

ACADEMIC REGULATIONS & SYLLABUS

CIVIL ENGINEERING

**B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2016-17)**



**SWARNANDHRA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Seetharamapuram, Narsapur – 534 280, W.G.Dt.
Andhra Pradesh**

1. INTRODUCTION

Academic Program of the institute are governed by rules and regulations approved by the Academic Council, which is the highest Academic body of the Institute. These academic rules and regulations are applicable to the students admitted during the academic year 2016-17 into first year of four year undergraduate program offered by the college leading to Bachelor of Technology (B.Tech) degree in the respective discipline.

2. ADMISSIONS:

2.1 Admission into first year of any Four Year B. Tech Program of study in Engineering:

Admissions into first year of B.Tech Program of Swarnandhra College of Engineering & Technology (**Subsequently referred to as SCET**) will be as per the norms stipulated by Jawaharlal Nehru Technological University Kakinada & Govt. of Andhra Pradesh. Admissions in each program in the Institution are classified into **CATEGORY –A**, through convener, EAMCET and **CATEGORY- B** filled by the college management.

2.2 Admission into the Second year (Lateral Entry) of any Four year B. Tech Program of study in

Engineering: The candidates should have passed the qualifying exam. (B.Sc. graduation & Diploma holders) for admission into the 3rd semester directly, based on the rank secured by the candidate at Engineering Common Entrance Test [ECET for (FDH)] in accordance with the instructions received from the Convener, ECET and Government of Andhra Pradesh. The candidate has to satisfy the other eligibility requirements stipulated by the JNTUniversity Kakinada and / or the Government of Andhra Pradesh from time to time.

2.3 Admissions with advance standing: These may arise in the following cases:

- a) When a student seeks transfer from other colleges to SCET and desirous to pursue the study at SCET in an eligible branch of study.
- b) When students of SCET get transferred from one regulation to another regulation or from previous syllabus to revised syllabus.
- c) When a student after long discontinuity rejoins the college to complete his/her Program of study for the award of degree.
- d) When a student is not able to pursue his/her existing Programme of study but wishes to get transferred to another Program of study.

These admissions may be permitted by the Academic Council of SCET as per the norms stipulated by the statutory bodies and Govt. of Andhra Pradesh. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Program of study at SCET will be governed by the transitory regulations.

3. PROGRAMMES OFFERED (UNDER GRADUATE)

Presently, the college is offering Under Graduate Programs in the following disciplines:

- Computer Science and Engineering (CSE)
- Electronics and communication Engineering (ECE)
- Electrical and Electronics Engineering (EEE)
- Information Technology (IT)
- Mechanical Engineering (ME)
- Civil Engineering(CE)

3.1 Structure of the Program:

Preamble:

It is emphasized in UGC Guidelines on Choice Based Credit System (CBCS), that the important measures taken to enhance academic standards and quality in higher education include innovation and improvements in curriculum, teaching-learning process, examination and evaluation systems, besides governance and other matters. It is also suggested to adopt grading system in place of conventional system of marks and percentages.

The proposed CBCS for Swarnandhra College of Engineering and Technology provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides advantageous approach in which the students can register courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach through open electives.

Key words CBCS, such as Course, credit, credit point, CGPA, SGPA, Grade Point, Letter Grades, Foundation Courses (FC), Program Core Course (PCC) and Elective Courses (EC) as given in UGC guidelines are used in this proposal with the same definitions.

Each Program of a Discipline or branch of study will consist of:

- i). Foundation courses in Basic Sciences, Engineering Sciences and Humanities.
- ii). Program core courses to impart broad based knowledge needed in the concerned branch of study.
- iii). Elective courses from the discipline or interdisciplinary areas /industry related opted by the student based on his/her interest in specialization.

Each Program of study will be designed to have 35-40 theory courses and 20-25 laboratory courses. The distribution and types of courses offered from the above is indicated in the following table.

Foundation Courses – Basic Sciences & Humanities
Foundation Courses – Engineering Sciences
Program Core Courses in the branch of study
Elective Courses

Note: All components prescribed in the curriculum of any Program of study will be conducted and evaluated.

Contact hours: Depending on the complexity and volume of the course the number of contact hours per week will be determined.

Credits:

- One teaching hour of theory/tutorial class is equivalent to one credit.
- Two hours of Practical class is equivalent to one credit.
- Each theory or elective course will be (L-T-P-C) equal to 4-0-0-4 or 3-1-0-4 or 3-0-2-4 or 2-0-4-4 or 1-0-4-3. Further, the laboratory courses can be (L-T-P-C) equal to 0-0-2-1 or 0-0-4-2.

3.2 Curriculum for each Program of study:

- The Four year curriculum of any B. Tech Program of study in any branch of Engineering is formulated based on the guidelines mentioned in 3.1 and will be recommended by the concerned Board of Studies and is approved by the Academic council of the college.
- In case of students admitted under lateral entry, the respective regular curriculum contents from 3rd semester onwards are to be pursued by them.
- In case of students admitted under advanced standing, the equivalence will be prepared by the concerned Board of Studies and the Academic Council has to approve the same.
- After approval from the Academic Council, the detailed curriculum will be prepared and made available to all the students along with the academic regulations.

3.3 Maximum duration of study and cancellation of admission:

Maximum duration permitted for any student to successfully complete the four year B. Tech. Program of study will be:

- Eight academic years in sequence from the year of admission for a normal student admitted into first year of any Program.
- Six academic years in sequence from the year of admission for a Lateral entry student admitted into second year of any Program.

- For students admitted with advanced standing, the maximum time for completion of Program of study, will be twice the period in terms of academic years in sequence, stipulated in the Program curriculum defined at the time of admission.

In case, any student fails to meet the above applicable/eligible conditions for the award of degree, his/her admission stands cancelled.

4. DURATION OF THE PROGRAMME AND MEDIUM OF INSTRUCTION: The duration of the B. Tech. Program is four academic years consisting of eight semesters. The medium of instruction and examinations are in English. Students, who fail to fulfill all the academic requirements for the award of the degree within the prescribed duration as per article 3.3, will forfeit he/she admission in B.Tech course.

5. MINIMUM INSTRUCTION DAYS: Each semester will consist of 22 weeks duration with minimum of 110 working days which includes instruction, mid semester examinations and Final examinations.

6. TRANSITORY REGULATIONS:

For students admitted under advance standing, these transitory regulations will provide the modus of operandi. At the time of such admission, based on the Program pursued (case by case)

- Equivalent courses completed by the student are established by the BOS of concerned discipline.
- Marks/Credits are transferred for all such equivalent courses and treated as successfully completed in the Program of study prescribed by SCET.
- A Program chart of residual courses not completed will be derived and a Program of study with duration specified will be prescribed for pursuit at SCET.
- Marks obtained in the previous system, as the case maybe, shall be converted to equivalent grades and CGPA.

All other modalities and regulations governing shall be the same as those applicable to the stream of students with whom; such a candidate is merged with current regulations.

7. DISTRIBUTION AND WEIGHTAGE OF MARKS:

- (i) In each semester the course of study consists of 5/6 theory subjects + 3 Laboratories. However, in the 8th semester there will be only 2 theory subjects in addition to the major project work.
- (ii) The performance of a student in each semester will be evaluated subject wise with a maximum of 100 marks for both Theory and Laboratories, where as Seminar, Soft Skills and

Aptitude Lab and Mini Project/Internship at the end of respective semesters are evaluated internally for 50 marks each. The Main Project during 8th Semis evaluated for 200 marks.

- (iii) **Seminar:** The seminar is internal evaluation. For the Seminar, the student shall collect the information on a specialized topic (thrust areas) and prepare a report showing his understanding over the topic and submit to the department, which shall be evaluated by the Head of the department, seminar supervisor and a senior faculty member. The seminar report shall be evaluated for 50 marks. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.
- (iv) **Soft Skills and Aptitude Lab:** This lab is internal evaluation. This has two components, Soft Skills and Aptitude. Each will be evaluated separately for 50 marks in a semester and the average of two components shall be taken as the final score. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.
- (v) **Mini Project/Internship:** This Mini Project/ Internship is internal evaluation. The mini project/Internship shall be carried out during the summer break for a minimum of 4 weeks after the 6th semester and to be completed before the start of the 7th Semester. A report has to be submitted at the beginning of the 7th semester for assessment by an internal evaluation committee comprising Head of the Department and two faculty of the department including the project Supervisor for 50 Marks. A minimum of 50% maximum marks shall be obtained to earn the corresponding credits.
- (vi) For each theory subject the distribution will be 40 marks for internal evaluation and 60 marks for the end semester examination. The internal evaluation of 40 marks consists of descriptive test for 30 marks and assignment for 10 marks.
- (vii) As part of internal assessment for each theory subject there will be 2 cycles of examinations. Each cycle consists of descriptive test for 30 marks and assignment for 10 marks which will be conducted for three units of syllabus. **Weighted average of two cycle's** performance will be considered for award of internal assessment. A weightage of 80% for the best cycle performance and 20% for second best cycle performance are given for internal evaluation.
- (viii) The **descriptive** examination question paper consists of three questions (at least one question from each unit) and all are need to be answered in 90 minutes.
- (ix) The **end semester** examination will be conducted for 60 marks covering total syllabus of the concerned subjects. In end examination pattern, **Part – A** consists of compulsory questions from all units (Brainstorming/Thought provoking/Case study) for 12 marks. **Part – B** has **6 questions** (one question from each unit) of which **four questions** to be answered and valued for 48 marks.
- (x) End practical examination will be conducted for 60 marks by the teacher concerned and

external examiner. For practical subjects there will be a continuous assessment during the semester for 40 internal marks with 20 marks for day-to-day work, including record valuation and 20 marks for internal test.

(xi) For the subjects of design or drawing such as Engineering Drawing, etc., the distribution will be 40 marks for internal evaluation with 20 marks for day-to-day work, and 20 marks from two internal test (80% of first best + 20% of second best). End examination will be conducted for 60 marks.

(xii) **Main Project:** The project work carried out by the students during 8th semester is evaluated for internal assessment and external examination.

a) **Internal Assessment:** Internal Assessment will be carried out by Projects internal assessment committee consisting of 1) Head of the Department 2) Supervisor and 3) Senior faculty member appointed by the Principal.

b) **External Examination:** External Examination will be conducted by Project external examination committee consisting of 1) Head of the Department 2) Supervisor and 3) External member selected from the panel of examiners.

Total marks to be awarded for Project work is 200, of which 60 marks will be for Internal Evaluation and 140 marks for External examination through presentation / viva - voice by the student. The internal evaluation will be on the basis of two seminars on the topic of the project.

(xiii) **Mandatory Courses:** Non-Credit Courses: Courses: These courses are mandatory for students and students have to successfully complete these courses.

a. IPR and Ethics in 5th Semester

b. Certificate Course in 6th Semester (MOOCs or Professional Certificate)

The evaluation shall be totally internal and students should get satisfactory result to get B. Tech degree. Students should produce valid certificate for certificate course to get satisfactory result.

(xiv) **Skill Based Lab (Elective):** This shall be conducted in 7th semester on thrust areas of respective departments. Students shall register and put up a minimum of 75% attendance. Based on their performance, examination to be conducted like other Labs.

(xv) **Open Electives:** Students are to choose one Open Elective (OE – I) during 6th Semester and one Open Elective (OE – II) in 8th Semester from the list of Open Electives given in the Course Structure. The student has to choose one Open Elective subject in Sem VI and Sem VIII from the list other than offered by parent Department, which was not studied in earlier semesters.

8. **GAP YEAR CONCEPT:** Outstanding students who wish to pursue entrepreneurship full time can take break of one year, after the 4th Semester with prior approval from the Principal (as per the recommendations of the Central Committee). This may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation.

9. **ATTENDANCE REGULATIONS AND CONDONATION:**

- (i) A student will be eligible to appear for end semester examinations, if he/she acquired a minimum of 75% of attendance in aggregate of all the subjects.
- (ii) Condonation of shortage of attendance in aggregate up to 10% on medical grounds (Above 65% and below 75%) in any semester may be granted by the College Academic Committee.
- (iii) Prescribed Condonation fee shall be payable by the student to appear for the end examination.
- (iv) A Student will not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester as applicable. They may seek re-admission for that semester as and when offered consecutively by the Department.
- (v) Shortage of Attendance below 65% in aggregate in no case be condoned
- (vi) Students with less than 65% of attendance in any semester are not eligible to take up their end examination of that particular semester and their registration for examination shall be cancelled.
- (vii) Attendance may also be condoned for those who participate in Intercollegiate/university sports, co- and extracurricular activities provided their attendance is in the minimum prescribed range for the purpose (>65%) and recommended by the concerned authority. He/She shall pay the prescribed condonation fee.
- (viii) A student will be condoned only four times for regular student and three times for lateral entry students during entire course of study.

10. **MINIMUM ACADEMIC REQUIREMENTS:**

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in **S.No.9**.

- (i) A student will be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he/she secures not less than a minimum of 35% of marks exclusively in the end semester examinations in each of the subjects, for which the candidate had appeared. However, the candidate should have secured, a minimum of 40% marks in both external and internal components put together to declare eligible for pass in the subject.
- (ii) A student will be promoted from first semester to second semester, second semester to

third and third to fourth semester, if he/she satisfies the minimum attendance requirement.

- (iii) A student will be promoted from 4th Semester to 5th Semester, if he/she fulfills the academic requirements of 40% of the credits up to 4th Semester from all the examinations (Regular and supplementary) whether or not the candidate takes the examinations.
- (iv) A student will be promoted from 6th to 7th Semester, only if he/she fulfills the academic requirements of 40% of the credits up to 6th Semester from, all the examinations (regular and supply) whether or not the candidate takes the examinations.
- (v) There will be supplementary examinations along with the regular semester examinations enabling the students to give a fair chance to appear in the subject if any failed.
- (vi) Candidate who fails in 8th Semester can appear for Advanced Supplementary Examinations soon after the announcement of result.

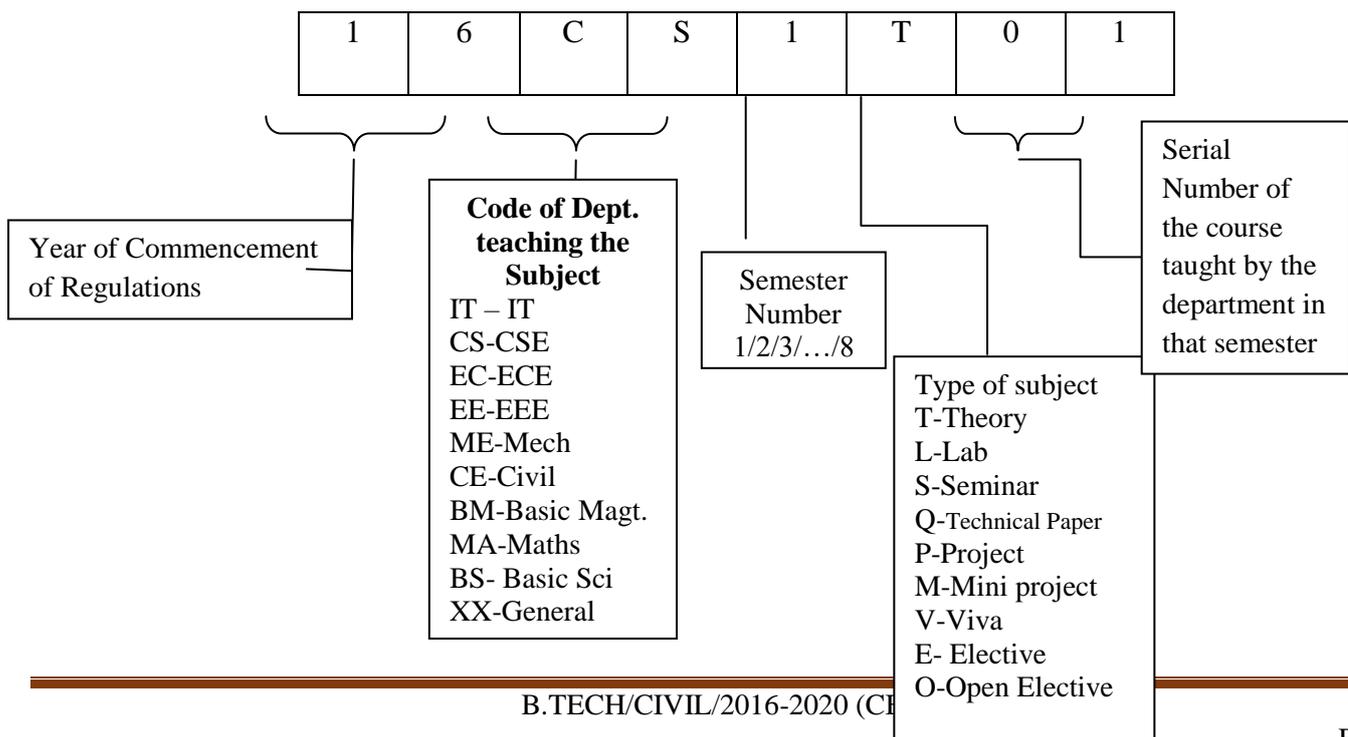
11. ELIGIBILITY FOR AWARD OF DEGREE:

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

- (i) Pursued a course of study for a stipulated period of four years and not more than eight years. (ii) Registered and successfully completed all the components prescribed in the program of study to which he/she is admitted.
- (iii) Obtained CGPA greater than or equal to 5 (minimum requirements for pass).
- (iv) Has no dues to the institute, hostels, libraries, NCC/NSS etc., and No disciplinary action is pending against him/her

12. COURSE CODE & COURSE NUMBERING SCHEME:

The subject codes will be given by the department teaching the subject. Each subject code contains 8 characters. The 8 characters for each subject will be filled as per the following guidelines.



13. GRADING SYSTEM:

13.1 Award of Grade:

(i) Grade Point Average (GPA):

a) The Grade Point Average (GPA) will be calculated according to the formula.

$$\text{GPA} = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the subject i

G_i = grade points obtained by the student in the subject.

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

$$\text{CGPA} = \frac{\sum C_i G_i}{\sum C_i}$$

Where C_i = number of credits for the subject i

G_i = grade points obtained by the student in the subject.

(ii) After a student satisfies the requirements prescribed for the award of UG/PG Program he/she shall be placed in one of the following four grades. The award of the degree is based on CGPA on a grade point scale of 10.

CGPA	Award of Division
$\geq 7.50^*$	First Class with Distinction
≥ 6.50	First Division
≥ 5.50	Second Division
≥ 5.00	Pass Division
< 5.00	Unsatisfactory

* In addition to the required CGPA of 7.50, the student must have necessarily passed all the courses of every semester in the minimum stipulated period for the programme.

13.2 Award of Grade in Each Semester:

(i) Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester for each subject. The letter grades and the corresponding grade points are as given in the Table.

Percentage of Marks Scored	Letter Grade	Grade points
≥ 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

- (ii) A student earns a minimum of 5 grade points (E grade) in a subject is declared to have successfully completed the subject, and is deemed to have earned the credits assigned to that subject. However it should be noted that a pass in any subject/term paper/seminar/project/miniproject shall be governed by the rules mentioned in S.No.7.
- (iii) Grade Sheet: A grade sheet (memorandum) will be issued to each student indicating his/her performance in all courses taken in that semester and also indicating the grades.
- (iv) Transcripts: After successful completion of the total programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued up to any point of study to any student on request and by paying the stipulated fee in force.
- (v) Candidates shall be permitted to apply for revaluation within the stipulated period with payment of prescribed fee.
- (vi) The Academic Council has to approve and recommend to the JNTUK, Kakinada for the award of a degree to any student.

