quality cost – The seven traditional tools of quality – New management tools

UNIT – 2: QUALITY PRINCIPLES AND TOOLS (9)

Leadership – Strategic quality planning – Quality statements – Customer focus, customer orientation, customer satisfaction, customer complaints and customer retention – Employee involvement – Motivation – Empowerment – Team and teamwork – Recognition and reward – Performance appraisal – Continuous process improvement – PDSA cycle, 5s, Kaizen – Supplier partnership – Partnering, supplier selection and supplier rating – Six-sigma concepts – Bench marking – TPM concepts.

UNIT – 3: ONLINE QUALITY CONTROL (9)

Control chart for attributes – Control chart for non-conforming – *p* chart and *np* chart – Control chart for nonconformities: C and U charts – Control chart for variables: X chart, R chart and σ chart – State of control and process out of control identification in charts – Pattern study – Process capability studies.

UNIT – 4: OFFLINE QUALITY CONTROL (9)

Lot by lot sampling – Types – Probability of acceptance in single, double, multiple sampling techniques – O.C. curves – Producers risk and consumers risk – AQL – LTPD – AOQL concepts – Standard sampling plans for AQL and LTPD – Uses of standard sampling plans.

UNIT – 5: RELIABLITY CONCEPTS AND ESTIMATION (9)

Reliability Concepts: Reliability engineering – Fundamentals – Failure data analysis – Mean failure rate, Mortality curves concept of burn in period – Useful life and wear out phase of a system – Mean time to failure – Meantime between failure – Hazard rate – Failure density and conditional reliability – Maintainability and availability – simple problems. **Reliability Estimation:** Series, parallel and mixed configurations – Reliability improvement techniques – Use of pareto analysis – Design for reliability – redundancy unit and standby redundancy – Fault tree analysis – Optimization in reliability.

Course Outcomes:

On successful completion of the course, Students will be able to		**POs related to COs**
CO1	Illustrate the quality concepts of statistical process control, and contributions TQM Gurus in quality management	**PO1,PO11, PO12**
CO2	Recognize the quality principles and impact of 5s, Kaizen, PDSA cycles in continuous process improvement.	**PO1,PO11, PO12**
CO3	Demonstrate the basic need of online quality control and process control in an organization	**PO1,PO2, PO3, PO11, PO12**
CO4	Explain the basic need of offline quality control and process control in an organization	**PO1,PO2, PO3, PO11, PO12**
CO5	Realize the concepts of Reliability and Estimation	**PO1, PO2,PO11, PO12**

Text Books:

1. Quality Control, Besterfield D.H., 8/e, 2009, Pearson Education, India.
2. Reliability Engineering, E Balagurusamy, 2017, McGraw Hill India

Reference Books:

1. Introduction to Statistical Quality Control, Douglas.C. Montgomery, 7/e, 2013, John Wiley.
2. Statistical Methods for Quality, Reliability and Maintainability, K.Muralidharan and A Syamsundar, 2012, PHI Learning.
3. Statistical Quality Control, Monohar Mahajan, 2001, Dhanpat Rai &and Sons.
4. Reliability, Maintainability and Risk, David J Smith, 8/e, 2011, Butterworth-Heinemann, Elsevier Ltd.
5. Fundamentals of Quality Control and Improvement, Amitava Mitra, 4/e, 2016, JohnWiley&Sons,Inc.

6. Reliability Engineering, Kailash C. Kapur and Michael Pecht, 2014, John Wiley & Sons, Inc.

Codes/Tables: Use of approved statistical table permitted in the examination.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	-	-	-	-	-	-	-	-	1	2
CO.2	3	-	-	-	-	-	-	-	-	-	1	2
CO.3	3	2	1	-	-	-	-	-	-	-	1	2
CO.4	3	2	1	-	-	-	-	-	-	-	1	2
CO.5	3	2	-	-	-	-	-	-	-	-	1	2
CO*	**3**	**2**	**1**	-	-	-	-	-	-	-	**1**	**2**

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OMEC412 INDUSTRIAL ENGINEERING AND PSYCHOLOGY (OPEN ELECTIVE-II)

Course Educational Objectives:

1. To learn the concepts of management and characteristics of personnel management and organization
2. To understand the organizational structures and plant layout for productivity improvements
3. To know the productivity, planning and control of a product
4. To discover the material handling techniques and Inventory control of manufacturing a product
5. To learn the industrial psychology and work study in an industry

UNIT – 1: CONCEPTS OF MANAGEMENT (9)

Management: Importance of administration and organization – Managerial skills, policies, goals and objectives – Scientific management – Contribution of FW Taylor, Henry Foyal and Gilberth – Principles, types, process, levels and functions of management – Management chart – Basic concepts in project management and MIS – Industrial ownership – Responsibilities of supervisor/foreman – Leadership concepts. **Personnel Management:** Recruitment, selection, training, job evaluation and merit rating – Wage plans and incentives – Welfare measures – Promotion, lay-off, transfer and discharge.

UNIT – 2: ORGANIZATIONAL STRUCTURES AND PLANT LAYOUT (9)

Organization: Concept, importance, characteristics, elements, and process of organization – Organization theory, principle, structure, chart and committees – Project, matrix and informal organization – Departmentation – Authority and delegation – Group dynamics – Organizational change, development and conflict – Managerial leadership and communication system. **Plant Layout:** Types – Flow pattern – Work station – Storage space – Layout procedure – Consideration in factory design.

UNIT – 3: PRODUCTION PLANNING AND CONTROL (9)

Productivity: Input output model – Factors affecting the productivity – Productivity resources and measures. **Production Planning:** Continuous and intermittent production – Job, open and closed job shop – One time large projects – Forecasting – Process planning – Economical batch quantity – Tool control – Control of production – Loading, scheduling, dispatching and routing – Progress and flow control.

UNIT – 4: MATERIALS MANAGEMENT AND INVENTORY CONTROL (9)

Materials Management: Concepts – Procurement – Purchase and order – Buying techniques. **Inventory Control:** Classification – Objectives – Functions – Economic order quantity (EOQ) – Inventory models – ABC analysis – Material requirements planning (MRP) – Manufacturing resource planning (MRP-II).

UNIT – 5: WORK STUDY AND INDUSTRIAL PSYCHOLOGY (9)

Work study: Ergonomics principles – Method study – Process chart symbols – Flow process and multiple activity chart – Flow and string diagram – Operation analysis – Analysis of motion – Design of work place – Therbligs – SIMO chart – Time st dy – Standard data – Analytical estimating – Performance rating – Allowances – PMTS. **Industrial Psychology:** Concept – Individual and group – Motivation theories – Hawthorne experiment – Morale and motivation – Working and environmental condition – Industrial fatigue.