14. SUPPLEMENTARY EXAMINATIONS: In addition to the Regular Final Examinations held at the end of each semester, Supplementary Final Examinations will be conducted during the academic year. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstance.

15. ADVANCED SUPPLEMENTARY EXAMINATIONS: Candidate who fails the subjects in 8th Semester can appear for Advanced Supplementary Examinations.

16. ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME):

- (i) The students have to acquire 132 credits from 3rd Semester to 8th Semester of B. Tech Program (regular) for the award of the degree.
- (ii) Students, who fail to fulfill the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.
- (iii) The same attendance regulations are to be adopted as per the rules mentioned in item No.9.
- (iv) **Rules for Promotion in to Next Higher Class:** (6th Semester to 7th Semester): A student shall be promoted from 6th Semester to 7th Semester only if he/she fulfills the academic requirements of 40% credits up to 6th Semester.

17. CONDUCT AND DISCIPLINE:

Students admitted in SCET (Autonomous) are to be followed the conduct and discipline of the college and which will be framed from time to time.

18. MALPRACTICES: The Principal shall refer the cases of malpractices in internal assessment tests and Semester-End Examinations, to a Malpractice Enquiry Committee, constituted by him/her for the purpose. The principal shall take necessary action, against such cases based on the recommendations of the committees per stipulated norms.

19. GENERAL:

- a) Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- b) The academic regulation should be read as a whole for the purpose of any interpretation.
- c) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of The Principal is final and which is to be ratified by the Chairman of the Governing Body.
- d) The college may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

**CIVIL ENGINEERING
COURSE STRUCTURE – UG(CBCS)**

SEMESTER-I

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16BS1T01	Proficiency Course in English – I	3		-	3	40	60	100
2	16MA1T01	Differential Equations and Laplace Transforms	3	-	-	3	40	60	100
3	16EE1T01	Basic Electrical Engineering	3	-	-	3	40	60	100
4	16BS1T03	Engineering Physics	3	-	-	3	40	60	100
5	16CS1T01	Fundamentals of Computers and C-Programming	3	-	-	3	40	60	100
6	16BS1T04	Environmental Sciences	3	-	-	3	40	60	100
7	16BS1L01	English Proficiency Lab	-	-	4	2	40	60	100
8	16BS1L03	Engineering Physics Lab	-	-	4	2	40	60	100
9	16CS1L01	C-Programming Lab	-	-	4	2	40	60	100
		Total	18	-	12	24	360	540	900

SEMESTER-II

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16BS2T01	Proficiency Course in English – II	3		-	3	40	60	100
2	16MA2T01	Linear Algebra and Vector Calculus	3	-	-	3	40	60	100
3	16MA2T02	Numerical Methods and Integral Transforms	3	-	-	3	40	60	100
4	16BS2T02	Engineering Chemistry	3	-	-	3	40	60	100
5	16ME2T02	Engineering Mechanics	1	-	4	3	40	60	100
6	16ME2T01	Engineering Drawing	3	-	-	3	40	60	100
7	16BS2L01	English Communication Skills Lab	-		4	2	40	60	100
8	16BS2L02	Engineering Chemistry Lab	-		4	2	40	60	100
9	16ME2L01	Engineering Work Shop Practice	-	-	4	2	40	60	100
		Total	16	-	16	24	360	540	900

**CIVIL ENGINEERING
COURSE STRUCTURE – UG
SEMESTER-III**

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16CE3T01	Strength of Materials	3	1	-	4	40	60	100
2	16CE3T02	Fluid Mechanics	3	1	-	4	40	60	100
3	16CE3T03	Surveying	3	-	-	3	40	60	100
4	16CE3T04	Engineering Geology	3	-	-	3	40	60	100
5	16BM3T01	Managerial Economics and Financial Analysis	3	-	-	3	40	60	100
6	16CE3L01	Strength of Materials Lab	-	-	4	2	40	60	100
7	16CE3L02	Surveying Lab-I	-	-	4	2	40	60	100
8	16CE3L03	Engineering Geology Lab	-	-	4	2	40	60	100
		Total				23	320	480	800

SEMESTER-IV

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16CE4T01	Hydraulics and Hydraulic Machinery	3	1	-	4	40	60	100
2	16CE4T02	Structural Analysis-I	3	1	-	4	40	60	100
3	16CE4T03	Concrete Technology	3	-	-	3	40	60	100
4	16CE4T04	Building Planning and Drawing	3		-	3	40	60	100
5	16CE4T05	Building Materials and Construction	3		-	3	40	60	100
6	16ME4L04	Fluid Mechanics and Hydraulic Machinery Lab	-	-	4	2	40	60	100
7	16CE4L01	Concrete Technology Lab	-	-	4	2	40	60	100
8	16CE4L02	Surveying Lab II	-	-	4	2	40	60	100
		Total				23	320	480	800

**CIVIL ENGINEERING
COURSE STRUCTURE – UG**

SEMESTER – V

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16CE5T01	Geotechnical Engineering	3	1	-	4	40	60	100
2	16CE5T02	Design and Drawing of Reinforced Concrete Structures	3	1	-	4	40	60	100
3	16CE5T03	Structural Analysis-II	3	-	-	3	40	60	100
4	16CE5T04	Transportation Engineering	3	-	-	3	40	60	100
5		Elective-I	3	-	-	3	40	60	100
6	16CE5L01	Geotechnical Engineering. Lab –I	-	-	4	2	40	60	100
7	16CE5L02	Transportation Engineering Lab-I	-	-	4	2	40	60	100
8	16CE5S01	Seminar	-	-	4	2	50	-	50
9		Mandatory Course-Professional Ethics and IPR				-	-	-	-
		Total				23	330	420	750

SEMESTER – VI

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16CE6T01	Design and Drawing of Steel structures	3	1	-	4	40	60	100
2	16CE6T02	Water resources Engineering-I	3	1	-	4	40	60	100
3	16CE6T03	Foundation Engineering	3	-	-	3	40	60	100
4		Elective-II	3	-	-	3	40	60	100
5		Open Elective-I	3	-	-	3	40	60	100
6	16ME6L03	Computer Aided Engineering Drawing	-	-	4	2	40	60	100
7	16CE6L01	Transportation Engineering Lab-II	-	-	4	2	40	60	100
8	16BS6L01	Soft Skills and Aptitude Lab	-	-	4	2	40	60	100
9		Mandatory Course-Certificate Course (Moocs, Professional certificate)					-	-	-
		Total	15	2	12	23	320	480	800

CIVIL ENGINEERING

SEMESTER – VII

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	16CE7T01	Water Resources Engineering -II	3	1	-	4	40	60	100
2	16CE7T02	Remote Sensing and GIS Applications	3	1	-	4	40	60	100
3	16CE7T03	Estimation, specifications and contracts.	3		-	3	40	60	100
4		Elective-III	3		-	3	40	60	100
5	16CE7L01	Environmental Engineering Lab	-	-	4	2	40	60	100
6	16CE7L02	Geo Technical Engineering Lab-II	-	-	4	2	40	60	100
7		Skill based Laboratory Elective	-	-	4	2	40	60	100
	16CE7LE01	1.GIS and CAD Lab							
	16CE7LE2	2.Etab Lab							
	16CE7LE3	3.Rivet Lab							
	16CS7LE5	4.Java Programming Lab							
	16CE7M01	Internship/ Mini Project	-	-	-	2	50	-	50
		Total	12	2	12	22	330	420	750

SEMESTER – VIII

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1		Elective-IV	3	-	-	3	40	60	100
2		Open Elective – II	3	-	-	3	40	60	100
3	16CE8P01	Project Work	-	-	24	12	60	140	200
		Total	6		24	18	140	260	400

LIST OF OPEN ELECTIVES

S.No.	Course Code	Name of the Course	Offering Dept.
1	16CEXO01	Green Buildings and Infrastructure	CIVIL
2	16CEXO02	Disaster Management	
3	16EEXO01	Electrical Safety Management	EEE
4	16EEXO02	Non-Conventional Energy Sources	
5	16MEXO01	Composite Materials	MECH
6	16MEXO02	Introduction to Operation Research	
7	16ECXO01	Introduction to Nanotechnology and its Applications	ECE
8	16ECXO02	Introduction to Global Positioning and Navigation Satellite Systems	
9	16CSXO01	Introduction to Data Base Management Systems	CSE
10	16CSXO02	Introduction to Big Data Analytics	
11	16ITXO01	Introduction to Software Project Management	IT
12	16ITXO02	Introduction to Internet of Things (IoT)	
13	16BMXO01	Innovations and Entrepreneurship	MBA
14	16BMXO02	Industrial Sociology & Psychology	

Note: The student has to choose one Open Elective subject in Sem VI and Sem VIII from the above list other than offered by parent department, which was not studied in earlier semesters.

Elective-I			Elective-II		
S.No.	Subject		S.No.	Subject	
1	16CE5E01	Water Supply Engineering	1	16CE6E01	Railway and Harbour Engineering
2	16CE5E02	Architecture and Town planning	2	16CE6E02	Industrial Water and Waste Water Management
3	16CE5E03	Environmental Impact Assessment and Management	3	16CE6E03	Watershed Management
4	16CE5E04	Finite Element Methods in Civil Engineering	4	16CE6E04	Pre-stressed Concrete
5	16CE5E05	Advanced Surveying	5	16CE6E05	Construction Technology and Management

Elective-III			Elective-IV		
S.No.	Subject		S.No.	Subject	
1	16CE7E01	Environmental Engineering	1	16CE8E01	Design and Drawing of Irrigation structures
2	16CE7E02	Water Resources System Planning and Management	2	16CE8E02	Ground Water Development and Management
3	16CE7E03	Pavement Analysis and Design	3	16CE8E03	Urban Transportation Planning
4	16CE7E04	Advanced Structural Analysis	4	16CE8E04	Air Pollution and Control
5	16CE7E05	Ground Improvement Techniques	5	16CE8E05	Soil Dynamics and Machine Foundations

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16BS1T01: Proficiency Course in English -I				

COURSE OBJECTIVES

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.

COURSE OUTCOMES

A) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

B) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, e-mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

C) Interactive skills:

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

D) Grammar in context

- Enable the skills of grammar using in a situation
- Identifying the needs of apt grammar in life related situation
- Promoting discourse with grammar effectively

Syllabus:

S No	Content	Hours
UNIT –I	The Power of Prayer One word substitutes Nouns – Pronouns	8
UNIT -II	Is progress real? Commonly Confused words Verbs	8
UNIT-III	Secret of Work Collocations Adjectives ,Adverbs and Articles	8
UNIT-IV	An Astrologer’s Day GRE words Prepositions and Sentences	8
UNIT-IV	Marriage Proposal Idioms Conjunctions and Interjections	8
UNIT-VI	The Road not Taken Phrasal Verbs Tenses	8
		48

Text Book: Proficiency Course in English, Semester –I by Maruti Publications.

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16MA1T01: Differential Equations and Laplace Transforms				

Prerequisites

Knowledge of differentiation, integration, logarithms, hyperbolic functions, and trigonometry is necessary. Concept of functions and their types, partial differentiation is also needed.

COURSE OBJECTIVES

1. The study of differential equations is introduced to make the students how to solve the problems in first order and first degree differential equations.
2. The study of second and higher order differential equations with constant coefficients.
3. To transform a given problem from one domain into another so that solving the corresponding problem becomes easier, Laplace transforms are introduced.
4. To know various physical and geometrical problems involving two or more independent variables, partial differential equations will be studied.

COURSE OUTCOMES

The students are able to

1. solve linear differential equations of all orders.
2. solve the first order partial differential equations.
3. apply the knowledge to find the expansions of functions using Taylors and Maclaurin's series.
4. solve many problems in engineering with the knowledge of Laplace transforms.

Syllabus:

UNIT -I Differential equations of first order and first degree

Linear – Bernoulli – Exact - Reducible to exact - Newton's Law of cooling-Law of natural growth and Decay - Orthogonal Trajectories.

UNIT -II Linear differential equations of higher order

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax}V(x)$, $xV(x)$. Method of Variation of parameters for solving second order linear differential equations.

UNIT –III Partial Derivatives

Taylor series and Maclaurin's series expansions of functions of single and two variables (without Proofs) - Jacobian, Functional dependence.

UNIT -IV Partial Differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations-Solutions of Linear Partial differential equations with constant coefficients by the method of separation of Variables.

UNIT -V Laplace transforms

Laplace transforms of standard functions-Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function.

UNIT -VI Inverse Laplace transforms

Inverse Laplace transforms -Convolution theorem (without proof).

Application: Solutions of ordinary differential equations using Laplace transforms.

Books:

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill.

Reference Books:

1. **ERWIN KREYSZIG**, Advanced Engineering Mathematics, 9th Edition, Wiley-India

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16EE1T01: Basic Electrical and Electronics				

COURSE OBJECTIVES

The student able to Understand:

- a) To study the concepts of various electrical elements, various network reduction techniques and AC circuits.
- b) To understand the principle of operation and performance of DC and AC machines.
- c) To study the principle of operation and working of various types of measuring instruments.
- d) To study the construction details, operation and characteristics of various semiconductor devices, digital and logic operations.

COURSE OUTCOMES

Students are able to

- a) Solve electrical networks with network topology concepts.
- b) Analyze the characteristics and performance of DC and AC machines.
- c) Choose right type of instrument for measurement of various electrical parameters.
- d) Explain the operation and characteristics of various semiconductor devices and concepts of digital and logic operations.

UNIT – I

Introduction To Electrical Engineering: Basic Electrical circuit elements (Resistor, Inductor and capacitor)-voltage and current sources-Ohm's Law-Kirchhoff's Laws-series circuits-equivalent resistance-star/delta conversion- Node and mesh analysis of DC circuits - Simple problems.

Network Theorems (DC Excitation)-Superposition-Thevenin's-Norton's-Maximum Power Transfer Theorem-Simple problems

UNIT – II

Ac Fundamentals: Introduction to AC circuits-RMS value-average value-form and peak factors – Real and reactive power – Apparent power- power factor- Behavior of R, L, and C in AC Circuits-Introduction to three phase circuits- phase and line parameters-three phase balanced and unbalanced systems-Simple problems.

UNIT – III

Electrical Machines: DC Machines: Classification of DC Machines-DC Generator and Motor-Construction-Principle of operation –EMF Equation-Performance Characteristics-Simple problems

AC Machines: Classification of AC Machines-Transformers-Synchronous Machines, Induction motor-Performance Characteristics-Starting Methods-Simple problems.

UNIT – IV

Measurement and Measuring Instruments: Introduction – Analog and Digital Instruments – Passive and Active Instruments – Static

Characteristics – Linear and Non-linear Systems – Dynamic Characteristics – Classification of the Instrument System – Measurement of Error – Indicating type Instruments – Measurement of Power-Voltmeter and Ammeter method- two and three wattmeter method-Measurement of Energy.

UNIT-V

Semi Conductor Devices And Its Characteristics : Characteristics of PN Junction Diode — Zener Diode- Intrinsic and Extrinsic Semiconductors – Semiconductor Diodes– Bipolar Junction Transistors-CB, CE, CC Configurations and Characteristics – FET – MOSFET – Silicon-controlled Rectifier – DIAC – TRIAC-Half wave and Full wave Rectifiers- Voltage Regulation.

UNIT – VI

Introduction To Digital Electronics : Binary Number System – Logic Gates – Boolean Algebra -De Morgan's Theorem- Simplification of Boolean Expressions using De Morgan's Theorem – Half and Full Adders – A/D and D/A Conversion.

Text Books:

1. Electrical and Electronic Principles and Technology-John Bird, Published by Elsevier Ltd
2. Engineering Circuit Analysis – William H. Hayt & Jack E. Kemmerly, Tata McGraw-Hill Company, 7th Edition.

Reference Books:

1. Basic Electrical and Electronics Engineering – S. K. Bhattacharya, Pearson Publications.
2. Basic Electrical & Electronics Engineering – J. B. Gupta, S. K. Kataria & Sons Publications.
3. A Course in Electrical and Electronic Measurements and Instrumentation – A. K. Sawhney, Dhanpat Rai & Co.
4. Electronic Devices and Circuit Theory – Robert L. Boylestad & Louis Nashelsky, Prentice - Hall of India, 6th Edition.
5. Electrical & Electronics Engineering – J. B. Gupta, S. K. Kataria & Sons Publications.

B. TECH 1st SEMESTER	L	T	L	C
	3	-	-	3
16BS1T03: Engineering Physics				

COURSE OBJECTIVES

1. **Understand** the basic *concepts, definitions, characteristics and phenomena*.
2. **Recognize** the *classical ideas and physical phenomena* and also *define and analyze* the concepts.
3. **Assess the role of Science** and in particular, *physics*, in helping us better understanding the *complex, technological* society of which we are apart.
4. **Investigate** and understand physical behavior in the lab using *scientific reasoning and logic* and interpret the result of simple *experiments and demonstration* of physical principles and also *evaluate* the impact of physical discoveries on how we view the world.
5. **Solve** a variety of basic *problems and given word problems*, student will identify the physical principle required to solve the problem, *formulate the equation* necessary to solve the problem.
6. **Effectively communicate** *experimental results and solutions* to application problems through oral and written reports.
Explain physical phenomena using *realistic mathematical modeling* at the level of general physics

COURSE OUTCOMES

Student able to understand:

1. Basic crystal systems and determination of crystal structures.
2. Proper choice of Magnetic/Dielectric Materials as per the functionality of appliance could be realized.
3. Concept of Magnetic Induction and Maxwell's equations.
4. Application of Schrodinger equation and Concept of band theory of solids.
5. Pure & doped Semiconductor devices for better utility.
6. Optical properties of solids and super conducting properties of solids and their applications.

Syllabus

UNIT-I CRYSTALLOGRAPHY AND X-RAY DIFFRACTION

Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC, BCC and FCC – Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg's law- Bragg's Spectrometer.

UNIT-II MAGNETIC AND DIELECTRIC PROPERTIES

MAGNETIC PROPERTIES: Origin of magnetic moment-Magnetic Materials: Classification of Magnetic Materials and properties - Hysteresis Loop of ferromagnetic material.

DIELECTRIC PROPERTIES: Introduction - Electronic, ionic and orientational (Qualitative) polarizations - Internal fields in solids – Clausius - Mossotti equation.

UNIT-III ELECTROMAGNETISM

Introduction-Concept of Electric Flux - Gauss's Law – Integral and Differential forms - Magnetic Field –The Biot-Savart's Law - Ampere's Law - B for a Solenoid - Faraday's Law of induction - Lenz's law - Displacement Current - Maxwell's Equations.

UNIT –IV QUANTUM MECHANICS AND BAND THEORY OF SOLIDS:

De Broglie concept of matter waves, Schrodinger Time Independent wave equation – Application to a Particle in a box- Defects of Classical free electron theory of metals – Quantum free electron theory – concept of Fermi energy - Bloch theorem (qualitative) – Kronig – Penney model – Origin of energy band formation in solids – Classification of materials into conductors, semiconductors & insulators.

UNIT – V SEMICONDUCTOR PHYSICS

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion currents – Einstein’s equations - Hall Effect and its applications.