Course Outcomes:

On successful completion of the course, Students will be able to		**POs related to COs**
CO1	Understand the concepts of management and characteristics of personnel management and organization	PO1, PO11, PO12
CO2	Explain the organizational structures and plant layout for productivity improvements	PO1,PO2, PO11, PO12
CO3	Describe the productivity, planning and control of a product	PO1,PO2, PO11, PO12
CO4	Explain the material handling techniques and Inventory control of manufacturing a product	PO1,PO2, PO11, PO12
CO5	Demonstrate the industrial psychology and work study in an industry	PO1,PO2, PO11, PO12

Text books:

1. Industrial Engineering and Management, 17/e, 2010, O.P. Khanna, Dhanpat Rai Publishing Company (P) Ltd., New Delhi.
2. Industrial Engineering and Management, Pravin Kumar, 1/e, 2015, Pearson Education, New Delhi.

Reference books:

1. Production and Operations Management, S. N. Chary, 6/e, 2019, Tata McGraw-Hill Education Pvt. Ltd., Noida.

2. Operations Management, William J Stevenson, 12/e, 2018, Tata McGraw-Hill Education Pvt. Ltd., Noida.
3. Production and Operations Management, Shailendra Kale, 1/e, 2013, Tata McGraw-Hill Education Pvt. Ltd., Noida.
4. Production and Operations Management, Kanishka Bedi, 3/e, 2013, Oxford University Press, India.
5. Manufacturing Organization and Management, 6/e, 2004, Harold T Amrine, John A Ritchey, Colin L Moodie and Joseph F Kmec, Pearson Education, New Delhi.
6. Industrial Engineering and Production Management, Martand T Telsang, 3/e, 2018, S.Chand Publications, New Delhi.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	-	-	-	-	-	-	-	-	1	1
CO.2	2	2	-	-	-	-	-	-	-	-	1	1
CO.3	2	2	-	-	-	-	-	-	-	-	1	1
CO.4	2	2	-	-	-	-	-	-	-	-	1	1
CO.5	2	2	-	-	-	-	-	-	-	-	1	1
CO*	**2**	2	-	-	-	-	-	-	-	-	1	1

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OMEC413 3D PRINTING AND DESIGN (OPEN ELECTIVE-II)

Course Educational Objectives:

1. To know the need and development of additive manufacturing technology.
2. To study the design for additive manufacturing and tool design
3. To recognize the parameters of photo polymerization and LOP
4. To explain powder bed fusion processes, binder and material jetting process
5. To know the post processes technique and applications of additive manufacturing process

UNIT – 1: OVERVIEW OF ADDITIVE MANUFACTURING (AM) (7)

Overview – Fundaments of Rapid Prototyping (RPT) – Additive V/s Conventional Manufacturing – Generic AM process – Development of AM technology – Use of layers – Classification of AM process – AM process chain – Basic steps for AM process – Differentiation between photopolymer system, powder based system, molten material system, solid sheets and metal system.

UNIT – 2: CAD MODELING AND DESIGN FOR ADDITIVE MANUFACTURING (11)

CAD Modeling: Preparation of CAD models – Data processing – STL format – Model slicing – Tool path generation – Data translation and loss – Customized design and fabrication for medical applications. **DFAM:** AM unique capabilities – DFAM concepts for complex geometry, integrated assemblies, customized geometry, multifunctional design and constraints – Part consolidation, redesign, structures and industrial applications – Light weight structure, optimization methods and topology. **Printing Processes:** Droplet formation technologies – Continuous mode – Drop on demand mode – Bioplotter.

UNIT – 3: LIQUID AND SOLID BASED ADDITIVE MANUFACTURING PROCESS (9)

Stereo lithography (SLA): Polymerization materials – Process – Patterns – Vat photo polymerization process – Benefits – Applications. **Fused Deposition Modeling (FDM**): Principle – Materials – Limitations – Benefits – Applications. **Laminated Object Manufacturing (LOM):** Bonding process – Adhesive bonding and thermal bonding – Materials – Limitation – Application.

UNIT – 4: POWDER BASED ADDITIVE MANUFACTURING PROCESS (9)

Selective Laser Sintering (SLS): Process – Materials – Powder fusion mechanism – Powder handling – Applications. **Selective Laser Melting (SLM) and Electron Beam Melting (EBM):** Principle – Materials – Process – Benefits – Applications. **Laser**

Engineered Net Shaping (LENS): Materials – Material delivery – Process parameters – Benefits – Applications. **Binder Jetting:** Materials – Process – Benefits. **Material Jetting:** Materials – Process – Multijet modeling – Benefits.

UNIT – 5: POST PROCESSINGTECHNIQUES AND APPLICATIONS (9)

Product Quality: Material removal – Surface texture improvements – Accuracy improvements – Aesthetic improvements – Preparation for use of pattern – Property enhancement using thermal and non thermal techniques – Inspection and testing – Defects and their causes. **Applications:** Additive Manufacturing application of aerospace, electronics, healthcare, defense, automotive, construction, food processing, machine tool – Business opportunities and future directions of AM.

Course Outcomes:

On successful completion of the course, Students will be able to		**POs related to COs**
CO1	Understand the need and development of additive manufacturing technology	PO1, PO2, PO3
CO2	Explain the design for additive manufacturing and tool design	PO1, PO2, PO3
CO3	Illustrate the parameters of photo polymerization and Laminated Object Manufacturing	PO1, PO2, PO3, PO5
CO4	Explain powder bed fusion processes, binder and material jetting process	PO1, PO2, PO3, PO5
CO5	Summarize the post processes technique and applications of additive manufacturing process	PO1, PO2, PO3, PO5

Text Books:

1. Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping and Direct Digital Manufacturing, Ian Gibson, David W.Rosen and Brent Stucker, 2/e, 2015, Springer.
2. Rapid Prototyping: Principles and Applications, Chee Kai Chua, Kah Fai Leong and Chu Sing Lim 3/e, 2010, World Scientific Publishers.

Reference Books:

1. Additive manufacturing: Innovations, Advances, and Applications, T.S. Srivatsan and T.S. Sudarshan, Taylor & Francis Group, LLC.
2. Additive Manufacturing of Emerging Materials, Bandar AlMangour, 2018, Springer.

3. 3D Printing and Additive Manufacturing Technologies, L. Jyothish Kumar, Pulak M. Pandey and David Ian Wimpenny, 2019, Springer Nature Singapore Pte Ltd.
4. 3D Printing: Technology, Applications, and Selection, Rafiq Noorani, 2018, CRC Press, Taylor & Francis Group.
5. Design for Additive Manufacturing, Martin Leary, 2019, Elsevier.
6. Additive Manufacturing Handbook: Product Development for the Defense Industry, Adedeji B. Badiru, Vhance V. Valencia, and David Liu, 2017, CRC Press, Taylor & Francis Group.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	1	-	-	-	-	-	-	-	-	-
CO.2	3	2	1	-	-	-	-	-	-	-	-	-
CO.3	3	2	1	-	2	-	-	-	-	-	-	-
CO.4	3	2	1	-	2	-	-	-	-	-	-	-
CO.5	3	2	1	-	2	-	-	-	-	-	-	-
CO*	**3**	**2**	**1**	-	**2**	-	-	-	-	-	-	-

IV B.Tech. I Semester

L	T	P/D	C
3	0	0	3

18OCSE411 FUNDAMENTALS OF DBMS

Course Educational Objectives:

1: Discuss the basic database concepts, applications, data models, schemas and instances and design Entity Relationship (E-R) model for a database.
2: Demonstrate the use of integrity constraints, relational algebra operations and relational calculus.
3: Describe the basics of SQL, construct queries using SQL, SQL functions, trigger and cursor concepts in PL/SQL.
4: Understand reasoning about functional dependency and to make the students to identify the role of normalization in database management systems.
5:To present the students with the knowledge of Transaction, concurrency and recovery strategies of DBMS.

UNIT 1 DATABASE SYSTEMS AND ENTITY RELATIONSHIP MODELING(8)

Database System Applications - Purpose of Database Systems - View of Data - Database Languages - Database Users and Administrators - Database Architecture - The Entity-Relationship Model - Attributes and Entity Sets - Relationship Sets - Entity-Relationship Diagrams - Extended E-R Features.

UNIT 2 RELATIONAL DATA MODEL (7)

Introduction to the Relational Model - Integrity Constraints - Fundamental Relational Algebra Operations - Tuple Relational Calculus - Domain Relational Calculus.

UNIT 3 INTRODUCTION TO SQL (12)

Characteristics of SQL - advantages of SQL - SQL Data types and Literals.-Types of SQL Commands - SQL Operators and their Procedures - Form of Basic SQL Query - Examples of Basic SQL Queries - Relational Set Operators – SQL Join operators - Introduction to Nested Queries - Views - Indexes - SQL Functions - Database Triggers - Cursors in SQL – PL/SQL

UNIT 4 NORMALIZATION (9)

Introduction to Schema Refinement - Properties of Decompositions – Functional Dependencies - Reasoning about Functional Dependencies - Normal Forms - First - Second - Third – BCNF - MVD - Fourth Normal Form.

UNIT 5 TRANSACTION PROCESSING CONCEPTS AND CONCURRENCY CONTROL TECHNIQUES (9)

Transaction Concept - Transaction States - Implementation of Atomicity and Durability - Serializability - Recoverability - Concurrent Executions - Lock-Based Protocols for

Concurrency Control - Time Stamp-Based Protocol for Concurrency Control - Multiple Granularity

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Demonstrate knowledge on Data models and Database LanguagesandDesign Entity Relationship model for a database	PO1, PO3
CO2	Analyze the relational database theory, and be able to write relational algebra and relational calculus expressions for queries.	PO1, PO2
CO3	Analyze and evaluate the databases using SQL DML/DDL Commands	PO1, PO2, PO3, PO5
CO4	Analyze databases using normal forms to provide solutions for real time applications.	PO1, PO2
CO5	Understand the properties of transactions in a database system, Analyze concurrency control techniques for handling concurrent transactions and understand recovery of data from failures	PO1, PO3,PO4

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	-	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	-	-	-	-	-	-	-	-
CO.3	2	2	3	-	2	-	-	-	-	-	-	-
CO.4	2	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	-	2	2	-	-	-	-	-	-	-	-
CO*	**2.6**	**2.6**	**2.6**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

TextBooks:

1. Database System Concepts, 6/e, 2006, Korth, Silberschatz, Sudarshan, Tata McGrawHill, New York.
2. Database Management System, 3/e, 2000,RaghuRamakrishnan, Tata McGrawHill, New York.

Reference Books:

1. Fundamentals of Database Systems, 5/e, 2008, Elmasri, Navathe, Pearson Education, USA.
2. *Database Management Systems* , 5/e, 2003, Peter Rob, A.*AnandaRao* and Carlos Coronel, Cengage Learning, USA.
3. SQL, PL/SQL Programming, 2/e, 2011, Ivan Bayross, BPB Publications, New Delhi, India.
4. Introduction to Database Systems, 8/e, 2004, C.J.Date, Pearson Education, USA.
5. Fundamentals of Database Management Systems, 1/e, 2006, M.L. Gillenson, Wiley, New Delhi, India.

IV B.Tech. I semester

L	T	P	C
3	0	0	3

18OCSE412 BASICS OF INTERNET OF THINGS

Course Educational Objectives:

1: To understand the fundamentals of Internet of Things.
2: To learn about Building state of the art architecture in IoT.
3: To learn about basis of IOT protocols.
4: To build a small low cost embedded system using Raspberry Pi and ARDUINO,
5: To apply the concept of Internet of Things in the real world scenario.

UNIT I: INTRODUCTION TO IOT (10)

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IOT- IoT Protocols -Logical Design of IoT - IoT communication models - IoT Communication APIs - IoT enabled Technologies- Wireless Sensor Networks - Cloud Computing - Big data analytics - Communication protocols - Embedded Systems.

UNIT II: M2M AND IOT ARCHITECTURE (8)

The Vision - Introduction - From M2M to IoT. M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture.

UNIT III: IOT PROTOCOLS (9)

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security

UNIT IV: BUILDING IOT WITH RASPBERRY PI & ARDUINO (10)

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino

UNIT V : CASE STUDIES AND REAL-WORLD APPLICATIONS (9)

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT – Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Demonstrate knowledge on fundamentals of Internet of Things and its functionalities.	PO1, PO2
CO2	Demonstrate knowledge on Building state of the art architecture in IoT.	PO1, PO2
CO3	Analyze various protocols for IoT	PO1, PO2,
CO4	Design a portable IoT using Rasperry Pi	PO1, PO2, PO3, PO4
CO5	Deploy an IoT application and connect to the cloud using Raspberry Pi & ARDUINO and apply the concept of Internet of Things in the real world scenario.	PO1, PO2, PO3, PO4, PO5

CO – PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2		-	-	-	-	-	-	-	-	-
CO.2	3	3	-	-	-	-	-	-	-	-	-	-
CO.3	2	2	3	3	-	-	-	-	-	-	-	-
CO.4	2	2	3	3	-	-	-	-	-	-	-	-
CO.5	3	3	2	2	3	-	-	-	-	-	-	-
CO*	2.6	2.4	2.6	2	3	-	-	-	-	-	-	-

Text Books:

1. Internet of Things – A hands-on approach, ArshdeepBahga, Vijay Madisetti, 2015, Universities Press.
2. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, 1st Edition, Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, 2014, Academic Press.

References:

1. Internet of Things (A Hands-on-Approach), 1stEdition, Vijay Madisetti and ArshdeepBahga, 2014,VPT.

2. Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, 1st Edition, Francis daCosta, Apress Publications, 2013
3. Architecting the Internet of Things, Bernd Scholz-Reiter, Florian Michahelles, ISBN 978- 3842-19156-5, Springer.
4. The Internet of Things Key Applications and Protocols, Olivier Hersent, David Boswarthick, Omar Elloumi, ISBN 978-1-119-99435-0, Wiley Publications.
5. The Internet of Things in the Cloud: A Middleware Perspective, HonboZhou , 2012, CRC Press .