UNIT-VI LASERS AND SUPER CONDUCTIVITY

LASERS: Introduction– Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein’s coefficients – Population inversion - Three level and four level laser pumping schemes - Ruby laser – Helium-Neon laser- Applications of Laser.

SUPERCONDUCTIVITY: General properties – BCS Theory of Superconductivity - Meissner effect – Type-I and Type-II superconductors – Flux quantization –Josephson effects – Applications of Superconductors.

Text Books

- 1 A text book of Engineering Physics by M-N- Avadhanulu& P.G. Kshirasagar(S-Chand publications)
- 2 Engineering Physics by R.K. Gaur and S.L. Gupta.

Reference Books

- 1 Engineering Physics“ by Palanisamy (Scitech Publishers)
- 2 Engineering Physics by Mani Naidu S (Pearson Publications)
- 3 Introduction to solid state physics“ by Charles Kittel (Willey India Pvt-Ltd)
- 4 Applied Physics“ by T.Bhimasenkarlam (BSP BH Publications)
- 5 Applied Physics“ by M. Arumugam (Anuradha Agencies)
- 6 Physics by David Halliday and Robert Resnick – Part I and Part II

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16CS1T01: Fundamentals of Computers and C Programming				

Prerequisites

Basic Mathematical Problems and their Solutions

COURSE OBJECTIVES

- 1) To enable the student to learn about the major components of a computer system.
- 2) To introduce the basic structure of the Algorithm and Flowchart.
- 3) To know the concepts of conditional & loop statements.
- 4) To implement the different user defined and pre-defined functions.
- 5) To know the pointers, structures and unions concept used in various areas.
- 6) To provide practical, hands-on training in C programming.

COURSE OUTCOMES

The student will be proficient in the following:

- 1) Identification and Usage of each part of a computer system.
- 2) The Evolution and Purpose of Programming.
- 3) Mastering in basic programming concepts and logic implementations.
- 4) Knowledge in file I/O operations (i.e. open, close, read, write, seek)
- 5) Ability to identify and implement appropriate Solution for a given Problem.
- 6) Know the terms "Structured Programming", "Algorithm", "Flowchart", "Data Types", "Control Statements", "Arrays", "Functions", "Pointers", "Structures", "Unions", "File I/O" and where they are applicable.

Syllabus

UNIT-I-COMPUTER FUNDAMENTALS

Computer System: definition, block diagram, **Hardware:** components, mother board layout, block diagram of mother board, **Software:** definition, types of software, **Algorithm:** definition, properties of algorithm, algorithms on basic problems, **Flowchart:** definition, symbols used in flow charts, flow charts for basic problems, types of computer Languages, bits, bytes, binary system.

UNIT-II-FUNDAMENTALS OF C LANGUAGE

Character Set, Tokens, Identifiers, Constants, Basic Data Types and Sizes, Arithmetic Operators, Relational Operators, Logical Operators, Conditional Operator, Increment and Decrement Operators, Assignment Operators, Bit-wise Operators, Special Operators, Expressions, Operator Precedence and Order of Evaluation, Evaluation of Expressions, Type Conversions: Implicit and Explicit, Structure of C Program.

UNIT-III-CONTROL STRUCTURES

Selection Statements: Simple if, if-else Statement, Nested if Statement, else-if Ladder, switch Statement.

Iterative Statements: while, do-while and for loops, break and continue statements, goto statement.

ARRAYS

Array definition, declaration, initialization and accessing array elements of 1-D and 2-D arrays.

STRINGS

String definition, declaration, initialization and accessing, string handling functions in **string.h**

UNIT-IV-FUNCTIONS

Introduction to Function, Types of Functions, Return Statement, Declaration, Definition and Calling a Function, Parameter Passing Techniques, Storage Classes, Passing 1-D Array to Functions.

Recursion: Types of recursion, rules of recursion, recursive solutions for factorial of a number, Fibonacci Series and GCD of two numbers.

C Preprocessors: File Inclusion and Macro Substitution.

UNIT-VPOINTERS

Pointer Definition, Declaration, Initialization and Accessing a Pointer, void pointer, null pointer, Pointer Arithmetic, Pointer to Pointer, Dynamic Memory Management Functions.

STRUCTURES AND UNIONS

Definition, Declaration and Initialization of Structures, Accessing Structures, Nested structures, Array of Structures, Pointer to structures Definition, Declaration and Initialization of Unions, difference between structures and unions.

UNIT-VIFILES

Introduction to Files, File I/O functions, File opening modes, sequential and random accessing files, file operations.

Text Books

- | | | |
|--------------------------|-----------------|-----|
| 1. Programming in ANSI C | E. Balagurusamy | TMH |
|--------------------------|-----------------|-----|

Reference Books

- | | | |
|--------------------------------------|----------------------|---------|
| 1. Programming with ANSI and Turbo C | Ashok N. Kamthane | Pearson |
| 2. Let us C | YashwantKanetkar | BPB |
| 3. The C Programming Language | Kernighan & Ritchie | PHI |
| 4. Programming in C | PradipDey&ManasGhosh | Oxford |

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
16BS1T04: Environmental Science				

COURSE OBJECTIVES

The objectives of the course is to impart

1. Overall understanding of the natural resources.
2. Basic understanding of the ecosystem and its diversity.
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. An understanding of the environmental impact of developmental activities.
5. Awareness on the social issues, environmental legislation and global treaties.

COURSE OUTCOMES

After completion of the course student able to understand:

1. The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
5. Social issues both rural and urban environment and the possible means to combat the challenges.
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit.

Syllabus:

UNIT – I

Multidisciplinary nature of Environmental Science: Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion.

UNIT - II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification.

Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT – III

Ecosystem and its conservation: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-IV

Biodiversity and its management: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT –V

Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

Solid Waste Management: Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

UNIT - VI

Social Issues: Population growth and explosion, effects. Water conservation, rain water harvesting. Role of information Technology in Environment and human health. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act - Forest Conservation Act – Motor Vehicle Act - Issues involved in enforcement of environmental legislation.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Field work: visit to an industrial area/ecosystem area (Forest, Grassland, Desert, and Aquatic).

Text Books:

1. Environmental Studies by K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
2. A text book of Environmental Studies by C. P. Kaushik&AnubhaKaushik, New Age International Publishers.

Reference Books:

1. Text Book of Environmental Studies by Deeshita Dave & P. UdayaBhaskar, Cengage Learning.
2. A text book of Environmental Studies by ShaashiChawla, TMH, New Delhi.

B. TECH 1st SEMESTER	L	T	P	C
	-	-	4	2
16BS1L01: English Proficiency Lab				

COURSE DESCRIPTION

Communicating in a language is also a skill. So a student has to look for an opportunity to practice English language in order to acquire proficiency in English. ‘Strengthen your Communication Skills: Part - A’ is designed to provide opportunities for engineering students to revise and consolidate the basic skills in listening, speaking, reading and writing in addition to giving ample practice in various communicative functions and Life skills.

PREREQUISITES

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

COURSE OBJECTIVES

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

COURSE OUTCOMES

a) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

b) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

c) Interactive skills:

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.

- Presenting ideas coherently within a stipulated time.

d) Life Skills and Core Skills:

- Examining self-attributes and identifying areas that require improvement self diagnosis, self-motivation.
- Adopting to a given situation and developing a functional approach to find solutions-adaptability, problem-solving.
- Understanding the importance of helping others-community service, enthusiasm.

Syllabus

WEEK	TOPIC		
			Introduction to syllabus
1	UNIT- 1	Section-A	Greeting, Introducing and taking leave
2	UNIT- 1	Section-B	Pure Vowels
3	UNIT- II	Section-A	Giving Information and Asking for information
4	UNIT- II	Section-B	Diphthongs
5	UNIT- III	Section-A	Inviting, Accepting and Declining Invitations
6	UNIT- III	Section-B	Consonants
7	UNIT- IV	Section-A	Commands, Instructions and Requests
8	UNIT- IV	Section-B	Accent and Rhythm
9	UNIT- V	Section-A	Suggestions and Opinions
10	UNIT- V	Section-B	Intonation
10WEEKS			TOTAL

Text Books:

Strengthen Your Communication Skills: Part – A by Maruthi Publications.

Reference Books:

- 1) INFOTECH English (Maruthi Publications)
- 2) Personality Development and Soft Skills (Oxford University Press, New Delhi)

B. TECH 1st SEMESTER	L	T	P	C
	-	-	4	2
16BS1L03: Engineering Physics Lab				

COURSE OBJECTIVES

1. To Investigate and understand physical behavior in the lab using scientific reasoning and logic and interpret the result of simple experiments and demonstration of physical principles and also evaluate the impact of physical discoveries on how we view the world.
2. Effectively communicate experimental results and solutions to application problems through oral and written reports.
3. Understand the basic concepts, definitions, characteristics and phenomena's.
4. Recognize the classical ideas and physical phenomena and also define and analyze the concepts.

COURSE OUTCOMES

1. An understanding of professional and develop confidence on recent trends
2. Able to gain technical Knowledge of measuring, operating and testing of physics instruments and equipments.
3. Acquire ability to apply knowledge of Physics.
4. Exposed to the real time working environment.
5. Demonstrate the ability to design and analyze Laws and Principles and conduct experiments
6. Ability to work on laboratory and multidisciplinary tasks

List of Experiments

Any Ten Experiments of the Following

A. Mechanics:

1. Determination of the Rigidity Modulus of given material wire using Torsional Pendulum.
2. Determination of the Acceleration due to Gravity and Radius of Gyration using Compound Pendulum.
3. Determination the Frequency of vibration in Transverse and Longitudinal Modes using Melde's Apparatus.
4. Determination Frequency of A.C supply by using Sonometer

B. Optics:

5. Determination of wavelength of Laser using diffraction grating.
6. Determination of Numerical Aperture of an Optical Fiber.
7. Determination of the Planck's constant using Photo-Cell.

C. Electro-Magnetism and Electronics:

8. Study the variation of Magnetic Field along the axis of a solenoid coil using Stewart-Gee's Apparatus.
9. Determination of the Time Constant for a C-R Circuit.
10. Determination of the Band Gap of a Semiconductor using a p-n junction diode.
11. Study of Characteristic curves (I/V) of a Zener diode to determine its Breakdown voltage.
12. Determination of Thermoelectric coefficient of a Thermistor by using its Characteristic curve.

Reference Book:

1. Engineering Physics Lab Manual Prepared by Physics Faculty.

B. TECH 1st SEMESTER	L	T	P	C
	-	-	4	2
16CS1L01: C Programming Lab				

COURSE OBJECTIVES

1. The Objective of this course is to introduce the field of programming using C language.
2. To have fundamental knowledge on basics of computers hardware and number systems.
3. To enhance their analyzing and problem solving skills and use the same for writing programs.
4. To learn and acquire art of computer programming.
5. The nature of C language is emphasized with a wide variety of examples.
6. To write efficient, maintainable, and portable code.

COURSE OUTCOMES

After Completion of the course student are

1. Able to identify different components of computer and their usage.
2. Able to write algorithms and flowcharts for basic problems.
3. Able to know concepts in problem solving.
4. Able to write, compile and debug programs in C language.
5. Able to design programs involving decision structures, loops and functions, pointers.
6. Able to understand the basic terminology used in computer programming.
7. Able to use of different data types in program.
8. Able to write diversified solutions using C language.

EXERCISE-I

- 1) Identify different components of a computer system. Write about them.
- 2) Prepare block diagram of mother board of a PC and describe each component.
- 3) Prepare algorithm for sequence and selection control structures.
- 4) Prepare algorithm for iterative control structure
- 5) Draw flowcharts for control structures (sequence, selection & iterative).

EXERCISE-II

- 1) Demonstrate the structure of C program
- 2) Write a C program to find the size of basic data types in C language.
- 3) Write a C program to find the biggest of three numbers using ternary operator.
- 4) Write a C program to convert decimal number to binary number using bitwise operators.

EXERCISE-III

- 1) Write a C program to find the biggest of three numbers using nested if-else statement.
- 2) Write a C Program to find the roots of a quadratic equation.
- 3) Write a C program to perform arithmetic operations using switch statement.
- 4) Write a C program to calculate the electricity bill using else-if ladder statement.
- 5) Write a C program to find the sum of elements of an integer array.

EXERCISE-IV

- 1) Write a C program to find the smallest and largest elements of an integer array.
- 2) Write a C program to perform matrix addition by checking compatibility.
- 3) Write a C program to perform matrix multiplication by checking compatibility.
- 4) Write a C program to generate the prime numbers up to n.

EXERCISE-IV

- 1) Write a C program to find given number is Armstrong number or not
- 2) Write a C program to find the length of the string without using string functions.
- 3) Write a C program to check the given string is palindrome or not without using string functions.
- 4) Write a C program to perform string operations using string handling functions.

EXERCISE-VI

- 1) Write a C program to find the square of a number using function and macro.
- 2) Write a C program to demonstrate the use of static storage class.
- 3) Write a C program to pass array to function and count the sum of elements in the array.

EXERCISE-VII

- 1) Write C functions to generate Fibonacci series with and without using recursion.
- 2) Write C functions to factorial with and without using recursion.
- 3) Write C functions to GCD of two numbers with and without using recursion.

EXERCISE-VIII

- 1) Write a C program to find address of a variable and a pointer variable.
- 2) Write a C functions to swap two numbers using call by value and call by reference
- 3) Write a C program to print employee details using structures and array of structures.

EXERCISE-IX

- 1) Write a C program to read and write individual characters to a file.
- 2) Write a C program to copy contents of one file to another.
- 3) Write a C program to reverse the contents in a file.
- 4) Write a C program to merge two files into third file.

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
16BS2T01: Proficiency Course in English -II				

COURSE OBJECTIVES

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.

CORUSEOUTCOMES

a) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

b) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, e-mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

c) Interactive skills:

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

d) Grammar in context

- Enable the skills of grammar using in a situation
- Identifying the needs of apt grammar in life related situation
- Promoting discourse with grammar effectively

Syllabus:

S No	Content	Hours
UNIT -I	Inspiring speech One word substitutes Subject- verb agreement Describing objects	8
UNIT -II	Dial 000 Commonly confused words Voice Paragraph writing	8
UNIT-III	My Struggle for Education Collocations Reported speech Letter writing	8
UNIT-IV	A Snake in the grass GRE words Conditional clauses Note making and note taking	8
UNIT-V	Lithuania Idioms Degrees of comparison Resume	8
UNIT-VI	Virtue Phrasal verbs Simple compound and complex sentences Report writing	8
	Total	48

Text Book: Proficiency Course in English -II by Maruti Publications.

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
16MA2T01: Linear Algebra and Vector Calculus				

PREREQUISITES

The two year intermediate course of Mathematics.

COURSE OBJECTIVES

1. To train the students for finding Rank –Echelon form, Normal form, and solution of liner systems – Direct Methods- Gauss Elimination, Gauss Jordan.
2. To train the student effectively how to find Eigen values, Eigen vectors and their properties.
3. To make the student to know the Cayley Hamilton Theorem-Applications: Finding Inverse and powers of a matrix by using Cayley-Hamilton theorem.
4. To evaluate many improper integrals easily by using Beta and Gamma functions.

COURSE OUTCOMES

The students are able to

1. apply the knowledge of matrices for solving linear system of equations
2. find the powers of the matrices by using Cayley Hamilton theorem.
3. apply the knowledge of evaluate improper integrals by using Beta and Gamma functions.
4. apply the knowledge of Vector Differentiation and Vector Integration in finding work done by a force.

Syllabus:

UNIT I: Linear systems of equations

Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination, Jacobi and Gauss Seidel Method.

UNIT II: Eigen values - Eigen vectors

Eigen values - Eigen vectors - Properties (without proof)-Cayley-Hamilton Theorem (without proof) Applications: Finding Inverse and powers of a matrix by using Cayley-Hamilton theorem.

UNIT III: Special functions

Beta and Gamma functions - Properties - Relation between Beta and Gamma functions Application: Evaluation of improper integrals.

UNIT IV: Multiple integrals

Multiple integrals - Double and triple integrals - Change of variables - Change of order of Integration. Application: Applications of Integration to Lengths, Volumes and Surface areas of solids of revolution in Cartesian Coordinates.

UNIT V: Vector Differentiation

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

UNIT VI: Vector Integration

Line integral - work done - Potential function - area - surface and volume integrals.

Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (without proof) and related problems.

Application: Work done by a force

Text Books:

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill.

Reference books:

1. ERWIN KREYSZIG, Advanced engineering Mathematics, 9th Edition, Wiley-India

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
16MA2T02: Numerical Methods and Integral Transforms				

PREREQUISITES

The two year intermediate course of Mathematics.

COURSE OBJECTIVES

1. To give a good training to the student in each topic and method.
2. To get the good results of the student in competitive examinations like GRE, GATE etc., by training in this context.
3. To develop the skills of the student to solve the different mathematical methods efficiently to meet the needs of solving the different mathematical models involving in real world process and engineering.
4. To motivate the student for innovating ideas by learning mathematical methods in the context of the real world applications and the need of the world.
5. To produce the competent engineers and professional, to meet the needs of industries in the context scenario.

COURSE OUTCOMES

Students are able to

1. Solve the algebraic and transcendental equations by different methods and also know the different interpolation formulae to find a polynomial or the value of the polynomial at a given point.
2. Find the quadrature, the solutions of ODEs by different formulae.
3. Solve the problems on Z-transforms and Fourier transforms.
4. Interpret a function as a Fourier series.

SYLLABUS

UNIT-I

Solution of Algebraic and Transcendental Equations: Introduction - Bisection Method - Method of False Position - Iteration Method - Newton Raphson Method.

UNIT-II

Interpolation: Introduction - Finite differences - Forward Differences Backward differences - Central differences - Symbolic relations, Differences of a polynomial - Newton's formulae for interpolation - Lagrange's Interpolation formula for unevenly spaced points.

UNIT-III

Numerical integration and solution 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 method - Euler's Method - Euler's Modified Method - IV order RungeKutta Method.

UNIT-IV

Z-Transform: Introduction - properties - Damping rule - Shifting rule - Initial and final value theorems - Inverse z transform- -Convolution theorem.

Applications: Solution of difference equations by Z-transforms.

UNIT-V

Fourier Series: Introduction- Determination of Fourier coefficients - even and odd functions - change of interval - Half-range sine and cosine series

UNIT – VI

Fourier Transforms: Fourier integral theorem (statement only) - Fourier Transforms, Fourier sine and cosine transforms - properties - inverse transforms - Finite Fourier transforms.

Text Books:

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. **B.V. RAMANA**, Higher Engineering Mathematics, Tata McGraw Hill.

Reference Books:

1. S. S. Sastri (PHI), Introductory Methods of Numerical Analysis 5th Edition.
2. ERWIN KREYSZIG, Advanced Engineering Mathematics, 9th Edition, Wiley-India

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
16BS2T02: Engineering Chemistry				

COURSE OBJECTIVES

1. For prospective engineers knowledge about water used in industries (boilers etc) and for drinking purposes is useful hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.
2. Knowledge of galvanic cells, electrode potentials is necessary for engineers to understand corrosion problem and its control, also this knowledge helps in understanding modern bio-sensors, fuel cells improve them.
3. The problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them.
4. A board understanding of the more important fuels employed on a large scale is necessary for engineer to understand energy – related problems and solve them.
5. Plastics are materials used very widely engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics/elastomers helps in selecting suitable materials for different purpose.
6. With the knowledge available now, future engineers should know at least some of the Engineering materials that are becoming available. Hence some of them are introduced here.

COURSE OUTCOMES

1. Student able to understand how to produce soft water & potable water by various methods.
2. Student can learn about nature and working various electrodes and cells.
3. Student can able to understand how to protect metals from the environment
4. Student can understand the importance of fuels and characteristics and HCV & LCV.
5. Student can understand the properties of polymers & their applications in our day today life.
6. Student can understand the building materials, solar materials and nanomaterials and principles of green chemistry.

Syllabus

UNIT I

WATER TECHNOLOGY

Hard Water – Estimation of Hardness By EDTA Method – **Potable Water**- Sterilization and Disinfection – Boiler Feed Water – **Boiler Troubles** – Priming And Foaming , Scale Formation, Boiler Corrosion, Caustic Embrittlement – **Softening of Water** - By Lime Soda, Zeolite Processes – Ion Exchange Process – Desalination Process by - Reverse Osmosis – Electro Dialysis.

UNIT II

ELECTRO CHEMISTRY

Electro Potential –Determination of single electrode potential –Standard electrode potential - Nernst Equation(problems)–Electro Chemical cell (Galvanic Cell) -**Reference Electrodes**-Standard Hydrogen Electrode, Calomel Electrode Determination of pH and conductivity – Applications (Strong Acid Vs Strong Base) - **Batteries** – Primary Cell: Dry Cell – Secondary Cell: Lead Acid Accumulator, Lithium Ion Battery – **Fuel Cells** – Hydrogen – Oxygen Fuel Cell, Methanol – Oxygen Fuel Cell.

UNIT III

CORROSION

Introduction - **Theories of Corrosion**(i) Dry Corrosion (Pilling Bed worth rule) (ii) Wet Corrosion – Galvanic Series – **Types of Corrosion**: Galvanic Corrosion, Differential Aeration Corrosion, Pitting Corrosion, Stress Corrosion – Factors Influencing Corrosion – Nature of The Metal , Nature of The Environment – **Corrosion Control**: Material Selection & Design –Cathodic Protection- Surface Coatings – Methods of Applications on Metals -Hot Dipping , Electroplating, Electroless Plating – Paints – Their Constituents & Their Function.

UNIT-IV

FUELS

Introduction to Fuels – Classification – **Solid Fuels** Merits & Demerits - Calorific Value – HCV and LCV – Bomb Calorimeter - Problems Based on Calorific Values – Analysis of Coal (Proximate and Ultimate Analysis) – Numerical Problems Based on Analysis – **Liquid Fuels** Merits & Demerits – Petroleum – Refining – Cracking(types) –Petrol – Diesel Knocking – Octane Number, Cetane Number - **Gaseous Fuels** Merits & Demerits – Natural Gas – LPG, CNG.

UNIT-V

POLYMERS SCIENCES & TECHNOLOGY

POLYMERS- introduction – Types of Polymers – Mechanism of Polymerization (Addition and Condensation) – Determination of Molecular weight by weight and number average methods - Individual Polymers (Preparation Properties and uses of PS, PVC and Bakelite) – Biodegradable polymers – Ziegler Natta Catalysis.

PLASTICS – Types – Compounding of Plastics – Moulding (Four Types) - Bullet Proof Plastics – Engineering Applications.

RUBBER & ELASTOMERS: Introduction –Preparation – Vulcanization – Compounding of Rubber – Preparation, Properties Uses of Buna-S, Buna-N and Thiokol-Engineering Applications.

UNIT VI

ENGINEERING MATERIALS, GREEN AND NANO CHEMISTRY

Refractories (Types, Properties Applications) – **Cement**-Hardening and Setting-Deteriorations of cement concrete – **Solar Energy Materials** – Introduction - Advantages and Disadvantages – Construction and Working of Photovoltaic cell – Solar Reflectors - **Carbon Nano tubes** - Preparation (Arc discharge, Laser Ablation, Chemical Vapor Deposition (CVD) methods), Properties & Applications – **Green Chemistry** – Principles -Engineering Applications.

Text Books:

1. N. Y. S. Murthy, V. Anuradha, K RamanaRao” A Text Book of Engineering Chemistry”, Matuthi.
2. K.SeshaMaheswaramma and Mridulachugh (2013) A Text Book of Engineering Chemistry, Pearson Publications.

Reference Books:

1. ShashiChawal “A Text Book of Engineering Chemistry, DhanpatRai Publishing company Ltd.
2. S. S. Dara (2013) Text Book of Engineering Chemistry, S. Chand Technical Series.

B. TECH 2nd SEMESTER	L	T	L	C
	3	-	-	3
16ME2T02: Engineering Mechanics				

COURSE OBJECTIVES

1. To understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies in two and three dimensions.
2. To understand the principle of work and energy, the effect of friction in equilibrium, the kinematics and laws of motions and the dynamic equilibrium.

COURSE OUTCOMES

At the end of the course student able to

1. Analyze the principles of statics of particles to solve engineering problems.
2. Establish various forces and moments acting on rigid bodies.
3. Define properties and theories related to surfaces and solids.
4. Describe the principles of various types of friction.
5. Analyze the principles of dynamics of particles to solve engineering problems.

UNIT– I

CONCURRENT FORCES IN A PLANE: Principles of statics, composition and resolution of forces, Equilibrium of concurrent forces in a plane, Method of projections, Equilibrium of three forces in a plane, Method of moments.

PARALLEL FORCES IN A PLANE: Two parallel forces, General case of parallel forces in a plane, Center of parallel forces

UNIT – II

GENERAL CASE OF FORCES IN A PLANE: Composition of forces in a plane, Equilibrium of forces in a plane

FORCE SYSTEMS IN SPACE: Concurrent forces in space: method of projections, Method of moments, couples in space, Parallel forces in space, General case of forces in space

UNIT – III

FRICTION: Introduction, Angle of Repose, Laws of Friction, and Friction of Bodies moving Up and Down on an Inclined Plane, Wedge Friction, Screw Jack.

UNIT - IV

CENTROID AND CENTER OF GRAVITY: Centroid of simple figures and Centroid of Composite figures. Center of Gravity of simple Bodies and Center of Gravity of Composite Bodies, Pappus Theorem.

MOMENT OF INERTIA: Introduction, Polar Moment of Inertia, Radius of Gyration, Parallel Axis Theorem, Moment of Inertia of Composite Areas, Product of Inertia.

MASS MOMENT OF INERTIA: Introduction, Radius of Gyration, Transfer Formula for Composite Bodies.

UNIT – V

KINETICS: Analysis as a Particle and analysis as a Rigid Body in Translation–Central Force Motion–Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

KINEMATICS: Rectilinear and Curvilinear Motion–Velocity and Acceleration–Motion of Rigid Body – Types and their Analysis in Planar Motion.

UNIT – VI

WORK-ENERGY METHOD:

Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

Text Books:

1. ENGINEERING MECHANICS - S. Timoshenko & D.H. Young, McGraw Hill
2. ENGINEERING MECHANICS - A.K.TAYAL – UMESH Publications
3. ENGINEERING MECHANICS - BASUDEB BHATTACHARYA – Oxford University Press.

Reference Books:

1. ENGINEERING MECHANICS - A. NELSON, McGraw Hill Publications
2. ENGINEERING MECHANICS - Ferdinand L. Singer, Harper Collins Publishers
3. ENGINEERING MECHANICS - S. S. Bhavikatti, New Age Publishers

B. TECH 2nd SEMESTER	L	T	P	C
	1	-	4	3
16ME2T01: Engineering Drawing				

COURSE OBJECTIVE

Engineering drawing is the principle method of communication for engineers. The objective to introduce the students, the techniques of constructing the various types of polygons and curves. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

COURSE OUTCOMES

1. Usage of drawing instruments and construct polygons.
2. Understand the orthographic projections of points, lines and planes in different positions.
3. Understand the orthographic projections of Solids.
4. Convert the Orthographic projections into Isometric and vice versa.

UNIT - I

INTRODUCTION: Engineering Drawing and Plane Curves, Use of Drawing Instruments and Conventions.

GEOMETRICAL CONSTRUCTIONS: Constructions of Polygons using General Method.

CONICS: Construction of Ellipse, Parabola and Hyperbola by Eccentricity Method.

CYCLOIDAL CURVES: Construction of Cycloid, Epi-Cycloid and Hypo-Cycloid.

UNIT - II

PROJECTIONS OF POINTS AND LINES: Introduction to Orthographic Projections - Projection of Points.

PROJECTION OF STRAIGHT LINES: Parallel to both the Planes, Parallel to One Plane and Inclined to Other Plane, Inclined to Both the Planes.

UNIT – III

PROJECTIONS OF PLANES: Introduction to Perpendicular Planes, Perpendicular to both the Reference Planes, Perpendicular to One Plane and Parallel to Other Plane, Perpendicular to One Plane and Inclined to Other Plane, Inclined to Both the Reference Planes.

UNIT – IV

PROJECTIONS OF SOLIDS: Projections of Simple Solids like Prism, Cylinder, Pyramids and Cones. Projections of Solids with Axis Perpendicular to one Plane, Projections of Solids with Axis Parallel to Both the Planes.

UNIT – V

PROJECTIONS OF SOLIDS – AXIS INCLINED TO ONE PLANE: Projections of Solids with Axis inclined to one plane and parallel to other Plane (Axis inclined to the VP and Parallel to the HP, Axis Inclined to the HP and Parallel to the VP).

UNIT – VI

ISOMETRIC PROJECTIONS: Principles of Isometric Projections - Isometric Scale, Isometric Projections of Planes, Simple Solids, Conversion of Isometric to Orthographic Views and Vice Versa.

Text Books:

1. Engineering Drawing by N.D. Bhatt, Charotar Publishers.
2. Engineering Drawing by K.L. Narayana & P. Khannaiah., SCIETECH Publishers.

Reference Books:

1. Engineering Drawing by M.B. Shah & B.C. Rana., Pearson's Publishers.
2. Engineering Drawing by K. Venugopal., NEW AGE Publications.

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	4	2
16BS2L01: English Communication Skills Lab				

COURSE DESCRIPTION

Communicating in a language is also a skill. So a student has to look for an opportunity to practice the language he is learning in order to acquire communication skills. ‘Strengthen your Steps’ is designed to provide opportunities for engineering students to revise and consolidate communication skills in different contexts formal and informal. It prepares the student for facing Interviews, participating in group discussions and making presentations.

PREREQUISITES

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

Syllabus and Lesson Plan

No. of Sessions	Name of the Topic
2	Unit - 6 Body Language
2	Unit - 7 Dialogues
2	Unit - 8 Presentation Skills
2	Unit - 9 Group Discussion
2	Unit - 10 Interviews and Telephonic interviews.
2	Unit - 11 Debates
12	Total

Text Book:

1. Strengthen Your Communication Skills – Maruthi Publications.

Reference Books:

1. Effective technical communication – Ashraf Rizvi.
2. A course in English communication – MadhaviApte.

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	4	2
16BS2L02: Engineering Chemistry Lab				

COURSE OBJECTIVES

1. To Investigate and understand physical behavior in the lab using scientific reasoning and logic and interpret the result of simple experiments and demonstration of chemical principles and also evaluate the impact of chemical discoveries on how we view the world.
2. Effectively communicate experimental results and solutions to application problems through oral and written reports.
3. Understand the basic concepts, definitions, characteristics and phenomena's.
4. Recognize the classical ideas and chemical phenomena and also define and analyze the concepts.

COURSE OUTCOMES

1. An understanding of professional and develop confidence on recent trends
2. Able to gain technical Knowledge of measuring, operating and testing of chemical instruments and equipment's.
3. Acquire ability to apply knowledge of Chemistry.
4. Exposed to the real time working environment.
5. Demonstrate the ability to learn principles, design and conduct experiments
6. Ability to work on laboratory and multidisciplinary tasks

List of Experiments

S. No	TITLE
	Introduction to chemistry lab
1	Estimation of HCl using standard Na ₂ CO ₃
2	Determination of Total hardness of water
3	Estimation of Ferric iron
4	Estimation of KMnO ₄ using standard H ₂ C ₂ O ₄
5	Estimation of Dissolved Oxygen by Wrinkles Method
6	Determination of pH by pH – Meter and universal indicator Method
7	Conductometric titration of Strong acid Vs Weak base
8	Conductometric titration of strong acid Vs Strong base
9	Potentiometric titration of Strong acid Vs Strong base
10	Potentiometric titration of Strong acid Vs Weak base
11	Preparation of Phenol-Formaldehyde Resin
12	Determination of saponification value of oils
13	Determination of Pour and Cloud point of oils

Text Books:

1. Engineering Chemistry Lab Manual Prepared by Chemistry Faculty.

Reference Book:

1. Dr. JyotsnaCherukuis(2012)Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. K. Mukkanti (2009) Practical Engineering Chemistry, B. S. Publication.

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	4	2
16ME2L01: Engineering Workshop Practice				

COURSE OBJECTIVE: To impart hands-on practice on basic Engineering trades and skills.

COURSE OUTCOMES:

1. Model and Develop various basic prototypes in the carpentry trade such as Lap joint, Dovetail joint, Mortise & Tenon joint and Cross-Lap joint.
2. Develop various basic prototypes in the trade of Sheet metal.
3. Understand various basic House Wiring Techniques and Forging Operations.
4. Identify different parts of Computer and its Operating Systems.

NOTE: At least **Two** Exercises to be done from each trade.

TRADE:

I. CARPENTRY:

- CROSS LAP JOINT 2. DOVETAIL JOINT 3. MORTISE and TENNON JOINT

II. FITTING:

1. SQUARE FIT 2. V-FIT 3. HALF ROUND FIT

III. FORGING:

1. ROUND ROD TO SQUARE
2. S-HOOK
3. ROUND ROD TO SQUARE HEADED BOLT

IV. HOUSE WIRING:

1. PARALLEL/SERIES CONNECTION OF THREE BULBS
2. STAIR CASE WIRING
3. FLOURESCENT LAMP FITTING

V. SHEET METAL:

1. SQUARE TRAY 2. HOLLOW CYLINDER 3. OPEN SCOOP

MANUAL:

1. Engineering Work Shop Practice Lab Manual Prepared by Mechanical Faculty.

B. TECH 3rd SEMESTER	L	T	P	C
	3	1	-	4
16CE3T01: Strength of Materials				

COURSE OUTCOMES

Students are able to

1. identify the position and the magnitude of maximum shear force and maximum bending moment a transverse section within a beam under uniformly distributed loads, point loads and their combinations.
2. sketch the variation of shear stresses and identify the position and magnitude of maximum flexural stress across the depth in rectangular, circular sections (Solid and Hollow)
3. determine the torsional moment of resistance and power transmitted by a shaft for a given shear.
4. calculate the effective lengths and Euler bulking loads for the given column when end conditions are held in position, free, either restrained fully or partially.
5. compute the principle stresses and strains under different axial loading conditions & simple shear.
6. illustrate the longitudinal stresses & circumferential stresses & volumetric strains in thin & thick cylinders.

SYLLABUS:

UNIT - I

SIMPLE STRESSES AND STRAINS: Elasticity and plasticity - Types of stresses and strains - Hooke's law - stress - strain diagram for mild steel - Working stress - Factor of safety - Lateral strain, Poisson's ratio and volumetric strain - Elastic moduli.

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 subjected to point loads, u.d.l

UNIT - II

FLEXURAL STRESSES: Theory of simple bending - Assumptions - Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis - Determination bending stresses - section modulus of rectangular and circular sections (Solid and Hollow)

SHEAR STRESSES: Derivation of formula - Shear stress distribution across various beam sections like rectangular, circular sections.

UNIT - III

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

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 - Gordon formula- Long columns subjected to eccentric loading - Secant formula - Empirical formulae - Straight line formula - Prof. Perry's formula.

Laterally loaded struts - subjected to uniformly distributed and concentrated loads - Maximum B.M. and stress due to transverse and lateral loading.

UNIT - V

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

UNIT - VI

THIN AND THICK CYLINDERS: Thin seamless cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and volumetric strains- changes in diameter, and volume of thin cylinders - Thin spherical shells.

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

Text Book:

1. Engineering Mechanics by R.K. Bansal, Laxmi Publications (p) Ltd., New Delhi
2. Strength of Materials by S. S. Bhavakatti.
3. Strength of Materials Vol. I by D.S. Prakasa Rao University Press.

Reference Books:

1. Strength of Materials by S.S. Rattan, Tata McGraw Hill Education Pvt.,Ltd.,
2. Strength of materials by R.K. Rajput, S. Chand & Co, New Delhi.

B. TECH 3rd SEMESTER	L	T	P	C
	3	1	-	4
16CE3T02: Fluid Mechanics				

COURSE OUTCOMES

Students are able to

1. describe the concepts of fluid properties like specific gravity, viscosity, density, surface tension.
2. determine hydrostatic forces on horizontal, vertical, inclined and curved surfaces and types of flows
3. explain Euler's and Bernoulli's equations and force exerted on pipe bend
4. discriminate the characteristics of boundary layer, laminar and turbulent boundary layer
5. estimate about laminar and turbulent flows .
6. measure the flows through venturimeter, orifice meter, rectangular notches, triangular notches, stepped notches .

SYLLABUS:

UNIT I

INTRODUCTION: Dimensions and units - Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

UNIT - II

HYDROSTATICS: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces - Center of pressure. Derivations and problems.

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

UNIT - III

FLUID DYNAMICS: Surface and body forces - Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Navier- Stokes equations (Explanatory) Momentum equation and its application - forces on pipe bend.

UNIT - IV

BOUNDARY LAYER THEORY: Boundary layer - concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers, no deviations BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT - V

LAMINAR FLOW: Reynold's experiment - Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

CLOSED CONDUIT FLOW: Laws of Fluid friction - Darcy's equation, Minor losses - pipes in series - pipes in parallel - Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold's number - Moody's Chart.

UNIT - VI

MEASUREMENT OF FLOW: Pitot tube, Venturi meter and Orifice meter - classification of orifices, small orifice and large orifice, flow over rectangular, triangular and trapezoidal and Stepped notches - Broad crested weirs.

Text Books:

1. Fluid Mechanics by Modi and Seth, TEXT BOOKS house.
2. Introduction to Fluid Machines by S.K. Som & G. Biswas, Tata McGraw Hill Pvt. Ltd.
3. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi

Reference Books:

1. Fluid Mechanics by Merie C. potter and David C. Wiggert, Cengage learning
2. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer, Oxford University Press, New Delhi
3. Fluid Mechanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi.

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
16CE3T03: Surveying				

COURSE OUTCOMES

Students are able to.

1. describe the principles and classification of surveying, Calculate horizontal and angular measurements.
2. identify to use various surveying instruments for Measure distances and bearings.
3. use different methods of surveying to Measure levels and draw contours .
4. demonstrate the various components of Theodolite. Prepare theodolite traversing including closing error and trigonometric levelling .
5. compute various data required for various methods of surveying for setting out of curves.
6. calculate areas of irregular boundaries, volumes of borrow pits, embankments ,capacity of reservoirs .

SYLLABUS:

UNIT - I

INTRODUCTION: definition - Uses of surveying-overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications- Errors in survey measurements.