IV B.Tech. I Semester

L	T	P	C
3	0	0	3

18OCSE413 INFORMATION SECURITY

Course Educational Objectives:

The main objectives of this course are:

1: The course will incorporate the foundational understanding of Information Security.

2: The course will incorporate the threats and network perimeter security design principles and provide abilities to review procedures for installation, troubleshooting and monitoring of network devices to maintain integrity, confidentiality and availability of data and devices.

UNIT-I INTRODUCTION (9)

Security mindset, Computer Security Concepts (CIA), Threats, Attacks, and Assets

UNIT-II CRYPTOGRAPHIC PROTOCOLS (8)

Introduction to Protocols, Communications using Symmetric Cryptography, Substitution Ciphers and Transposition Cipher, Block cipher, Stream cipher, Modes of operation, Symmetric and Asymmetric cryptography.

UNIT-III INFORMATION SECURITY THREATS (9)

Virus, Malware, DDoS attack, Trojan, Worm, Spyware, Social Engineering, Phishing attacks, man-in-middle attack, DNS poisoning.

UNIT –IV PROXY & FIREWALLS (10)

Working of Stateful Firewall, The Concept of State, Stateful Filtering and Stateful Inspection, Fundamentals of Proxying, Pros and Cons of Proxy Firewalls, Types of Proxies, Tools for Proxying.

UNIT –V NETWORK INTRUSION DETECTION & PREVENTION SYSTEMS (9)

Network Intrusion Detection Basics, the Roles of Network IDS in a Perimeter Defense, IDS Sensor Placement, IPS, IPS Limitations, NIPS, Host Based Intrusion Prevention Systems, Traffic Monitoring.

Course Outcomes:

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

Course Outcomes		POs related to COs
CO1	Apply fundamental concepts of Information Security threats and vulnerabilities to adopt right security measures and design real time scenarios	PO1, PO2 , PO3
CO2	Implement, monitor and maintain a secure network consisting of enterprise level routers and switches.	PO1, PO2, PO3
CO3	Design and implement AAA and IPSec and firewall technologies and design network policies to securing networks	PO1, PO2, PO3
CO4	Design/develop/ implement the security solution for a given application.	PO1, PO2, PO3, PO4
CO5	Detect the different types of intrusions	PO1, PO2, PO3, PO4, PO5

CO-PO Mapping

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	3	3	-	-	-	-	-	-	-	-	-
CO.2	3	3	3	-	-	-	-	-	-	-	-	-
CO.3	3	3	2	-	-	-	-	-	-	-	-	-
CO.4	2	3	2	3	1	-	-	-	-	-	-	-
CO.5	2	3	3	2	2	-	-	-	-	-	-	-
CO*	**2.4**	**3**	**2.6**	**2.5**	1.5	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Text Books:

1. W. Stallings, Network Security Essentials (6th Edition), Prentice Hall.
2. W. R. Stevens, TCP/IP Illustrated, Vol. 1: TheProtocols, AddisonWesley 1993

References

1. D. E. Comer, Internetworking with TCP/IP, Vol.1 (4th Edition),Prentice Hall, 2000
2. R. Oppliger, Internet and Intranet Security (2nd edition), ArtechHouse, 2002
3. W.R.Cheswick and S.M.Bellovin, Firewalls and Internet security(2nd edition), Addison-Wesley, 2003

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OEEE411 WIND ENERGY CONVERSION SYSTEMS

Course Educational Objectives:

1. To make the student know various methods of measuring wind speed and facilities available for storage of such data.
2. To train the students to design the blade of a wind turbines.
3. To make the student understand methods for sitting a wind farm.
4. To make the student understand economics of establishing wind system.
5. To make the student know the applications of wind turbine.

UNIT – 1: INTRODUCTION (9)

Modern wind turbines, wind resources, wind vs. traditional electricity generation, technology advancements, material Usage. Applications: grid connected power, industrial applications, stand-alone system, water pumping, offshore prospects Introduction of Wind Resource Assessment , spatial variation, time variations, seasonal and monthly variability, diurnal variations. Characteristics of steady wind: turbulence, types of turbulence models, turbulence intensity.

UNIT – 2: WIND MEASUREMENT (9)

Vertical profiles of the steady wind. Wind speed measurement parameters, Monitoring station instrumentation, cup anemometer, propeller anemometer, Ultrasound anemometer, wind vane, data loggers, remote wind speed sensing techniques- Sodar, Lidar, SAR, LWS, Satellite remote sensing, Aerofoil, two dimensional airfoil theory, relative wind velocity. Wind flow models, wind flow pattern. Axial momentum theory, Momentum theory, blade element theory. Wind machine characteristics.

UNIT – 3: WIND TURBINES (9)

Historical development. Classification of wind turbines. Turbine components. Wind turbine design of Wind turbine, rotor torque and power, Power control, braking systems. Turbine blade design. Blade material, SERI blade sections. Transmission and generation efficiency, Energy production and capacity factor, Torque at constant speeds, Drive train oscillations.

UNIT – 4: ELECTRICAL AND CONTROL SYSTEMS (9)

Introduction to electricity and magnetism. Classification of generators, AC circuits, Synchronous generators, Induction generators, Variable speed generators. Control systems. Power Collection system. Power quality, wind farm and generation protection, interface protection, losses in generation. Asynchronous Load: Piston water pumps, Centrifugal pumps, Paddle wheel heaters, Batteries.

UNIT – 5: WIND FARM DESIGN (9)

Introduction, wind flow modeling, use of capacity factor for wind farm design, planning of wind farm. Siting of wind turbines, ecological indicators, layout of wind farm, initial site selection, micrositing, wake model. Economics of Wind Systems: Cost calculation, annual energy output, time value of money, capital recovery factor, depreciation. Cost of wind energy, present value of annual costs, value of wind generated electricity.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Choose a method for measuring wind speed.	PO1,PO2,,PO3
CO2	Identify ideal wind site for wind farm	PO1,PO2,PO3,PO4
CO3	Understand the Design the wind turbine	PO1,PO2,PO3
CO4	Use the turbine for a particular application,	PO1,PO2,PO3
CO5	Capable to Start a wind turbine farm.	PO1,PO3,PO4

Text Books:

1. SirajAhmed:"Wind Energy-Theory and Practice" Second Edition, PHI Learning Pvt. Ltd, New Delhi, 2011.

Reference Books:

1. Garg L Johnson: "Wind Energy Systems" Prentice Hall. Inc, New Jersey, 1985

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	2	-	-	-	-	-	-	-	-	-
CO.2	3	2	2	1	-	-	-	-	-	-	-	-
CO.3	3	2	2	-	-	-	-	-	-	-	-	-
CO.4	3	2	2	-	-	-	-	-	-	-	-	-
CO.5	3	2	-	1	-	-	-	-	-	-	-	-
CO*	**3**	**2**	**2**	**1**	-	-	-	-	-	-	-	-

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OEEE412 FUNDAMENTALS OF ENERGY AUDITING

Course Educational Objectives:

1. Learn about energy scenario
2. Learn about fundaments of Energy Auditing.
3. Learn about concept Energy Consumption.
4. Understand the Energy efficient motors and power factor improvement.
5. Know the concept Energy Measuring Instruments.