UNIT - II

DISTANCES AND DIRECTION: Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements (EDM) -principles of electro optical EDM- errors and corrections to linear measurements-compass survey -Meridians, Azimuths and Bearings, declination, computation of angle.

Traversing – Purpose-types of traverse-traverse computation -traverse adjustments -omitted measurements.

UNIT - III

LEVELING AND CONTOURING: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments - method of levelling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

UNIT - IV

THEODOLITE: Theodolite, description, principles - uses and adjustments -temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite - Trigonometrical leveling.

TACHEOMETRIC SURVEYING: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT - V

CURVES: Types of curves, design and setting out - simple and compound curves - transition curves. Introduction to geodetic surveying, Total Station and Global positioning system.

UNIT - VI

COMPUTATION OF AREAS AND VOLUMES: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section

and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Text Books:

1. Surveying (Vol No.1, 2 &3) by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd, New Delhi.
2. Advance Surveying by SatishGopi, R. Sathi Kumar and N. Madhu, Pearson Publications.
3. Text book of Surveying by C. Venkataramaiah, University press, India (P) limited.
4. Surveying and levelling by R. Subramanian, Oxford University press.

Reference Books:

1. Text book of Surveying by S.K. Duggal (Vol No.1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Text book of Surveying by Arora (Vol No. 1&2), Standard Book House, Delhi.
3. Higher Surveying by A.M. Chandra, New Age International Pvt ltd.
4. Fundamentals of surveying by S.K. Roy - PHI learning (P) Ltd.
5. Plane Surveying by Alak de, S. Chand & Company, New Delhi.

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
16CE3T04: Engineering Geology				

COURSE OUTCOMES

Students are able to

1. identify and classify the geological minerals.
2. measure the rock strengths of various rocks.
3. classify and measure the earthquake prone areas to practice the hazard zonation.
4. predict the Landslides and subsidence.
5. analyze the ground conditions through geophysical surveys.
6. investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc...

SYLLABUS:

UNIT-I

INTRODUCTION: Branches of Geology, Importance of Geology in Civil Engineering with case studies.

Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

UNIT-II

MINERALOGY AND PETROLOGY: Definitions of mineral and rock, Different methods of study of mineral and rock, The study of physical properties of minerals and rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite And Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT-III

STRUCTURAL GEOLOGY: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-IV

GROUND WATER:Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes And Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

UNIT-V

GEOPHYSICS: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and

Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT-VI

GEOLOGY OF DAMS, RESERVOIRS AND TUNNELS: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

Text Books:

1. 'Engineering Geology' by SubinoyGangopadhyay, Oxford University press.
2. 'Engineering Geology' by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.3.
3. 'Engineering Geology' by N. ChennKesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.
4. 'Engineering Geology' by VasudevKanithi, University Press.

Reference Books:

1. 'Engineering Geology for Civil Engineers' by P.C. Varghese, PHI learning pvt. Ltd.
2. 'Geology for Engineers and Environmental Society' by Alan E Kehew, person publications, 3rd edition
3. 'Fundamentals of Engineering Geology' by P.G. Bell, B.S.P. Publications, 2012.
4. 'Engineering Geology' by V.Parthesarathi et al., Wiley Publications
5. 'Environmental Geology' by K.S. Valdiya, McGraw Hill Publications, 2nd edition.

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
16BM3T01: Managerial Economics and Financial Analysis				

COURSE OUTCOMES

Students are able to

1. Describe the importance of Managerial Economics and its utility in decision making
2. Understand the meaning and usefulness of production function and cost function in analyzing firm's production activity.
3. Comprehend the concept of Market structure, different types of Markets and pricing policies.
4. Identify different forms of business organizations and analyze their merits and demerits.
5. Evaluate the investment proposals through techniques of capital budgeting and Financial performance of the company through Financial Statements.

SYLLABUS:

UNIT –I: Managerial Economics & Demand Analysis:

Definition - Nature and Scope - Relation with other disciplines - Concept of Demand-Types-Determinants - Law of Demand - Exceptions - Elasticity of Demand - Types and Measurement-Demand forecasting and its Methods.

UNIT –II: Production and Cost Analysis:

Production function - Law of Variable proportions - Isoquants and Isocosts -Law of returns -Economies of Scale - Cost Concepts - Fixed ,Variable Costs ,Explicit Costs , Implicit Costs & Opportunity cost - Cost Volume Profit Analysis - Break Even Point (Simple Problems)

UNIT -III: Market Structures & Pricing Policies:

Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly – Features – Price & Output Determination - Pricing Methods

UNIT -IV: Forms of Organizations & Business Cycles:

Business Organization- Sole Trader – Partnership - Joint Stock company - State/Public Enterprises and their forms - Business Cycles: Meaning and Features - Phases of Business Cycle.

UNIT - V: Introduction to Accounting:

Definition- Branches-Systems of Accounting-Single Entry- Double Entry System – Journal- Ledger-Trail Balance-Final Accounts (Simple problems).

UNIT - VI: Capital and Capital Budgeting:

Concept of Capital – Types -Sources of Capital-Long Term Sources-Equity, Preference and Debt Capital - Concept of Capital Budgeting-Cash Flow Estimation-Techniques of Capital Budgeting-Traditional and Modern Methods (Simple problems).

Text Books:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. T.V.Ramana& B. Kuberudu: Managerial Economics and Financial Analysis, Himalaya Publishing

3. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

Reference Books:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.
5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.
6. Domnick Salvatore: Managerial Economics In a Global Economy, 4th Edition, Thomson.
7. Narayanaswamy: Financial Accounting A Managerial Perspective, PHI.
8. Raghunatha Reddy & Narasimhachary: Managerial Economics & Financial Analysis, Scitech.
9. S.N. Maheswari & S.K. Maheswari, Financial Accounting, Vikas.

B. TECH 3rd SEMESTER	L	T	P	C
	-	-	4	2
16CE3L01: Strength of Materials Lab				

COURSE OUTCOMES

Students are able to

1. calculate Young Modulus, torsional strength, hardness and tensile strength of given specimens
2. determine the compressive strength of concrete cubes and bricks
3. estimate stiffness of open coiled and closed coiled springs.
4. evaluate the impact strength of the given specimen.
5. examine the bending moment of the given material (Steel / Wood) of Cantilever beam & simply supported beam.

SYLLABUS:

LIST OF EXPERIMENTS

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

LIST OF MAJOR EQUIPMENT

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.

B. TECH 3rd SEMESTER	L	T	P	C
	-	-	4	2
16CE3L02: Surveying Lab-I				

COURSE OUTCOMES

Students are able to

1. use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling.
2. apply the procedures involved in field work and to work as a surveying team.
3. demonstrate and Plan a survey appropriately with the skill to understand the surroundings.
4. select accurate measurements, field booking, plotting and adjustment of errors can be understood.
5. prepare and Plot traverses / sides of building and determine the location of points present on field on a piece of paper.

SYLLABUS:

LIST OF EXPERIMENTS

1. Survey by chain survey of road profile with offsets in case of road
2. Survey in an area by chain survey (Closed circuit).
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse).
5. Plane table survey: finding the area of a given boundary by the method of Radiation.
6. Plane table survey: finding the area of a given boundary by method of intersection.
7. Two Point Problem by the plane table survey.
8. Fly levelling: Height of the instrument method. (differentiallevelling).
9. Fly levelling: rise and fall method.
10. Fly levelling: closed circuit/ open circuit.
11. Fly levelling: Longitudinal Section and Cross sections of a given road profile.

Reference Book:

1. IS 2720 - relevant parts.

B. TECH 3rd SEMESTER	L	T	P	C
	-	-	4	2
16CE3L03: Engineering Geology Lab				

COURSE OUTCOMES

Students are able to

1. identify Mega - scopic minerals & their properties.
2. identify Mega - scopic rocks & their properties.
3. identify the site parameters such as contour, slope & aspect for topography.
4. know the occurrence of materials using the strike & dip problems.

SYLLABUS:

LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of
 - a. Rock forming minerals - Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc...
 - b. Ore forming minerals - Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc...
2. Megascopic description and identification of rocks.
 - a. Igneous rocks - Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc...
 - b. Sedimentary rocks - Sand stone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc...
 - c. Metamorphic rocks - Biotite- Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc...
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work - To identify Minerals, Rocks, and Geomorphology & Structural Geology.

Reference Books:

1. 'Applied Engineering Geology Practicals' by M T MautheshaReddy, New Age International Publishers, 2nd Edition.
2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.

B. TECH 4th SEMESTER	L	T	P	C
	3	1	-	4
16CE4T01: Hydraulics and Hydraulic Machinery				

COURSE OUTCOMES

Students are able to

- 1: determine the most economical dimensions of different channel sections.
- 2: classify different types surface profiles in open channel flow.
- 3: formulate an equation for a phenomenon using dimensional Analysis.
- 4: compute the jet forces on different plates issued for estimation of efficiency and work done of different type's of blades.
- 5: analyze and select a suitable type of Turbine.
- 6: design and select a suitable type of Pump.

SYLLABUS:

UNIT - I

OPEN CHANNEL FLOW: Types of flows - Type of channels - Velocity distribution - Energy and momentum correction factors - Chezy's, Manning's; and Bazin formulae for uniform flow- Most Economical sections. Critical flow: Specific energy - critical depth - computation of critical depth - critical sub - critical and super critical flows.

UNIT - II

OPEN CHANNEL FLOW II: Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes - surface profiles - direct step method - Rapidly varied flow, hydraulic jump, energy dissipation. Proportionality, sensitivity and flexibility.

UNIT - III

HYDRAULIC SIMILITUDE: Dimensional analysis - Rayleigh's method and Buckingham's pi theorem - study of Hydraulic models - Geometric, kinematic and dynamic similarities-dimensionless numbers - model and prototype relations.

UNIT-IV

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency - Angular momentum principle, Applications to radial flow turbines. Layout of a typical Hydropower installation - Heads and efficiencies - classification of turbines.

UNIT - V

HYDRAULIC TURBINES-I: Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube - theory and function efficiency.

HYDRAULIC TURBINES - II: Governing of turbines - surge tanks - unit and specific turbines -unit speed - unit quantity - unit power - specific speed performance characteristics - geometric similarity - cavitation.

UNIT - VI

CENTRAIFUGAL - PUMPS: Pump installation details – classification - work done - Manometric head - minimum starting speed - losses and efficiencies specific speed, multistage pumps - pumps in parallel -

performance of pumps characteristic curves - NPSH- Cavitation.

RECIPROCATING PUMPS: Introduction, classification of reciprocating pumps, main components of reciprocating pumps, working of a reciprocating pumps, discharge through pumps, indicator diagram, work done by reciprocating pumps, slip of reciprocating pumps.

Text Books:

1. Open Channel flow by K. Subramanya, Tata McGraw Hill Publishers.
2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal- Laxmi Publications (P) Ltd., New Delhi.
3. Fluid Mechanics by Modi and Seth, TEXT BOOKS house.

Reference Books:

1. Fluid mechanics and fluid machines by Rajput, S. Chand & Co.
2. Hydraulic Machines by Banga& Sharma Khanna Publishers.
3. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria& Sons.

B. TECH 4th SEMESTER	L	T	P	C
	3	1	-	4
16CE4T02: Structural Analysis-I				

COURSE OUTCOMES

Students are able to

1. analyze Propped Cantilever under different loading and support conditions.
2. determine the S.F.D & B.M.D of Fixed Beams under different loading conditions.
3. deduce Continuous Beams under different loading and support conditions by Clapeyron's theorem of three moments .
4. evaluate the continuous beam using slope deflection method.
5. apply Energy theorem in strain energy in linear elastic system & castigliano's first theorem.
6. explain about the moving loads under different loading conditions & influence lines of S.F & B.M under different loading conditions.

SYLLABUS:

UNIT - I

PROPPED CANTILEVERS: Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

UNIT - II

FIXED BEAMS: Introduction to statically indeterminate beams with U. D. load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and Bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT - III

CONTINUOUS BEAMS: Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT-IV

SLOPE-DEFLECTION METHOD: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT - V

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

UNIT - VI

MOVING LOADS AND INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a sections, ingle point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

Text Books:

1. Structural Analysis by V.D. Prasad Galgotia publications, 2nd Editions.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

Reference Books:

1. Theory of Structures by Gupta, Pandit& Gupta; Tata McGraw Hill, New Delhi.
2. Theory of Structures by R.S. Khurmi, S. Chand Publishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
16CE4T03: Concrete Technology				

COURSE OUTCOMES

Students are able to

1. identify the characteristics of basic ingredients and properties of concrete
2. Distinguish the properties of fresh and hardened concrete
3. Assess the quality of hardened concrete
4. Select various admixtures of concrete
5. discriminate Concepts Proportioning of concrete mixes by various methods -BIS method of mix design.
6. Justify the significance of special concretes

SYLLABUS:

UNIT-I

INGREDIENTS OF CONCRETE CEMENTS & ADMIXTURES: Portland cement - Chemical composition - Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement - Test for physical properties - Different grades of cements - Admixtures-Mineral and chemical admixtures - accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.

AGGREGATES: Classification of aggregate - Particle shape & texture - Bond, strength & other mechanical properties of aggregates - Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate -Bulking of sand -Deleterious substance in aggregate - Soundness of aggregate - Alkali aggregate reaction - Thermal properties - Sieve analysis - Fineness modulus - Grading curves - Grading of fine & coarse Aggregates -Gap graded and well graded aggregate as per relevant IS code - Maximum aggregate size. Quality of mixing water

UNIT - II

FRESH CONCRETE: Steps in Manufacture of Concrete-proportion, mixing, placing, compaction, finishing, curing - including various types in each stage. Properties of fresh concrete-Workability - Factors affecting workability - Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability - Segregation & bleeding - Mixing and vibration of concrete, Ready mixed concrete, Shotcrete.

UNIT - III

HARDENED CONCRETE: Water / Cement ratio - Abram's Law -Gelspae ratio - Nature of strength of concrete -Maturity concept - Strength in tension & compression - Factors affecting strength - Relation between compression & tensile strength - Curing, Testing of Hardened Concrete:Compression tests - Tension tests - Factors affecting strength -Flexure tests -Splitting tests - Non-destructive testing methods - codalprovisions for NDT.

UNIT - IV

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

UNIT - VI

SPECIAL CONCRETES: Ready mixed concrete, Shotcrete -Light weight aggregate concrete - Cellular concrete -No-fines concrete, High density concrete, Fibre reinforced concrete - Different types of fibres- Factors affecting properties of F.R.C, Polymer concrete - Types of Polymer concrete - Properties of polymer concrete, High performance concrete-Self consolidating concrete, SIFCON, self healing concrete.

Text Books:

1. Concrete Technology by M.S.Shetty. - S.Chand& Co. 2004.
2. Concrete Technology by M.L. Gambhir. - Tata Mc. Graw Hill Publishers, New Delhi.

Reference Books:

1. Properties of Concrete by A.M.Neville - PEARSON - 4th edition.
2. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
16CE4T04: Building Planning and Drawing				

COURSE OUTCOMES

Students are able to

1. distinguish the different income groups in India and their housing requirements
2. apply the concept of climatology for housing layouts and principles of planning
3. plan the individual rooms with reference to functional and furniture requirements.\
4. prepare different sign conventions and bonds
5. develop the skills of Drawing Plans, Sections and Elevations of different houses.
6. design and draw various rooms with the given data

SYLLABUS:

UNIT-I

BUILDING BYELAWS AND REGULATIONS: Introduction - terminology - objectives of building byelaws - floor area ratio - floor space index - principles under laying building bye laws - classification of buildings - open space requirements - built up area limitations- height of buildings- wall thickness - lightening and ventilation requirements.

UNIT -II

RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings - requirements of different rooms and their grouping- characteristics of various types residential buildings.

UNIT -III

PUBLIC BUILDINGS: Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.

UNIT-IV

SIGN CONVENTIONS AND BONDS : Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles.

English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT- V

DOORS, WINDOWS, VENTILATORS AND ROOFS: Panelled door, panelled and glassed door, glassed windows, paneled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs. King Post truss, Queen Post truss Sloped and flat roof buildings: drawing plans, Elevations and Cross Sections of given sloped roof buildings.

UNIT-VI

PLANNING AND DESIGNING OF BUILDINGS: Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram.

Text Books:

1. Planning and Design of buildings by Y.S. Sane
2. Planning, designing and scheduling by Gurucharan Singh and Jagadish Singh
3. Building planning and drawing by M. Chakravarthi.
4. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur,

Reference Book:

1. Building drawing by Shah and Kale

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
16CE4T05: Building Materials and Construction				

COURSE OUTCOMES

Students are able to

1. reproduce knowledge towards civil engineering materials used in construction.
2. describe about stones, bricks, tiles and their importance in building construction.
3. explain about brick and stone masonry in building construction.
4. interpret on lime, cement, wood and their importance in construction field.
5. prepare building components and various finishing's in building construction.
6. define coarse and fine aggregates.

SYLLABUS:

UNIT- I

STONES, BRICKS AND TILES : Properties of building stones - relation to their structural requirements, classification of stones - stone quarrying - precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials - their quality.

UNIT-II

MASONRY: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls.

WOOD: Structure – Properties - Seasoning of timber - Classification of various types of woods used in buildings - Defects in timber. Alternative materials for wood - Galvanized Iron, Fiver - Reinforced Plastics, Steel, Aluminium.

UNIT-III

LIME AND CEMENT: Lime: Various ingredients of lime - Constituents of lime stone -classification of lime - various methods of manufacture of lime. **Cement:** Portland cement- Chemical Composition - Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance - various tests for concrete.

UNIT -IV

BUILDING COMPONENTS: Lintels, arches, vaults, stair cases - types. Different types of floors - Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs - King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNIT-V

FINISHINGS: Damp Proofing and water proofing materials and uses - Plastering Pointing, white washing and distempering - Paints: Constituents of a paint 7 Types of paints - Painting of new/old wood- Varnish. Form Works and Scaffoldings.

UNIT-VI

AGGREGATES: Classification of aggregate - Coarse and fine aggregates - particle shape and texture - Bond and Strength of aggregate - Specific gravity - Bulk Density, porosity and absorption - Moisture content of Aggregate - Bulking of sand - Sieve analysis.

Text Books:

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

Reference Books:

1. Building Materials by S.K.Duggal, New Age International Publications.
2. Building Materials by P.C.Verghese, PHI learning (P) ltd.
3. Building Materials by M.L.Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction by P.C.Verghese, PHI Learning (P) Ltd.

B. TECH 4th SEMESTER	L	T	P	C
	-	-	4	2
16ME4L04: Fluid Mechanics and Hydraulic Machinery Lab				

COURSE OUTCOMES

Students are able to

1. determine coefficient of discharge of venturimeter and orifice meter
2. calculate friction factor and sudden contraction of given pipeline
3. evaluate impact of jet on vanes
4. test the efficiency of centrifugal pump, multi stage centrifugal pump ,reciprocating pump
5. evaluate the efficiency of pelton wheel ,francis turbine

LIST OF EXPERIMENTS

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

LIST OF EQUIPMENT

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

B. TECH 4th SEMESTER	L	T	P	C
	-	-	4	2
16CE4L01: Concrete Technology Lab				

COURSE OUTCOMES

Students are able to

1. describe the consistency and fineness of cement.
2. identify the setting times of cement.
3. estimate the specific gravity and soundness of cement.
4. discover the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
5. experiment the flakiness and elongation index of aggregates.
6. calculate the bulking of sand.