UNIT – 1: ENERGY SCENARIO (9)

Primary and Secondary Energy, Conventional and non-conventional energy, Energy Security, Energy Conservation and its importance, Energy conservation Act., Thermal Energy basics, Energy Audit its definition & methodology.

UNIT – 2: FUNDAMENTALS OF ENERGY AUDIT (9)

Energy Situation – World and India, Energy Audit Instruments, Benchmarking for energy performance, Energy Action Planning, Duties and responsibilities of Energy Manager; Energy financial management, Project Management, Energy monitoring and targeting, pinch technology.

UNIT – 3: ENERGY CONSUMPTION (9)

Energy Consumption, Conservation, Codes, Standards and Legislation. Energy Audit-Definitions, Concept, Types of Audit, Energy Index, Cost Index, Pie Charts, Sankey Diagrams, Load Profiles, Energy Conservation Schemes. Measurements in Energy Audits, Presentation of Energy Audit Results.

UNIT – 4: ENERGY EFFICIENT MOTORS AND POWER FACTOR IMPROVEMENT (9)

Energy Efficient Motors , Factors Affecting Efficiency, Loss Distribution , Constructional Details , Characteristics - Variable Speed , Variable Duty Cycle Systems, RMS Hp-Voltage Variation-Voltage Unbalance- Over Motoring- Motor Energy Audit. Power Factor– Methods of Improvement, Power factor With Non Linear Loads

UNIT – 5: LIGHTING AND ENERGY INSTRUMENTS FOR AUDIT (9)

Good Lighting System Design and Practice, Lighting Control, Lighting Energy Audit - Energy Instruments- Watt Meter, Data Loggers, Thermocouples, Pyrometers, Lux Meters, Tong Testers, Application of PLCs.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Understand the concept basic energy scenario.	**PO1, PO2.**
CO2	Demonstrate knowledge on energy auditing and evaluate energy audit results.	**PO1,PO2**
CO3	Analyze demand side management concepts through case study	**PO1,PO2**
CO4	Acquire knowledge on motor energy audit.	**PO1,PO2**
CO5	Acquire knowledge on energy instruments.	**PO1,PO2**

Text Books:

1. Industrial Energy Management Systems, Arry C. White, Philip S. Schmidt, David R. Brown, Hemisphere Publishing Corporation, New York, 1994.
2. Fundamentals of Energy Engineering - Albert Thumann, Prentice Hall Inc,Englewood Cliffs, New Jersey, 1984.

Reference Books:

1. Economic Analysis of Demand Side Programs and Projects – California Standard Practice Manual, June 2002 – Free download available online http://www.calmac.org/events/spm_9_20_02.pdf
2. Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann Publications, 2007.
3. Energy management by Paul o‟ Callaghan, Mc-graw Hill Book company-1st edition, 1998
4. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd- 2nd edition, 1995.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	2	-	-	-	-	-	-	-	-	-	-
CO.2	2	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-
CO.4	3	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	3	-	-	-	-	-	-	-	-	-	-
CO*	**2.8**	**2.6**	-	-	-	-	-	-	-	-	-	-

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OEEE413 INTRODUCTION TO POWER QUALITY

Course Educational Objectives:

1. To introduce the fundamental of electric power quality phenomena.
2. To make students learn the voltage variations.
3. To provide detailed analysis of Transients.
4. To make students learn about Harmonics.
5. To learn the power quality conditioners.

UNIT – 1: INTRODUCTION (9)

What is power quality? Power quality – voltage quality - why are we concerned about power quality? - the power quality Evaluation procedure - Terms and Definitions - Transients - Long-duration voltage variations - short-voltage variations - voltage imbalance - wave form distortion - voltage fluctuation - power frequency variations - power quality terms CBEMA and ITI curves.

UNIT – 2: VOLTAGE SAGS AND INTERRUPTIONS (9)

Sources of sags and interruptions - Estimating voltage sag performance - fundamental principles of protection - solutions at the end-use level - Motor-starting sags - utility system fault-clearing issues.

UNIT – 3: TRANSIENT OVER VOLTAGES (9)

Sources of over voltages - principles of over voltage protection - devices for over voltage protection - utility capacitor-switching transients - utility system lightning protection.

UNIT – 4: FUNDAMENTALS OF HARMONICS& APPLIED HARMONICS(9)

Harmonic Distortion - Voltage versus current distortion - Harmonics versus Transients - power system qualities under non sinusoidal conditions - Harmonic indices - Harmonic sources from commercial loads - Harmonic sources from Industrial loads Effects of Harmonics - Harmonic distortion evaluations – Principles of Controlling Harmonics - Devices for Controlling Harmonic Distortion.

UNIT – 5: POWER QUALITY BENCH MARKING AND MONITORING (9)

Benchmarking process, Power Quality Contracts. Monitoring considerations - power quality measurement equipment, assessment of power quality measurement data, application of intelligent systems, - Power quality Monitoring standards.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Able to understand voltage sag, swell, long and short duration voltage variations.	PO1,PO2,,PO4,PO12
CO2	Able to understand the sources, principle of protection of voltage sag and interruption.	PO1,PO2,PO3,PO4,,PO12
CO3	Able to understand the concept of capacitor switching and lightning.	PO1,PO2,PO4,PO12
CO4	Able to understand the controlling of harmonic distortion.	PO1,PO2,PO3,PO4, ,PO12
CO5	Able to understand various power quality monitoring equipment and benchmarking process.	PO1,PO3,PO4,PO12

Text Books:

1. Electrical Power Systems Quality - Roger C. Dugan - Mark F. McGranaghan - Surya Santoso - H.Wayne Beaty - 2nd Edition - TMH Education Pvt. Ptd.

Reference Books:

1. Electrical systems quality Assessment by J. Arrillaga - N.R. Watson - S. Chen - John Wiley & Sons
2. Understanding Power quality problems by Math H. J. Bollen IEEE Press

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	2	-	3	-	-	-	-	-	-	-	3
CO.2	2	2	3	3	-	-	-	-	-	-	-	3
CO.3	2	2	-	3	-	-	-	-	-	-	-	3
CO.4	2	2	3	3	-	-	-	-	-	-	-	3
CO.5	2	-	3	3	-	-	-	-	-	-	-	3
CO*	**2**	**2**	**3**	**3**								**3**

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OECE411 FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

Course Educational Objectives:

1. To study the concepts of Artificial Intelligence.
2. To understand the search strategies and Problem solving using Artificial Intelligence.
3. To gain insight information about Logical Agents and Reasoning patterns in propositional logic
4. To study the Uncertain Knowledge and Reasoning
5. To study the Application of Robotics and predictive analytics using Rapid Miner

UNIT – 1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE, PROBLEMS, PROBLEM SPACES AND SEARCH (9)

The AI Problems - The underlying assumption - The AI technique - The levels of the model - Criteria of success - Some general references - One final word and beyond - Defining the problem as a State space search - Production systems - Problem characteristics - Production system characteristics - Issues in the design of search programs.

UNIT – 2: PROBLEM SOLVING, UN-INFORMED SEARCH STRATEGIES, INFORMED SEARCH AND EXPLORATION (9)

Uninformed search strategies - Avoiding repeated states - Informed (Heuristic) search strategies - Heuristic functions - Local search algorithms and optimization problems - Local search in continuous spaces - Backtracking search for CSPs.

UNIT – 3: KNOWLEDGE AND REASONING (9)

Logical agents – Knowledge based agents - The wumpus world – Logic - Propositional logic - a very simple logic - Reasoning patterns in propositional logic - Effective propositional inference - Agents based on propositional logic.

UNIT – 4: UNCERTAIN KNOWLEDGE AND REASONING, LEARNING (9)

Uncertainty - Acting under uncertainty - Baye's rule and its use - Learning from observations - Forms of learning - Inductive learning - Learning decision trees.

UNIT – 5: ROBOTICS AND PREDICTIVE ANALYTICS (9)

Robotics: Introduction-Robot hardware - Robotic perception - Planning to move-Robotic software Architectures - Application Domains.

Case Study1: Medical Data Analysis using Rapid Miner Tool

Case Study2: Agriculture Data Analysis using Rapid Miner Tool

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Gain the basic Knowledge about AI technique and Production systems	**PO1**
CO2	Comprehend the Un informed and Informed Search Strategies.	**PO1, PO3**
CO3	Analyze and Implement Reasoning patterns in propositional logic	**PO1, PO2**
CO4	Formulate the Knowledge and Reasoning techniques in solving problems	**PO1, PO4**
CO5	Apply Robotics to Solve Real world Problems and use rapid miner applications	**PO1, PO2, PO4, PO9**

Text Books:

1. Artificial Intelligence A Modern Approach, 2/e, Stuart Russell and Peter Norvig, 2003, Pearson Education, New Delhi, India.
2. Artificial Intelligence, 3/e, Elaine Rich, Kevin Knight and Shiva Shankar B Nair, 2004, Tata McGraw Hill, Hyderabad, India.

Reference Books:

1. Artificial Intelligence Structures and Strategies for Complex Problem Solving, 5/e, George F. Luther, 2005, Pearson Education, New Delhi, India.
2. Introduction to Artificial Intelligence, 1/e, Eugene Charniak and Drew McDermott, 1985, Pearson Education, New Delhi, India.
3. Artificial Intelligence: The Basics, 1/e, Kevin Warwick, 2012, Wearset ltd, Boldon.
4. Introduction to Artificial Intelligence, 2/e, Philip C. Jackson, 1985, Dover Publications, New York, USA.
5. Our Final Invention: Artificial Intelligence and the End of the Human Era, 1/e, James Barrat, 2013, Thomas Dunne Books, New York, USA.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	2	-	-	-	-	-	-	-	-	-	-	-
CO.2	2	-	3	-	-	-	-	-	-	-	-	-
CO.3	2	2	-	-	-	-	-	-	-	-	-	-
CO.4	2	-	-	2	-	-	-	-	-	-	-	-
CO.5	2	2	-	2	-	-	-	-	1	-	-	-
CO*	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OECE412 FUNDAMENTALS OF EMBEDDED SYSTEMS

Course Educational Objectives:

1. To provide a basic knowledge like characteristics, classification and Application areas of Embedded Systems.
2. Students learn the Architecture, Memory Interfacing and Interrupt Structures of 8051.
3. By learning instruction sets we can write the Assembly Language Programs and get knowledge in interfacing techniques.
4. Students will learn the Real time operating systems.
5. To learn Communication and Interfacing Techniques and its buses.

UNIT – 1: INTRODUCTION (9)

History of Embedded Systems-Classification of Embedded systems-Purpose of Embedded system- Characteristics of Embedded systems- Major Application Areas of Embedded Systems- Core of the Embedded System- Sensors and Actuators- Embedded Firmware, Applications- Washing Machine.

UNIT – 2: THE 8051 ARCHITECTURE (9)

Introduction- 8051 Micro controller Hardware- Register set of 8051-Input/Output Ports and Circuits- External Memory- memory and I/O interfacing of 8051Counter and Timers-Serial data Input/Output- Interrupt structure of 8051.

UNIT – 3: BASIC ASSEMBLY LANGUAGE PROGRAMMING CONCEPTS (9)

The Assembly Language Programming Process- Programming Tools and Techniques-Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations-Decimal Arithmetic. Jump and Call Instructions. Applications: Interfacing with Keyboards- Displays- D/A and A/D Conversions- Multiple Interrupts

UNIT – 4: REAL-TIME OPERATING SYSTEMS (RTOS) (9)

Operating System Basics- Types of Operating Systems- Tasks- Process and Threads-Multiprocessing and Multitasking- Task Scheduling- Threads- Processes and Scheduling: Putting them Altogether- Task Communication- Task Synchronization- Device Drivers-How to Choose an RTOS.

UNIT – 5: COMMUNICATION INTERFACE AND COMMUNICATION BUSES (9)

Communication interface- (Board level communication interfaces- Product level communication interfaces)- Timing -and Counting Devices- Watchdog Timer- Real Time Clock- Networked Embedded Systems- Serial Bus Communication Protocols- Parallel Bus Device Protocols- Parallel Communication Network Using ISA- PCI- PCI-X and Advanced Buses.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Understanding and designing of embedded systems	P01, P02, P03, P04,P06
CO2	Learning the Architecture and its functions	PO1,P02,P03,P06
CO3	Knowledge to write the programs in Assembly Language programs	P01, P02, P03, P04
CO4	Knowledge in real time operating systems	P01, P03,P04,P05,P06
CO5	Understanding the transmissions through different types of buses	P01, PO2,P03,P04,P05,P06

Text Books:

1. Introduction to Embedded System-2nd edition- 2003-Shibu KV- Mc-Graw Hill - New Delhi.
2. The 8051 Microcontroller-3rd Edition-2007- Kenneth J.Ayala- Thomson Delmar Learning- New Delhi.
3. Embedded system architecture- programming and design-sixthreprint- 2005- Rajkamal- TMH- New Delhi.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	2	-	2	-	-	-	-	--	-
CO.2	3	2	2	-	-	3	-	-	-	-	--	-
CO.3	3	3	3	2	-	-	-	-	-	-	--	-
CO.4	3	-	3	3	2	2	-	-	-	-	--	-
CO.5	3	3	3	3	2	2	-	-	-	-	--	-
CO*	**3**	**2.75**	**2.8**	**2.5**	**2**	**2.25**	-	-	-	-	--	-

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OECE413 DATA COMMUNICATION AND NETWORKS

Course Educational Objectives:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts.
4. Preparing the student for entry Advanced courses in computer networking.
5. Allow the student to gain expertise in some specific areas of networking.