SYLLABUS:

LIST OF EXPERIMENTS

At least 10 experiments must be conducted (at least one for each property)

1. Determination of normal Consistency and fineness of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of specific gravity and soundness of cement.
4. Determination of compressive strength of cement.
5. Determination of grading and fineness modulus of coarse aggregate by sieve analysis.
6. Determination of specific gravity of coarse aggregate.
7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
8. Determination of bulking of sand.
9. Determination of workability of concrete by compaction factor method.
10. Determination of workability of concrete by slump test.
11. Determination of workability of concrete by Vee-bee test.
12. Determination of compressive strength of cement concrete and its young's modulus.
13. Determination of split tensile strength of concrete.
14. Non-Destructive testing on concrete (for demonstration).

LIST OF EQUIPMENT

1. Standard set of sieves for coarse aggregate and fine aggregate
2. Vicat's apparatus
3. Specific gravity bottle.
4. Lechatlier's apparatus.
5. Slump Test Apparatus.
6. Compaction Factor Test Apparatus.
7. Vee- Bee test apparatus
8. Longitudinal compressor meter
9. Universal testing Machine (UTM)/Compression Testing Machine (CTM).
10. Rebound hammer, Ultrasonic pulse velocity machine, micro cover meter etc

B. TECH 4th SEMESTER	L	T	P	C
	-	-	4	2
16CE4L02: Surveying Lab II				

COURSE OUTCOMES

Students are able to

1. use the theodolite along with chain/tape, compass on the field.
2. apply geometric and trigonometric principles of basic surveying calculations.
3. plan a survey, taking accurate measurements, field booking, plotting and adjustment of errors.
4. describe field procedures in basic types of surveys, as part of a surveying team.
5. generalize the field procedures using total station.

SYLLABUS:

List of Experiments

1. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
2. Theodolite Survey: Finding the distance between two inaccessible points.
3. Theodolite Survey: Finding the height of far object.
4. Tacheomatic survey: Heights and distance problems using tacheomatic principles.
5. One Exercise on Curve setting.
6. One Exercise on contours.
7. Total Station: Introduction to total station and practicing setting up, levelling up and elimination of parallax error.
8. Total Station: Determination of area using total station.
9. Total Station: Traversing
10. Total Station: Contouring
11. Total Station: Determination of Remote height.
12. Total Station: distance between two inaccessible points.

Note: Any 10 field work assignments must be completed.

B. TECH 5th SEMESTER	L	T	P	C
	3	1	-	4
16CE5T01 : GEOTECHNICAL ENGINEERING				

Course Outcomes:

Students are able to

1. explain various quantities related to soil mechanics and establish their inter-relationships.
2. develop different methods of index properties of the soils and classify the soils.
3. compute different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
4. relate stress distribution in soils in day-to-day civil engineering practice.
5. estimate compressibility of soils,
6. develop stress-strain behavior of different sands.

SYLLABUS:

UNIT - I

Introduction: Soil formation- soil structure and clay mineralogy -Adsorbed water – Mass-volume relationship - Grain size analysis - Sieve and Hydrometer methods -consistency limits and indices.

UNIT - II

Index Properties of Soils: Various Types of soil Classifications - Unified soil classification and I.S. Soil classification-Relative density - Mechanism of compaction - factors affecting - effects of compaction on soil properties -compaction control.

UNIT -III

Permeability: Soil water - capillary rise - One dimensioned flow of water through soils - Darcy's law-permeability - Factors affecting -laboratory determination of coefficient of permeability -Permeability of layered systems. Total, neutral and effective stresses -quick sand condition - 2-D flow and Laplace's equation - Seepage through soils -Flow nets: Characteristics and Uses.

UNIT - IV

Stress Distribution In Soils: Stresses induced by applied loads -Boussinesq's and Westergaard's theories for point loads and areas of different shapes- Newmark's influence chart - 2:1 stress distribution method.

UNIT - V

Consolidation: Compressibility of soils - $e-\sigma$ and $e-\log \sigma$ curves - Stress history - Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation - Determination of coefficient of consolidation (C_v) - Over consolidated and normally consolidated clays.

UNIT - VI

Shear Strength of Soils: Basic mechanism of shear strength - Mohr -Coulomb Failure theories - Stress-Strain behavior of Sands - Critical Void Ratio - Stress-Strain behavior of clays - Shear Strength determination-various drainage conditions.

TEXT BOOKS:

1. 'Basic and Applied Soil Mechanics' by Gopal Ranjan and A.S.R.Rao, New Age International Publishers.
2. "Soil mechanics" by R.F.Craig, Seventh edition, spon press, Talyor & Francis Group, London
3. "Principles of Soil Mechanics" by R F Scott. , Addison-Wesley. 1963.
4. "Principles of Geotechnical Engineering" by Braja M. Das and Khaled Sobhan-Eight edition, Cengage Learning-USA

REFERENCES:

1. 'Fundamentals of Soil Mechanics' by D.W.Taylor., Wiley.
2. 'An introduction to Geotechnical Engineering' by Holtz and Kovacs; Prentice Hall.
3. 'Soil Mechanics and Foundations' by B.C.Punmia.

B. TECH 5th SEMESTER	L	T	P	C
	3	1	-	4
16CE5T02 : DESIGN & DRAWING OF REINFORCED CONCRETE STRUCTURES				

Course Outcomes:

Students are able to

1. define & Work on different types of design philosophies. K1
2. analysis and design of flexural members and detailing. K4
3. Design structures subjected to shear, bond and torsion. K6
4. compute different type of compression members. K3
5. identify & Familiarize students with different types of footings and their design. K1
6. generalize & Equip student with concepts of design of different types of slabs. K2

SYLLABUS:

UNIT -I

Introduction: Working stress method Design codes and handbooks, loading standards - Dead, live, wind and earthquake loads, elastic theory, design constants, modular ratio, neutral axis depth and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly and doubly reinforced beams.

Limit State Design: Concepts of limit state design - Basic statistical principles -Characteristic loads - Characteristic strength - Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design - stress - block parameters - limiting moment of Resistance.

UNIT -II

Design for Flexure: Limit state analysis and design of singly reinforced sections-effective depth- Moment of Resistance- Doubly reinforced and flanged (T and L) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel-Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T&L)- Effective width of flange -Behavior- Analysis and Design.

UNIT - III

Design for Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion - concept of bond, anchorage and development length, I.S. Code provisions. Design examples in simply supported and continuous beams, detailing.

Limit state design for service ability: Deflection, cracking and code provision.

UNIT - IV

Design of Compression members: Effective length of a column, Design of short and long columns- under axial loads, uniaxial bending and biaxial bending - Braced and un-braced columns - I S Code provisions.

UNIT -V

Footings: Different types of footings-Design of isolated and combined footings-rectangular and circular footings subjected to axial loads, uni-axial and bi-axial bending moments.

UNIT - VI

Slabs: Classification of slabs, design of one - way slabs, two - way slabs, and continuous slabs using IS Coefficients (conventional), design of waist-slab staircase.

NOTE: All the designs to taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement detailing of T-beams, L-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
4. Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:

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

REFERENCES:

1. 'Design of concrete structures' by Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata McGrawHill, 3rd Edition, 2005.
2. 'Reinforced Concrete Structures' by Park and Pauley, John Wiley and Sons.

IS Codes:

- 1) IS -456-2000 (Permitted to use in examination hall)
- 2) IS - 875
- 3) SP-16

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16CE5T03: STRUCTURAL ANALYSIS – II				

Course Outcomes:

Students are able to

1. differentiate determinate and indeterminate structures.
2. determine the horizontal thrust, bending moment, normal thrust, radial shear.
3. analyze structures using moment distribution.
4. develop the analysis of frames by Kani's method.
5. evaluate lateral load analysis of structures.
6. discriminate cable and suspension bridge structures.

SYLLABUS:

UNIT I

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT-II

Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature

UNIT – III

Moment Distribution Method: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycles.

UNIT – IV

Kani's Method: Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway.

UNIT – V

Lateral Load Analysis Using Approximate Methods: Application to building frames. (i) Portal method (ii) Cantilever method.

UNIT – VI

Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

TEXT BOOKS:

1. 'Structural Analysis' by T.S.Thandayamoorthy, Oxford universitypress, India.
2. "Structural analysis" by Devdas menon (2008)-Narosa Publishing House.
3. 'Structural Analysis' by R.C. Hibbeler, Pearson Education, India
4. 'Theory of Structures – II' by B.C.Punmia, Jain & Jain, Laxmi Publications, India.

5. 'Structural Analysis' by C.S. Reddy, Tata Mc-Graw hill, New Delhi.

REFERENCES:

1. 'Intermediate Structural Analysis' by C. K. Wang, Tata McGraw Hill, India.
2. 'Theory of structures' by Ramamuratam, Dhanpatrai Publications.
3. 'Analysis of structures' by Vazrani & Ratwani – Khanna Publications.
4. 'Comprehensive Structural Analysis-Vol.I&2' by Dr. R. Vaidyanathan & Dr. P. Perumal- Laxmi Publications Pvt. Ltd., New Delhi.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16CE5T04: TRANSPORTATION ENGINEERING				

Course Outcomes:

Students are able to

1. plan highway network for a given area.
2. determine Highway alignment and design highway geometrics.
3. illustrate Intersections and prepare traffic management plans.
4. Judge suitability of pavement materials
5. deduce flexible and rigid pavements.
6. construct and maintain highways.

SYLLABUS:

UNIT-I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans - First, second, third road development plans, road development vision 2021, Rural Road Development Plan - Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys - Drawings and Reports.

UNIT - II

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

UNIT - III

Traffic Engineering: Parameters of Traffic- Volume, Speed and Density- Traffic Volume Studies; Speed studies - spot speed and speed & delay studies; Parking Studies; Road Accidents- Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways - Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections - Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals - Webster Method - IRC Method.

UNIT - IV

Highway Materials: Subgrade soil: classification - Group Index - Subgrade soil strength - California Bearing Ratio - Modulus of Subgrade Reaction. Stone aggregates: Desirable properties - Tests for Road Aggregates - Bituminous Materials: Types - Desirable properties - Tests on Bitumen - Bituminous paving mixes: Requirements - Marshall Method of Mix Design.

UNIT – V

Design Of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors.

Flexible Pavements: Design factors-Flexible Pavement Design Methods-CBR method-IRC method - Burmister method - Mechanistic method -IRC Method for Low volume Flexible pavements.

Rigid Pavements: Design Considerations - wheel load stresses - Temperature stresses - Frictional stresses - Combination of stresses - Design of slabs - Design of Joints - IRC method - Rigid pavements for low volume roads - Continuously Reinforced Cement Concrete Pavements - Roller Compacted Concrete Pavements.

UNIT - VI

Highway Construction and Maintenance: Types of Highway Construction - Earthwork; Construction of Earth Roads, Gravel Roads, Water Bound Macadam Roads, Bituminous Pavements and Construction of Cement Concrete Pavements. Pavement Failures, Maintenance of Highways, pavement evaluation, strengthening of existing pavements.

TEXT BOOKS:

1. 'Highway Engineering 'by Khanna S.K., Justo C.E.G and Veeraragavan A, Nem Chand Bros, Roorkee.
2. 'Traffic Engineering and Transportation' Planning by Kadiyali L.R, Khanna Publishers, New Delhi.
3. 'Highway Engineering' by Srinivasa Kumar R, Universities Press,Hyderabad.

REFERENCES:

1. 'Transportation Engineering and Planning' by Papacostas C.S. and PD Prevedouros, Prentice Hall of India Pvt. Ltd; New Delhi.
2. 'Principles of Highway Engineering' by Kadiyali LR, Khanna Publishers, New Delhi.
3. 'Transportation Engineering - An Introduction' byJotin Khisty C,Prentice Hall, Englewood Cliffs, New Jersey.
4. 'Highway Engineering' by Paul H. Wright and Karen K Dixon, Wiley Student Edition, Wiley India (P) Ltd., New Delhi.
5. 'Principles of Transportation Engineering' by Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi
6. 'Practice and Design of Highway Engineering' by Sharma SK, Principles, S.Chand & Company Private Limited, New Delhi.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16CE5E01: WATER SUPPLY ENGINEERING				

ELECTIVE-I

Course Outcomes:

Students are able to

1. design the water and distribution networks and sewerage systems.
2. identify the water source and select proper intake structure.
3. explain about characterization of water.
4. select the appropriate appurtenances in the water supply.
5. trace suitable treatment flow for raw water treatments.
6. layouts of distribution networks.

SYLLABUS:

UNIT-I

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities.

Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting.

UNIT-II

Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs.

Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, lying of pipe lines.

UNIT-III

Quality and Analysis of Water: Characteristics of water-Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality-I.S. Drinking water quality standards and WHO guidelines for drinking water.

UNIT-IV

Treatment of Water: Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration.

UNIT-V

Disinfection: Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odors - Iron and manganese removal –Adsorption-fluoridation and defluoridation–aeration– Reverse Osmosis-Iron exchange–Ultra filtration.

UNIT–VI

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods -Components of Distribution system: valves such as sluice valves, air valves, scour valves and check valves, hydrants, and water meters–Laying and testing of pipe lines- selection of pipe materials, pipe joints.

TEXT BOOKS

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.
2. Elements of Environmental Engineering – K.N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.

REFERENCES

1. Water Supply Engineering – Dr. P.N. Modi
2. Water Supply Engineering – B.C. Punmia
3. Water Supply and Sanitary Engineering – G.S.Birdie and J.S. Birdie
4. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16CE5E02: Architecture and Town planning				

ELECTIVE-I

Course Outcomes:

Students are able to

1. illustrate architectural styles of eastern and western world.
2. evaluate principles of designing ,composition of plan, principles of composition
3. explain the importance of orders of architecture.
4. discriminate the spaces of buildings using design concepts, planning principles.
5. analyze modern town planning ,standards of town planning
6. write the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities.

SYLLABUS:

UNIT – I

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

UNIT – II

Architectural Design: Principles of designing – Composition of Plan – relationship between plan and elevation- building elements, form, surface texture, mass, line, color, tone- Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character, expression.

UNIT - III

Principles of Planning: Principles of planning a residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors. Post-classic Architecture: Introduction of post-classic architecture contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wrigt, Walter Groping.

UNIT – IV

Historical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa- Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT – V

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning- Neighborhood Planning.

Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation planning regulations and limitations.

UNIT – VI

Land Scaping and Expansion of Towns: Land scaping for the towns, horizontal and vertical expansion of towns- garden cities, satellite towns floating towns- sky scrapers-pyramidal cities.

TEXTBOOKS:

1. 'The great ages of World Architecture' by G.K. Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture' by Y. S. Sane.
3. 'Professional Practice' by G.K.Krishnamurthy, S.V.Ravindra, PHI Learning, New Delhi.
4. 'Indian Architecture – Vol. I & II' by Percy Brown, Taraporevala Publications, Bombay.
5. 'Fundamentals of Town Planning' by G.K. Haraskar.

REFERENCES:

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

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16CE5E03: ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT				

ELECTIVE-I

Course Outcomes:

Students are able to

1. prepare EMP, EIS, and EIA reports.
2. identify the risks and impacts of a project.
3. select of an appropriate EIA methodology.
4. evaluate the EIA report.
5. estimate the cost benefit ratio of a project.
6. develop the role of stakeholder and public hearing in the preparation of EIA.

SYLLABUS:

UNIT – I

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters – role of stakeholders in the EIA preparation –stages in EIA.

UNIT – II

E I 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 - EIS and EMP.

UNIT-III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT – V

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of deforestation.

Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment.

UNIT-VI

EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000. Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.

REFERENCES:

1. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke–Prentice Hall Publishers.
2. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K. Katania & Sons Publication, New Delhi.
3. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd., Delhi.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16CE5E04: Finite Element Methods in Civil Engineering				

ELECTIVE-I

Course Outcomes:

Students are able to

1. describe the review of stiffness method & Rayleigh-Ritz method of functional approximation.
2. solve simple boundary value problems using Numerical technique of Finite element method.
3. develop finite element formulation of one and two dimensional problems and solve them.
4. produce Stiffness matrices, Apply boundary conditions and solve for the displacements.
5. compute Stresses and Strains and interpret the result.
6. prepare Iso-parametric formulation element , shape functions , stiffness matrix & nodal load vector etc.,

SYLLABUS:

UNIT-I

Introduction: Review of stiffness method- Principle of Stationary potential energy-Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation.

UNIT-II

Principles of Elasticity- Equilibrium Equations- Strain Displacement relationships-Constitutive relationship for plane stress, plane strain and axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT-III

Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix -Selection of approximate displacement functions- solution of a plane truss- transformation matrix- Galerkin's method for 1-D truss - Computation of stress in a truss element.

UNIT-IV

Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix- Examples on Analysis of beams Subjected to Concentrated and Distributed loading.

UNIT-V

Finite element formulation for plane stress and plane strain problems Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces.

UNIT-VI

Iso-parametric Formulation: An iso-parametric bar element- plane bilinear isoparametric element- quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature for performing numerical integrations.

TEXT BOOKS:

1. 'A first course in the Finite Element Method by Daryl L. Logan Thomson Publications.

2. 'Introduction to Finite Elements in Engineering' by Tirupati R.Chandrupatla, Ashok D. Belgundu, PHI publications.
3. 'Introduction to Finite Element Method' by Desai & Abel CBS Publications.

REFERENCES:

1. 'Concepts and applications of Finite Element Analysis by Robert D.Cook, Michael E Plesha, John Wiley & sons Publications.
2. 'Text book of Finite Element Analysis by P. Seshu, Prentice Hall of India.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
16CE5E05: ADVANCED SURVEYING				

ELECTIVE-I

Course Outcomes:

Students are able to

1. identify the basics of Geodetic Surveying and triangulation systems.
2. examine the hydrographic surveying and prediction of tides
3. demonstrate the Photogrammetric Surveying.
4. define the Astronomical Surveying.
5. visualize the importance and applications of total stations.
6. use the GPS instrument to obtain appropriate information of the objects and their positions.

SYLLABUS:

UNIT – I

Geodetic Surveying: Definition, importance, triangulation system, order of triangulation, size and shape of triangulation, strength of figure criterion, triangulation fieldwork, base line measurement- tape corrections, problems in baseline measurement, measurement of angles.

UNIT –II

Hydrographic Surveying: Tides-lunar tides, solar tides, spring and neap tides, measurement of tides- shore lines, soundings, sounding equipments, locating soundings by cross rope method and range and time intervals-mean sea level-prediction of tides.

UNIT – III

Photogrammetric Surveying: Basic principles,-photo theodolite, horizontal and vertical angles from terrestrial photographs, elevation of a point by photographic measurement, determination of focal length of the lens, Aerial camera- scale of vertical photograph, scale of tilted photograph, combined effects of tilt and relief, stereoscopic vision, mosaics.

UNIT – IV

Astronomical Surveying: Spherical Trigonometry, latitude and longitude, solar system, astronomical teams, coordinate systems-altitude, azimuth system, declination, hour angle system, time and astronomical work-sidereal time, apparent solar time, mean solar time, standard time, application of astronomy in surveying, corrections to astronomical observations.

UNIT – V

Total stations: Importance, measurement of horizontal angles, vertical angles, horizontal distance, slope distance, height of object-remote elevation measurement (REM), remote distance measurement (RDM)-radial and continuous distances for measuring the lengths and sides of the closed circuits, areas and perimeters calculations.