UNIT – 1: INTRODUCTION TO DATA COMMUNICATION (9)

Introduction: Network Topologies, Protocols & Standards, Layered Architecture LAN, WAN, MAN. OSI Reference Model, TCP/IP Reference Model, Guided and Unguided Media.

UNIT – 2: DATA LINK LAYER (9)

Data Link Layer: Design Issues, Framing – Error Control – Flow Control, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, ARQ schemes, HDLC. PPP. Ethernet- IEEE 802.3,4,5 Protocols, Wireless LAN- the 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer- The802.11 MAC Sub layer Protocol-The 805.11 Frame Structure-Services.

UNIT – 3: MAC LAYER AND ROUTING ALGORITHM (9)

The Medium Access Control Sub layer-The Channel Allocation Problem-Static Channel Allocation- Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-CSMA Protocols- Collision-Free Protocols, Need for Internetworking, Design Issues, Addressing, Internet Protocol (IPv4/IPv6), Virtual Circuit and Datagram Networks, Routing Algorithms, Congestion Control Algorithms.

UNIT – 4: TRANSPORT LAYER (9)

Transport layer: UDP, TCP, Congestion Control mechanisms, QOS, Techniques to improve QOS.

UNIT – 5: COMMUNICATION INTERFACE AND COMMUNICATION BUSES (9)

Application Layer: Cryptography and network security, DNS, Electronic Mail, FTP, HTTP, SNMP, DHCP.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Independently understand basic computer network technology	**PO1, PO2,PO3**
CO2	Understand and explain Data Communications System and its components.	**PO1, PO2, PO3,PO4**
CO3	Analysis the different types of network topologies and protocols. And Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer	**PO1, PO2,PO3,**
CO4	Identify the different types of network devices and their functions within a network.	**PO1, PO2,PO4**
CO5	Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.	**PO1,PO2,PO4**

Text Books:

1. Computer Networks, Tanenbaum and David J Wetherall, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education.

Reference Books:

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011
2. William Stallings, "Data & Computer Communication", Pearson Education India, 10th Edition, 2014.
3. James F. Kurose, Keith W. Ross, "Computer Networking: A Top–Down Approach Featuring the Internet", Pearson Education, 6th Edition, 2013.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	-	-	-	-	-	-	-	-	-
CO.2	2	3	2	3	-	-	-	-	-	-	-	-
CO.3	3	3	2	-	-	-	-	-	-	-	-	-
CO.4	3	2	-	3	-	-	-	-	-	-	-	-
CO.5	3	2	-	3	-	-	-	-	-	-	-	-
CO*	**2.8**	**2.6**	**2.3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OSAH411 GRAPH THEORY WITH APPLICATIONS

Course Educational Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. To learn the representation of graphs and understanding the Graph Isomorphism, Sub graph-Vertex degrees, Walk, Paths, Cycles-graph connection, Bipartite graphs.
3. To understand the Trees concepts, digraphs, binary relations, Shortest path algorithms and to familiarize the knowledge of graph theory
4. To understand the matrix representation of graphs, designing incidence matrix, Adjacency matrix and circuit matrix
5. To explore the use of graphs in various applications in Switching and Coding Theory. Also, to identify the important graph based real time applications of electrical networks such as RLC Networks with Independent sources, LOOP circuits

UNIT – 1: GRAPH THEORY INTRODUCTION (9)

Graph and simple graphs (Complete graphs, Complement of graph) - Graph isomorphism–Sub graph- Vertex degrees, walk, paths, cycles-graph connection and components-Bipartite graphs.

UNIT – 2: DIRECTED GRAPHS AND SHORTEST PATH ALGORITHMS (9)

Trees – Cut edges- Cut vertices-Blocks , Directed graphs types of directed graphs - digraphs and binary relations – directed paths and connectedness - Dijkstra's shortest path algorithm, Floyd-Warshall shortest path algorithm

UNIT – 3: MATRIX REPRESENTATION OF GRAPHS (9)

Introduction - Adjacency matrix -Applications of Adjacency matrix-sufficient condition for isomorphism of graphs-power of an adjacency matrix-Adjacency matrix of a digraph-incidence matrix-circuit matrix-cut set matrix.

UNIT – 4: GRAPHS IN SWITCHING AND CODING THEORY (9)

Contact Networks – Analysis of Contact Networks – Synthesis of Contact Networks – Sequential Switching Networks – Unit Cube and its Graph – Graphs in Coding Theory.

UNIT – 5: ELECTRICAL NETWORK ANALYSIS BY GRAPH THEORY (9)

Introduction - Kirchhoff's current and Voltage laws-Loop currents and Node Voltages-RLC Networks with Independent sources: Nodal analysis, Loop analysis.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Demonstrate knowledge in reading and writing rigorous mathematical proofs involving introductory aspects of graphs and develop analytical skills in solving graph theoretic problems	PO1,PO2,PO3 PO4
CO2	Demonstrate knowledge in Trees concepts, digraphs, binary relations, and Develop analytical skills in solving problems involving directed graphs and shortest path algorithm	PO1,PO2,PO3 PO4
CO3	Demonstrate knowledge in matrix representation of graphs, designing incidencematrix, Adjacency matrix and circuit matrix and explore analytical skills in solving problems involving adjacency matrix and incidence matrix	PO1,PO2,PO3 PO4
CO4	Demonstrate knowledge in significant practical applications of graphs in Switching and Coding Theory; explore analytical skills in solving practical problems using graph theory concepts and Develop skills in designing Mathematical models for real time applications in coding theory.	PO1,PO2,PO3 PO4
CO5	Demonstrate knowledge in significant real time applications of electrical networks such as RLC Networks Independent sources; explore analytical skills in solving practical problems involving using graph theory concepts and Develop skills in designing Mathematical models for real time electrical networks.	PO1,PO2,PO3 PO4

Text Books:

1. Discrete mathematical structures with applications to computer science. J.P.Trimblay and R.Manohar , 27/e, Tata Mc Graw Hill Publications , 2006, New Delhi.
2. Graph Theory with applications to engineering and computer Science, NarasinghDeo, 25/e, Printice – Hall of India Private Limited, 2003, New Delhi

Reference Books:

1. Clark J. And Holton D.A., " A first look at Graph theory", Allied Publishers, 1990.
2. R.B.Bapat , Graphs and Matrices, Springer, London Dordrecht Heidelberg, New York, 2010
3. Gary Haggard John Schlipf, Sue Whitesides, Discrete Mathematics for Computer Science, 4/e, 2007, Thomson Publication, 2008, New Delhi.
4. S.D Sharma ,KedarNath Ram Nath Operation Research & Co, Meerut . 2007.
5. J.A.Bonday and U.S.R. Murty, Graph Theory with application (2nd Edition), North Holland, 1976 .

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	3	3	3	2	-	-	-	-	-	-	-	-
CO.2	3	3	3	2	-	-	-	-	-	-	-	-
CO.3	3	3	3	2	-	-	-	-	-	-	-	-
CO.4	3	3	3	2	-	-	-	-	-	-	-	-
CO.5	3	3	3	2	-	-	-	-	-	-	-	-
CO*	**3**	**3**	**3**	2	-	-	-	-	-	-	-	-

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OSAH412 BANKING AND INSURANCE

Course Educational Objectives:

1. To introduce students to the banking sector and its operations.
2. To provide elaborate knowledge on functions of banking
3. To enable students to understand the digital technology in banking
4. To provide an understanding of insurance and risk management
5. To enable students to gain knowledge on various insurance organizations.

UNIT – 1: INTRODUCTION TO BANKING (9)

Meaning and functions of banking, importance of banking, Reserve Bank of India- Functions.

UNIT – 2: BANK-CUSTOMER RELATIONSHIP (9)

Debtor-creditor relationship, deposit products or services, payment and collection of cheques. Accounts – Types of accounts, procedure for opening and closing an account. Loans and Advances- Principles of lending, Types of loans.

UNIT – 3: BUSINESS MODELS & ELECTRONIC PAYMENT SYSTEM (9)

Features, types of e-payment system, e-cash, NEFT, RTGS, Credit cards, Electronic Wallet and Debit cards. Business models- B2B, B2C, C2C, and B2G.

UNIT – 4: INTRODUCTION TO RISK AND INSURANCE (9)

Concept of risk, risk Vs uncertainty. Insurance definition, Insurance as risk mitigation mechanism, elements of insurance.

UNIT – 5: INSURANCE OVERVIEW (9)

Principles of insurance, insurance types, LIC & GIC, insurance - functions, IRDA, Insurance Players in India.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Demonstrate Knowledge in Tools and concepts of Banking.	PO11, PO12
CO2	Explain the operations and functions of banking towards customers	PO7, PO11
CO3	Apply skills in providing solutions for Online banking and e payment	PO7,PO11, PO12
CO4	Employ the risk management practices especially the insurance mechanism.	PO9,PO11
CO5	Classify the various types of Insurance and understand the principles behind insurance	PO7, PO11

Text Book:

1. A.V. Ranganadha Chary, R.R. Paul, Banking and Financial System, Kalyani Publisher, New Delhi, 2nd Edition.
2. P.K.Gupta, Insurance and Risk Management, Himalaya Publishing House, New Delhi.

Reference Books:

1. Diwan, Praq and Sunil Sharma, Electronic Commerce- A Manager's Guide to E-Business, Vanity Books International, Delhi, 2002.
2. Kalakota Ravi and Whinston Andrew B, Frontiers of Electronic Commerce, Pearson Education India, 1996 New Delhi.
3. Schneider, Gr ey P, Ele ctron ic Com merce , Cou rse Technology, Cengage Learning, 8th Edition, New Delhi, 2008.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1	-	-	-	-	-	-	-	-	-	-	2	2
CO.2	-	-	-	-	-	-	2	-	-	-	3	-
CO.3	-	-	-	-	-	-	3	-	-	-	3	2
CO.4	-	-	-	-	-	-	-	-	2	-	3	-
CO.5	-	-	-	-	-	-	2	-	-	-	3	-
CO*	**-**	**-**	**-**	**-**	**-**	**-**	**2.33**	**-**	**2**	**-**	**2.8**	**2**

IV B.Tech I Semester

L	T	P	C
3	0	0	3

18OSAH413 MANAGING INNOVATION AND ENTREPRENEURSHIP

Course Educational Objectives:

1. To enable students understand the importance of innovation in business practices
2. To enable students to innovate new methods and practices in business using innovation approaches
3. To provide knowledge on raising finance for starting new business
4. To enable students to protect their innovation through patent and copyright
5. To motivate students to become successful entrepreneurs through constant innovation

UNIT – 1: CREATIVITY AND INNOVATION (9)

Introduction, Levels of Innovation, the Sources of Innovative Opportunity, The Innovation Process, Innovative Strategies, Creativity – Inbound, Outbound; Context and Process of New Product Development.

UNIT – 2: PARADIGMS OF INNOVATION (9)

Innovation in the Context of Developed Economies and Emerging Economies, Performance gap, Infrastructure gap, Sustainability gap, Regulatory gap, Preference gap.

UNIT – 3: INTELLECTUAL PROPERTY INNOVATION AND ENTREPRENEURSHIP (9)

Introduction to Entrepreneurship, Managerial and Entrepreneurial Competencies, Entrepreneurial Growth and Development, Intellectual Property – Forms of IP, Patents, Trademarks, Design Registration, Copy Rights, and Patent Process in India.

UNIT – 4: OPEN INNOVATION FRAMEWORK & PROBLEM SOLVING (9)

Concept of Open Innovation Approach, Limitations and Opportunities of Open Innovation Framework, Global Context of Strategic Alliance, Problem Identification and Problem Solving, Innovation and Diversification.

UNIT – 5: SOURCES OF FINANCE AND VENTURE CAPITAL (9)

Importance of Finance, Strategies of Venture Funding, Investment Process, Advantages and Disadvantages of Venture Capital, Venture Capital Developments in India.

Course Outcomes:

On successful completion of the course, Students will be able to		POs related to COs
CO1	Demonstrate the principles of business innovation and entrepreneurship for establishing industrial ventures..	PO9,PO11
CO2	Apply the approaches to innovation for developing successful ventures	PO9, PO11
CO3	Develop a comprehensive and well planned acquisition of finance for a new venture	PO9,PO10,PO11
CO4	Exhibit entrepreneurial competencies and protect the innovations	PO9,PO11
CO5	Apply ethics in constructive innovation framework.	PO8, PO11,PO12

Text Books:

1. Vi nn ie Ja uha ri , S ud han sh u B hu sha n, I nn ov at ionManagement, Oxford University Press, 1st Edition, 2014.
2. Drucker, P. F., Innovation and Entrepreneurship, Taylor & Francis, 2nd Edition, 2007.

Reference Books:

1. Robert D Hisrich, Claudine Kearney, Managing Innovation and Entrepreneurship, Sage Publications, 1st Edition, 2014.
2. V.K.Narayanan, Managing Technology and Innovation for Competitive Advantage, Pearson India, 1st Edition, 2002.

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO.1		-	-	-	-	-	-	-	1	-	2	
CO.2		-	-	-	-	-	-	-	2	-	1	
CO.3		-	-	-	-	-	-	-	1	1	1	
CO.4		-	-	-	-	-	-	-	2	-	1	
CO.5		-	-	-	-	-	-	1	-	-	1	1
CO*	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1.5**	**1**	**1.3**	1