UNIT – VI

Global Positioning System: Principles of GPS, components of GPS, types of GPS and accuracy, applications of GPS, sources of error GPS and limitations.

TEXT BOOKS:

1. 'Surveying and Levelling' by R. Subramanian, Oxford University Press, New Delhi.
2. 'A text book of Surveying' by C. Venkatramaiah, University Press, New Delhi.
3. 'Surveying Vol. II and Vol. III (Higher Surveying)' by Dr. B. C. Punmia, Ashok K. Jain and Arun K. Jain, Laxmi Publications Pvt. Ltd., New Delhi.
4. 'Advanced Surveying' by Satheesh Gopi, R. Sathikumar and N. Madhu, Pearson, New Delhi.

REFERENCES:

1. 'Remote Sensing and its Applications' by L A R Narayan, Universities Press, New Delhi.
2. 'Geographical Information Science' by Narayan Panigrahi, Universities Press, New Delhi.
3. 'Basics of Remote Sensing and GIS' by Dr. S. Kumar, University Science Press, New Delhi.

B. TECH 5th SEMESTER	L	T	P	C
	-	-	4	2
16CE5L01: GEOTECHNICAL ENGINEERING LAB - I				

Course Outcomes:

Students are able to

1. examine index properties of soil and classify them.
2. discover permeability of soils.
3. describe differential free swell.
4. demonstrate permeability of soil.

SYLLABUS:

LIST OF EXPERIMENTS

1. Determination of water content by oven drying method.
 2. Determination of specific gravity by Density bottle method & Pycnometer method.
 3. Sieve analysis – Mechanical analysis – dry soil.
 4. Hydrometer analysis
 5. Determination of Differential free Swell (DFS).
 6. Determination of Shrinkage limit.
 7. Determination of Liquid limit & Plastic limit.
 8. Determination of field unit weight by Core cutter method & sand replacement method.
 9. Determination of permeability by Constant head permeameter.
 10. Determination of permeability by Variable head permeameter.
- At least eight experiments shall be conducted.

LIST OF EQUIPMENT

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic limit.
3. Apparatus for shrinkage limit.
4. Field density apparatus for
 - a) Core cutter method
 - b) Sand replacement method
5. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
6. Hydrometer
7. Permeability apparatus for
 - a) Constant head test
 - b) Variable head test
8. Hot air ovens (range of temperature 50)

REFERENCE BOOK:

1. IS 2720 –relevant parts.

B. TECH 5th SEMESTER	L	T	P	C
	-	-	4	2
16CE5L02: TRANSPORTATION ENGINEERING LAB - I				

Course Outcomes: Students are able to

1. evaluate the desirable properties of the pavement materials.
2. perform quality control tests on pavements and pavement materials.
3. design the job mix formula for Bituminous Mixes.
4. demonstrate Marshall stability test

SYLLABUS:

LIST OF EXPERIMENTS

I. ROAD AGGREGATES:

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

II. BITUMINOUS MATERIALS:

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

III. BITUMINOUS MIX:

1. Marshall Stability test.

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.

TEXT BOOKS:

1. S.K. Khanna, C.E.G Justo and A.Veeraraghavan: Highway Material Testing Manual, Neam Chan Brothers New Chand Publications, New Delhi.

REFERENCE BOOKS:

1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.

B. TECH 5 th SEMESTER	L	T	P	C
	-	-	-	-

16CE5L02: PROFESSIONAL ETHICS & INTELLECTUAL PROPERTY RIGHTS
(Mandatory Course)

UNIT I: Engineering Ethics: Importance of Engineering Ethics—Professional and Professionalism – Professional Roles to be played by an Engineer –Professional Ethics.

UNIT II: Engineering as Social Experimentation: Role of engineering in knowledge society- Knowledge acquired – Conscientiousness – Relevant Information –Engineers as Managers, Consultants, and Leaders.
Engineers’ Responsibility for Safety and Risk: Role and importance of Safety and risk- Types of Risks – Threshold Levels for Risk– RiskBenefit Analysis.

UNIT III : Engineers’ Responsibilities and Rights: Collegiality-Conflict of Interest-solving conflict problems – Ethical egoism-Collective bargaining -Confidentiality-Acceptance of Bribes/Gifts--Occupational Crimes-industrial espionage-Whistle Blowing-types of whistle blowing.

UNIT IV: Intellectual property and Copy Rights: Introduction to Intellectual Property Law - Types of Intellectual Property -Infringement
Copyrights: Introduction to Copyrights – Principles of Copyright – Rights Afforded by Copyright Law – Copyright Formalities and Registration.

UNIT V: Patents and Trademarks: Introduction to Patent Law –Rights under Patent Law – Patent Requirements – Patent Application Process and Granting of Patent – Double Patenting – Patent Cooperation Treaty.

Trademarks: Introduction to Trade Mark – Trade Mark Registration Process – Trade Mark maintenance – Likelihood of confusion

UNIT VI: Trade secrets and Cyber Law

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security –Unfair Competition –Breach of Contract .**Cyber law:** Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security .

Books Recommended:

1. “Engineering Ethics and Human Values” by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. “Professional Ethics and Morals” by Prof.A.R.Aryasri, DharanikotaSuyodhana-Maruthi Publications.
3. Deborah E.Bouchoux: “Intellectual Property”. Cengagelearning , NewDelhi, BS Publications (Press)
4. PrabhuddhaGanguli: ‘ Intellectual Property Rights” Tata Mc-Graw – Hill, New Delhi
5. “Professional Ethics and Human Values” by A.Alavudeen, R.KalilRahman and M.Jayakumaran- Laxmi Publications.
6. “Engineering Ethics” by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009
7. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
8. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights",Excel Books. New Delhi.

B.TECH 6th SEMESTER	L	T	P	C
	3	1	-	4
16CE6T01: DESIGN AND DRAWING OF STEEL STRUCTURES				

Course Outcomes:

Students are able to

1. describe the connections and welded connections, design fillet weld subjected to moment acting in the plane and at right angles to the plane of the joint.
2. discriminate the design steps of tension members and compression members
3. design of columns along with lacings and battens
4. evaluate the design steps of slab base and gusset base
5. explain detailing of compound beams and built-up beams
6. design plate girder and gantry girder with connection detailing.

SYLLABUS:

UNIT - I

Connections: Riveted connections - definition, rivet strength and capacity, Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses - IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT - II

Tension Members and compression members: General Design of members subjected to direct tension and bending -effective length of columns. Slenderness ratio-permissible stresses. Design of compression members, struts etc.

UNIT - III

Design of Columns: Built up compression members-Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

UNIT - IV

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected moment.

UNIT -V

Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams- Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT - VI

Design of Plate Girder: Design consideration - I S Code recommendations Design of plate girder-Welded - Curtailment of flange plates, stiffeners - splicing and connections.

Design of Gantry Girder: impact factors - longitudinal forces, Design of Gantry girders.

NOTE: Welding connections should be used in Units II - VI. The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases - slab base and gusseted base

Plate 5 Detailing of Plate girder including curtailment, splicing and stiffeners.

INTERNAL EXAMINATION PATTERN:

The total internal marks (40) are distributed in three components as follows:

1. Descriptive (subjective type) examination: 30 marks
2. Assignment: 10 marks

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part- A is 40% and Part- B is 60%.

TEXT BOOKS

1. 'Steel Structures Design and Practice' by N.Subramanian, Oxford University Press.
2. 'Design of Steel Structures' by Ramachandra, Vol - 1, Universities Press.
3. 'Design of steel structures' by S.K. Duggal, Tata Mcgraw Hill, and New Delhi
4. Design of Steel Structures' by S.S. Bhavakatti

REFERENCES

1. 'Structural Design in Steel' by Sarwar Alam Raz, New Age International Publishers, New Delhi
2. 'Design of Steel Structures' by P. Dayaratnam; S. Chand Publishers
3. 'Design of Steel Structures' by M. Raghupathi, Tata Mc. Graw-Hill
4. 'Structural Design and Drawing' by N. Krishna Raju; University Press.

IS Codes:

- 1) IS -800 - 2007
- 2) IS - 875
- 3) Steel Tables.

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

B. TECH 6th SEMESTER	L	T	P	C
	3	1	-	4
16CE6T02: WATER RESOURCES ENGINEERING-I				

Course Outcomes:

Students are able to

1. discuss the theories and principles governing the hydrologic processes.
2. quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects.
3. develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
4. design storms and carry out frequency analysis.
5. prepare unit hydrograph and synthetic hydrograph.
6. estimate flood magnitude and carry out flood routing.

SYLLABUS:

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data sources of data.

Precipitation: Types and forms, measurement, raingauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT-II

Abstractions from Precipitation: Initial abstractions.

Evaporation: factors affecting, measurement, reduction

Evapotranspiration: factors affecting, measurement, control

Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT – III

Runoff: Catchment characteristics, Factors affecting runoff, components, computation empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Hydrograph Analysis – Components of hydrograph – Base flow separation- Unit hydrograph – assumptions, limitation, derivation, applications- Synthetic unit hydrograph – S-hydrograph

UNIT –IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.

Flood Routing: Hydrologic routing, channel and reservoir routing Muskingum and Puls methods of routing.

UNIT-V

Groundwater- Types of aquifer – Aquifer parameters- Dupuit's assumptions-steady flow to wells for confined and unconfined Aquifer- Pumping test- Rain Water Harvesting (RWH) in rural and urban areas – RWH from roof top and open areas – Artificial recharge structures (Introduction only).

UNIT-VI

IRRIGATION: Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, water logging and drainage, standards of quality for Irrigation water, principal crops and crop seasons, crop rotation.

TEXT BOOKS

1. Subramanya.K., “Engineering Hydrology”, Tata McGraw Hill, New Delhi , 1999
2. Jayarami Reddy.P., “Hydrology”, Tata McGraw Hill, New Delhi , 1999
3. Raganath.H., “Hydrology”, Wiley Eastern Limited, New Delhi, 1998.

REFERENCES

1. Ven Te.Chow, Maidment D.R. and Mays L.W. “Applied Hydrology,” McGraw Hill International Book Company. NewYork, 1995.
2. Ven Te Chow, “Hand book of Applied Hydrology”, McGraw Hill Book Co., Inc., NewYork, 1964.
3. Vijay P.Singh, “Elementary Hydrology”, Prentice Hall of India, New Delhi, 1994.

B.TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
16CE6T03 : FOUNDATION ENGINEERING				

Course Outcomes:

Students are able to

1. explain the various types of shallow foundations and decide on their location based on soil characteristics.
2. compute the magnitude of foundation settlement and decide on the size of the foundation accordingly.
3. develop field test data and arrive at the bearing capacity.
4. examine the principles of bearing capacity of piles and design them accordingly.
5. interpret load carrying capacity of piles based on static pile formulae.
6. describe the different shapes of wells.

SYLLABUS:

UNIT - I

Soil Exploration: Need- Methods of soil exploration-Boring and Sampling methods- Field tests - Penetration Tests - Pressure meter-planning of Programme and preparation of soil investigation report.

UNIT - II

Earth Slopes And Earth-Retaining Structures: Infinite and finite earth slopes in sand and clay - types of failures - factor of safety of infinite slopes - stability analysis by Swedish arc method, standard method of slices - Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions. Rankine's & Coulomb's theory of earth pressure - Culmann's graphical method - earth pressures in layered soils.

UNIT-III

Shallow Foundations - Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity - criteria for determination of bearing capacity - factors influencing bearing capacity - analytical methods to determine bearing capacity - Terzaghi's theory - IS Methods.

UNIT-IV

Shallow Foundations - Settlement Criteria: Safe bearing pressure based on N- value - allowable bearing pressure; safe bearing capacity and settlement from plate load test - Types of foundation settlements and their determination - allowable settlements of structures.

UNIT -V

Pile Foundation: Types of piles - Load carrying capacity of piles based on static pile formulae - Dynamic pile formulae- Pile load tests - Load carrying capacity of pile groups in sands and clays.

UNIT-VI

Well Foundations: Types- Different shapes of well - Components of well- functions- forces acting on well foundations- Design Criteria-Determination of steining thickness and plug - construction and Sinking of wells - Tilt and shift.

TEXT BOOKS:

1. 'Basic and Applied Soil Mechanics' by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).
2. "Soil Mechanics and Foundations" by MUNI BUDHU, Third edition, JOHN WILEY & SONS, INC.
3. "Pile Foundation Analysis and Design" by H. G. Poulos & E. H. Davis 1980-Rainbow-Bridge Book Co.
4. "Pile Design and Construction Practice" by Michael Tomlinson and John Woodward, 6th Edition, CRC Press-Taylor & Francis Group.
5. 'Soil Mechanics and Foundation Engineering' by V.N.S.Murthy, CBS publishers.

REFERENCES:

1. Foundation Analysis and Design 'by Bowles, J.E., (1988)- 4th Edition, McGraw-Hill Publishing Company, Newyork.
2. 'Principles of Foundation Engineering 'by Das, B.M., - (2011) -6th edition (Indian edition) Cengage learning
3. "Soil Mechanics and Foundations" by B.C.Punmia.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
16CE6E01: RAILWAY AND HARBOUR ENGINEERING				

ELECTIVE-II

Course Outcomes:

Students are able to

1. apply geometrics in a railway track.
2. develop good transportation network
3. prepare airport planning and geometrics
4. describe airfield pavements.
5. plan and maintenance of Docks
6. construct and maintenance of Harbours.

SYLLABUS:

A.RAILWAY ENGINEERING

UNIT - I

Components of Railway Engineering: Permanent way components -Railway Track Gauge - 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 - Rail joints.

UNIT - II

Geometric Design of Railway Track: Alignment - Engineering Surveys -Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency - Degree of Curve – safe speed on curves - Transition curve Compound curves - Reverse curves - Extra clearance on curves - widening of gauge on curves- vertical curves - cheek rails on curves.

UNIT - III

Turnouts & Controllers: Track layouts - Switches - Design of Tongue Rails - Crossings - Turnouts - Layout of Turnout - Double Turnout - Diamond crossing - Scissors crossing. Signal Objectives - Classification - Fixed signals - Stop signals - Signaling systems -Mechanical signaling system - Electrical signaling system - System for Controlling Train Movement - Interlocking - Modern signaling Installations.

B.AIRPORT ENGINEERING

UNIT - IV

Airport Planning & Design: Airport Master plan- Airport site selection-Air craft characteristics- Zoning laws - Airport classification - Runway orientation - Wind rose diagram - Runway length - Taxiway design - Terminal area and Airport layout - Visual aids and Air traffic control.

UNIT - V

Runway Design: Various Design factors - Design methods for Flexible pavements- Design methods for Rigid pavements- LCN system of Pavement Design- Airfield Pavement Failures - Maintenance and Rehabilitation of Airfield pavements- Evaluation & Strengthening of Airfield pavements-Airport Drainage- Design of surface and subsurface drainage.

C.DOCKS & HARBOURS

UNIT - VI

Planning, Layout, Construction & Maintenance of Docks & Harbours:

Classification of ports - Requirement of a good port -classification of Harbours - Docks - Dry & wet docks - Transition sheds and workhouses - Layouts; Quays - construction of Quaywalls - Wharves -Jetties - Tides - Tidal data and Analysis - Break waters - Dredging - Maintenance of Ports and Harbours - Navigational aids.

TEXT BOOKS:

1. Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi
2. Airport Engineering by Khanna & Arora - Nemchand Bros, New Delhi.
3. Docks and Harbour Engineering by Bindra S.P. - Dhanpathi Rai & Sons, New Delhi.

REFERENCES:

1. 'Railway Engineering' by Saxena & Arora - Dhanpat Rai, New Delhi.
2. 'Transportation Engineering Planning Design' by Wright P.H. & N.J. - John Wiley & Sons.
3. 'Airport Engineering' by Virendra Kumar, Dhanpat Rai Publishers, New Delhi.
4. 'Transportation Engineering' by Srinivasa Kumar R, University Press, Hyderabad
5. 'Highway, Railway, Airport and Harbour Engineering' by Subramanian KP, Scitech Publications (India) Pvt. Limited, Chennai.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
16CE6E02: INDUSTRIAL WATER AND WASTE WATER MANAGEMENT				

ELECTIVE-II

Course Outcomes:

Students are able to

1. explain treatment methods for any industrial wastewater.
2. define the manufacturing process of various industries.
3. develop the need of common effluent treatment plant for the industrial area in their vicinity.
4. describe industrial wastewater disposal management
5. collect treatment methods of liquid waste from Steel plants, Fertilizers, Textiles
6. identify treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers

SYLLABUS:

UNIT - I

Industrial water Quantity and Quality requirements: Boiler and cooling waters-Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills.

UNIT - II

Miscellaneous Treatment: Use of Municipal wastewater in Industries - Advanced water treatment - Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, elutriation, Removal of Iron and Manganese, Removal of Color and Odor.

UNIT - III

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates -Industrial wastewater sampling and preservation of samples for analysis Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction -Neutralization - Equalization and proportioning- recycling, reuse and resources recovery.

UNIT - IV

Industrial wastewater disposal management: discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method.

UNIT - V

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants.

UNIT - VI

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants.

Text books:

1. Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, New Delhi.
2. Industrial Wastewater treatment by A.D. Patwardhan, PHI Learning, Delhi.
3. Wastewater Treatment for Pollution Control and Reuse, by Soli. Jarceivala, Shyam R Asolekar, Mc-Graw Hill, New Delhi; 3rdEdition.
4. Industrial Wastewater Treatment by KVSG Murali Krishna.

References:

1. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc-GrawHill, Third Edition
2. Wastewater Engineering by Metcalf and Eddy Inc., Tata McGrawhill Co., New Delhi
3. Wastewater Treatment- Concepts and Design Approach by G.L.Karia & R.A. Christian, Prentice Hall of India.
4. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard, Cengage Learning.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
16CE6E03: WATERSHED MANAGEMENT				

ELECTIVE-II

Course outcomes:

Students are able to

1. calculate watershed parameters and analyze watershed characteristics to take appropriate management action.
2. quantify soil erosion and design control measures.
3. estimate land grading techniques for proper land management.
4. explain suitable harvesting techniques for better watershed management.
5. design appropriate models for watershed management.
6. describe advances of watershed models.

SYLLABUS:

UNIT-I

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

UNIT-II

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

UNIT-III

Principles of Erosion: Types and causes of erosion, factors affecting erosion, estimation of soil loss due to erosion- Universal soil loss equation.

Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, check dams, rock-fill dams, brushwood dam, Gabion.

UNIT-IV

Water Harvesting: Techniques of rain water harvesting- rain water harvesting from roof top, surface flow harvesting, subsurface flow harvesting, stop dams, farm ponds and dugout ponds, percolation tanks.

UNIT-V

Land Management: Land use and Land capability classification, management of forest, agricultural, grassland and wild land, land grading operation, Reclamation of saline and alkaline soils.

UNIT-VI

Watershed Modeling: Data of watershed for modeling, application and comparison of watershed models, model calibration and validation, advances of watershed models.

TEXT BOOKS:

1. 'Watershed Management' by Das MM and M.D Saikia, PHI Learning Pvt. Ltd, 2013.
2. 'Land and Water Management' by Murthy.VVN, Kalyani Publications, 2007.
3. 'Watershed Management' by Murthy J V S, New Age International Publishers, 2006.

REFERENCES:

1. 'Water Resource Engineering' by Wurbs R A and James R A, Prentice Hall Publishers, 2002.
2. 'Watershed Hydrology' by Black P E, Prentice Hall, 1996

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
16CE6E04: PRESTRESSED CONCRETE				

ELECTIVE-II

Course Outcomes:

Students are able to

1. discriminate the different methods of pre stressing.
2. generalize & Equip student with different systems and devices used in prestressing.
3. estimate the effective pre stress including the short and long term losses.
4. analyze and design of pre stressed concrete beams under flexure
5. develop and Familiarize students with the analysis and design of prestressed concrete members under shear and torsion.
6. illustrate the relevant IS codal provisions for pre stressed concrete.

SYLLABUS:

UNIT – I

Historic development -Basic concepts of Prestressing- Advantages –limitations and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength- Permissible Stresses- Relaxation of Stress, Stress Corrosion- Durability, Fire Resistance, Cover Requirements.

UNIT-II

Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section- pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

UNIT-III

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes - Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage- bending of members and frictional losses-Total losses allowed for design.

UNIT-IV

Design for Flexural resistance- Types of flexural failure – Code procedures- Design of sections for flexure- Control of deflections- Factors influencing- Prediction of short term and long term deflections.

UNIT-V

Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

UNIT-IV

Transfer of Prestress in pre tensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

TEXT BOOKS

1. 'Prestressed Concrete' by N. Krishna Raju, Tata McGraw hill
2. 'Prestressed Concrete' by S. Ramamrutham

REFERENCES:

1. 'Prestressed Concrete' by P. Dayaratnam
2. 'Prestressed Concrete' by T. Y. Lin & Burns, Wiley Publications

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
16CE6E05: CONSTRUCTION TECHNOLOGY AND MANAGEMENT				

ELECTIVE-II

Course Outcomes:

Students are able to

1. prepare appreciate the importance of construction planning.
2. design functioning of various earth moving equipment.
3. develop the methods of production of aggregate products and concreting.
4. report knowledge towards project management and construction techniques.
5. describe about concreting equipment.
6. explain construction methods like earthwork, piling etc.

SYLLABUS:

UNIT- I

Construction project management and its relevance - qualities of a project manager – project planning - coordination - scheduling - monitoring - bar charts - milestone charts.

UNIT -II

Project evaluation and review technique - critical path method-cost analysis - updating - crashing for optimum cost - crashing for optimum resources - allocation of resources.

UNIT- III

Construction equipment - economical considerations - earthwork equipment - Trucks and handling equipment - rear dump trucks - capacities of trucks. and handling equipment - calculation of truck production - compaction equipment - types of compaction rollers.

UNIT -IV

Hoisting and earthwork equipment - hoists - cranes - tractors - bulldozers - graders – scrapers draglines- clamshell buckets.

UNIT -V

Concreting equipment – crushers - jaw crushers - gyratory crushers - impact crushers- selection of crushing equipment - screening of aggregate- concrete mixers- mixing, consolidating and finishing.

UNIT -VI

Construction methods-earthwork-piling- placing of concrete - form work - fabrication and erection- quality control and safety engineering.

TEXT BOOKS:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata Mcgrawhill.
2. 'Construction Project Management Theory and Practice' by Kumar Neeraj Jha (2011), Pearson.
3. 'Construction Technology' by Subir K. Sarkar and Subhajit Saraswati, OxfordUniversitypress.

REFERENCES:

1. 'Construction Project Management-An Integrated Approach' by Peter Fewings, Taylor and Francis.
2. 'Construction Management Emerging Trends and Technologies' by Trefor Williams, Cengage learning.

B. TECH 6TH SEMESTER	L	T	P	C
	-	-	4	2
16ME6L03 : COMPUTER AIDED ENGINEERING DRAWING				

Course Outcomes:

Students are able to

1. define the concept of CAD software.
2. discuss various building components using CAD software.
3. examine aspects in 3D views of buildings by using software.
4. practice computer aided solid modeling.

SYLLABUS

UNIT – I

PROJECTIONS OF SOLIDS:

Projection of regular solids inclined to both the planes, Auxiliary views and sectional views of Regular solids.

UNIT –II

DEVELOPMENT OF SURFACES OF RIGHT REGULAR SOLIDS-Prisms, cylinders, pyramids, cone and their parts Interpenetration and Intersection of right regular solids.

UNIT –III

Isometric Projections and Orthographic projections- Plane figures, simple and compound solids, isometric projections of objects having non-isometric lines and spherical parts. Perspective Projections-perspective view of points, lines, plane figures and simple solids, vanishing point method.

UNIT-IV

INTRODUCTION TO COMPUTER AIDED DRAFTING - Generation of points, lines, curves, polygons, dimensioning Types of modeling-Object selection commands, edit, zoom, cross, hatching, pattern filling, utility commands in object selection commands, 2D and 3D wire frame modeling.

UNIT-V

VIEW POINTS AND VIEW PORTS-view point coordinates and views displayed, examples to exercise different options like save, restore, delete, joint, single option.

UNIT-VI

COMPUTER AIDED SOLID MODELING- Isometric projections, orthographic projections of isometric projections, Building-plan, Section, Elevation.

TEXT BOOKS:

1. Engineering graphics - K. C. John, PHI Publications.
2. Engineering Drawing by N.D.Bhatt , Charotar Publications.

REFERENCE BOOKS:

1. Engineering Drawing - R.K. Dhawan,S.Chand
2. Engineering Drawing - K.L.Narayana, P.Kannaiah
3. Engineering Drawing - Agarwal &Agarwal, Mc Graw Hill

OTHERS:

B. TECH 6th SEMESTER	L	T	P	C
	-	-	4	2
16CE6L01: TRANSPORTATION ENGINEERING LAB-II				

Course Outcomes:

Students are able to

1. Conduct traffic volume study
2. Conduct parking study
3. Conduct Road accident study
4. Conduct design & drawing

SYLLABUS:

LIST OF EXPERIMENTS:

I. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Studies at intersection.
3. Turning movement.
4. Spot speed studies.
5. Parking study.
6. Speed and delay studies
7. Road accident studies

II. DESIGN & DRAWING:

1. Earthwork calculations for road works.
2. Drawing of road cross sections.
3. Rotors intersection design.

LIST OF EQUIPMENT:

1. Endoscope for spot speed measurement.
2. Stop Watches

TEXT BOOKS:

1. S.K. Khanna, C.E.G Justo and A.Veeraraghavan: Highway Material Testing Manual, Neam Chan Brothers New Chand Publications, New Delhi.

REFERENCE BOOKS:

1. IRC Codes of Practice
2. Code of Practice of B.I.S.

B. TECH 6 th SEMESTER	L	T	P	C
	-	-	4	2

16BS6L01: SOFT SKILLS AND APTITUDE LAB

Soft Skills

- Total Number of Laboratory Sessions: 10
- Total Number of Modules: 4

List of Modules:

- **Module-I:** Communicative Grammar and Language Skills
 - i) **Grammar:**
 - a) Parts of Speech
 - b) Articles and useful prepositions
 - c) Sentence and its types
 - d) Verb forms and Tenses
 - e) Question Tags
 - f) Do-Forms and Wh-questions
 - g) Common mistakes at proficiency
 - ii) **Language Skills**
 - a) Listening activity with a CD on Parts of Speech
 - b) Listening activity with a CD on Articles and Prepositions
 - c) Listening activity through CD on sentence and its types
 - d) Listening activity with a CD on Verb forms and Tenses
 - e) Reading activity on Question Tags
 - f) Reading activity on Do-Forms and Wh-questions
 - g) Writing activity (Resume)
 - h) Writing activity (E-mail)
 - i) Writing activity (Guided Composition)
 - j) Writing activity (Guided Composition)
- **Module-II:** Communication Skills
 - a) JAM/J2M on a given topic
 - b) Introduce yourself (Strengths and weaknesses)
 - c) Conversations
 - d) Body Language
 - e) Presentations
 - f) Group Discussion
 - g) Interview Skills
- **Module-III:** Vocabulary
 - a) 20 useful vocabulary for an engineering resume
 - b) Commonly confused words
 - c) One-word Substitutes
 - d) Useful phrases or expressions for a Telephonic Interview
 - e) Useful phrases or expressions for introduction and conclusion at a speech, interview, presentation, seminar, conference, GD etc.
 - f) GRE words
 - g) Useful phrases for an interview

- **Module-IV: Soft Skills**
 - a) Positive Attitude- Courtesy and etiquette
 - b) Motivation
 - c) Adaptability
 - d) Goal Setting
 - e) Leadership Qualities
 - f) Team Work
 - g) Problem Solving
 - h) Time and Stress Management
 - i) Negotiation and conflict resolution
 - j) Interpersonal Skills

- **Method/Approach to be Adopted:** Communicative, implicit, incidental and activity based method to create enthusiasm among the students.

Division of Syllabus for each Laboratory Session

Lab-I: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Parts of Speech

Language Skills Topic: Listening activity with a CD on Parts of Speech
Activity follows

Part-II: Communication Skills

Topic: JAM/J2M on a given topic

Part –III: Vocabulary

Topic: 20 useful vocabulary for an engineering resume

Part-IV: Soft Skills

Topic: Positive Attitude- Courtesy and etiquette

Lab-II: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Articles and useful prepositions

Language Skills Topic: Listening activity with a CD on Articles and Prepositions

Follow-up Activity: Articles and Prepositions

For E.g., Picture Description on Articles and Prepositions

Part-II: Communication Skills

Topic: Introduce yourself (Strengths and weaknesses)

Activity: Role Play/Simulation

Part –III: Vocabulary

Topic: Commonly confused words

Part-IV: Soft Skills

Topic: Motivation

Lab-III: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Sentence and its types

Language Skills Topic: Listening activity through CD on sentence and its types

Follow-up Activity: Sentence and its types

Part-II: Communication Skills

Topic: Conversations

For E.g., Greetings and Introducing, Making Requests etc.

Activity: Role Play/Simulation

Part –III: Vocabulary

Topic: One-word Substitutes

Part-IV: Soft Skills

Topic: Adaptability

Lab-IV: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Verb forms and Tenses

Language Skills Topic: Listening activity with a CD on Verb forms and Tenses

Follow-up Activity: Story Narration

Part-II: Communication Skills

Topic: Conversations

Part –III: Vocabulary

Topic: Useful phrases or expressions for a Telephonic Interview

Part-IV: Soft Skills

Topic: Goal Setting

Lab-V: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Question Tags

Language Skills Topic: Reading activity with a CD on Question Tags

Follow-up Activity: Question Tags

Part-II: Communication Skills

Topic: Body Language

Part –III: Vocabulary

Topic: Useful phrases or expressions for introduction and conclusion at a speech, interview, presentation, seminar, conference, GD etc.

Part-IV: Soft Skills

Topic: Leadership Qualities

Lab-VI: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Do-Forms and Wh-questions

Language Skills Topic: Reading activity without a CD on Do-Forms and Wh-questions

Follow-up Activity on Do-Forms and Wh-questions

Part-II: Communication Skills

Topic: Presentations

Part –III: Vocabulary

Topic: GRE words

Part-IV: Soft Skills

Topic: Team Work

Lab-VII: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (Resume)

Part-II: Communication Skills

Topic: Group Discussion

Part –III: Vocabulary

Topic: GRE Words

Part-IV: Soft Skills

Topic: Problem Solving

Lab-VIII: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (E-mail)

Part-II: Communication Skills

Topic: Group Discussion

Part –III: Vocabulary

Topic: GRE words

Part-IV: Soft Skills

Topic: Time and Stress Management

Lab-IX: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills

Grammar Topic: Common mistakes at proficiency

Language Skills Topic: Writing (Guided Composition)

Part-II: Communication Skills

Topic: Group Discussion

Part –III: Vocabulary

Topic: Common mistakes at proficiency

Part-IV: Soft Skills

Topic: Negotiation and conflict resolution

Lab-X: Time allotted 4 periods

Part-I: Communicative Grammar and Language Skills
Grammar Topic: Common mistakes at proficiency
Language Skills Topic: Writing (Guided Composition)

Part-II: Communication Skills
Topic: Interview Skills

Part –III: Vocabulary
Topic: Common mistakes at proficiency

Part-IV: Soft Skills
Topic: Interpersonal Skills

APTITUDE LAB FOR VI SEM (40 HOURS)

TOPICS

<u>APTITUDE</u>		<u>REASONING</u>	
• PERCENTAGES	(3)	BLOOD RELATIONS	(2)
• RATIO AND PROPORTIONS	(3)	DIRECTIONS	(2)
• AVERAGES	(2)	SYLLOGISM	(2)
• TIME AND WORK	(2)	CODING AND DECODING	(2)
• PIPES AND CISTERNS	(1)	ANALOGY	(2)
• PROFIT AND LOSS	(3)	CLASSIFICATION	(2)
• LCM & HCF	(3)	SERIES	(2)
• SIMPLE INTEREST	(2)		
• COMPOUND INTEREST	(3)		
• TIME AND DISTANCE	(2)		
• TRAINS ,BOATS & STREAMS	(2)		

B. TECH 7th SEMESTER	L	T	P	C
	3	1	-	4
16CE7T01: WATER RESOURCES ENGINEERING - II				

Course Outcomes:

Students are able to

1. describe the design of diversion head works.
2. generalize the design & planning of reservoirs.
3. analyze stability of gravity dams.
4. explain the criteria for design of earth dams.
5. illustrate ogee spillways and energy dissipation works.
6. develop irrigation canals and canal network.

SYLLABUS:

UNIT-I

Diversion Head works: Types of Diversion head works, weirs and barrages, layout of diversion head works, components. Causes and failure of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-II

Reservoir planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation

Dams: Types of dams, selection of type of dam, selection of site for a dam.

UNIT-III

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis, drainage galleries, grouting.

UNIT-IV

Earth dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters, stability analysis-stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions- Rehabilitation of dams to mitigate seepage.

UNIT-V Spillways: Types, design principles of Ogee spillways, types of spillway crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.

UNIT-VI

Canal structures

Falls: Types and their location, design principles of straight glacis fall.

Regulators: Head and cross regulators, design principles, canal outlets- types, proportionality, sensitivity and flexibility.

Cross Drainage works

Types, selection, design principles of aqueduct.

TEXT BOOKS:

1. Irrigation and water power engineering by B.C Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi.
2. Irrigation Engineering and hydraulic structures by S.K Garg, Khanna publishers.
3. Irrigation Water Resources and Water Power Engineering by PN Modi, Standard Book House.

REFERENCE BOOKS:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers.
2. Concrete dams by Varshney, Oxford and IBH publishers.
3. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers.
4. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers.

B. TECH 7th SEMESTER	L	T	P	C
	3	1	-	4
16CE7T02: REMOTE SENSING AND GIS APPLICATIONS				

Course outcomes:

Students are able to

1. describe the basic principles of Remote Sensing and GIS techniques.
2. identify familiar with ground, air and satellite based sensor platforms.
3. interpret the aerial photographs and satellite imageries.
4. list and create input spatial data for GIS application.
5. recognize the application of RS and GIS in Civil engineering.
6. classify RS and GIS concepts in Geomorphology, Forest, water resources engineering, Flood zone delineation mapping.

SYLLABUS:

UNIT – I

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-Band Interleaved by Pixel, Band Interleaved by Line, Band Sequential, IRS, LANDSAT, SPOT.

UNIT – II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image Preprocessing, image enhancement, image classification, supervised classification, unsupervised Classification.

UNIT - III

Geographic Information System: Introduction, key components, application areas of GIS, map projections. Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT - IV

Spatial data analysis: Introduction overlay function-vector overlay operations, raster Overlay operations, arithmetic operators, comparison and logical operators, conditional Expressions, overlay using a decision table, network analysis-optimal path finding, network Allocation, network tracing.

UNIT - V

RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, Geomorphology, urban applications.

UNIT - VI

Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater Prospects and potential recharge zones, watershed management.

TEXT BOOKS:

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

REFERENCES:

1. 'Remote Sensing and its Applications' by Narayan LRA, Universities Press, 2012.
2. 'Concepts and Techniques of Geographical Information System' by Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. 'Introduction to Geographic Information Systems' by Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. 'Basics of Remote sensing & GIS' by Kumar S, Laxmi Publications, New Delhi, 2005.
5. 'Principals of Geographical Information Systems' by Burrough P A and R.A. McDonnell, Oxford University Press, 1998.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
16CE7T03: ESTIMATION, SPECIFICATIONS & CONTRACTS				

Course Outcomes:

Students are able to

1. demonstrate the quantity calculations of different components of the buildings.
2. explain the rate analysis of different quantities of the buildings components.
3. determine the quantities of different works of roads and canals.
4. discuss and Learn various specifications and conditions of contractors.
5. compute and should be capable of finalizing the value of structures.
6. estimate in a position to find the cost of various building components.

SYLLABUS:

UNIT – I

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

UNIT – II

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT-III

Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.

UNIT – IV

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation of buildings in detail- Standard specifications for different items of building construction (specified items only).

UNIT-V

Detailed Estimation of Buildings using individual wall method.

UNIT -VI

Detailed Estimation of Buildings using centre line method.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of SIX questions from Unit 1 to Unit 4, out of which THREE are to be answered (60% weight-age) & ONE mandatory question (40% weight-age) from Units 5 & 6 is to be answered.

TEXT BOOKS:

1. 'Estimating and Costing' by B.N. Dutta, UBS publishers, 2000.
2. 'Civil Engineering Contracts and Estimates' by B. S. Patil, Universities Press (India) Pvt. Ltd., Hyderabad.
3. 'Construction Planning and Technology' by Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. 'Estimating and Costing' by G.S. Birdie.

REFERENCES:

1. 'Standard Schedule of rates and standard data book' by public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)
3. 'Estimation, Costing and Specifications' by M. Chakraborti; Laxmi publications.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
16CE7E01: ENVIRONMENTAL ENGINEERING				

ELECTIVE-III

Course Outcomes:

Students are able to

1. define the sewerage systems.
2. determine characterization of Sewage.
3. develop appropriate appurtenances in the sewerage systems.
4. design suitable treatment flow for sewage treatment.
5. identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river.
6. observe Bio-solids (Sludge) management practices.

SYLLABUS:

UNIT - I:

Introduction to sanitation - systems of sanitation - relative merits & demerits -collection and conveyance of waste water - sewerage - classification of sewerage systems- Estimation of sewage flow and storm water drainage - fluctuations - types of sewers – Hydraulics of sewers and storm drains- design of sewers - appurtenances in sewerage - cleaning and ventilation of sewers.

UNIT - II:

Pumping of wastewater: Pumping stations - location - components- types of pumps and their suitability with regard to wastewaters.

House Plumbing: systems of plumbing - sanitary fittings and other accessories-one pipe and two pipe systems - Design of building drainage.

UNIT - III:

Sewage characteristics- Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations.

Treatment of sewage: Primary treatment-Screens-grit chambers-grease traps-floatation- sedimentation- design of preliminary and primary treatment units.

UNIT - IV:

Secondary treatment: Aerobic and anaerobic treatment process-comparison. Suspended growth process: Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons.

Attached Growth Process: Trickling Filters-mechanism of impurities removal- Classification-design-operation and maintenance problems. RBCs, Fluidized bed reactors.

UNIT V:

Miscellaneous Treatment Methods: Nitrification and Denitrification - Removal of Phosphates -UASB-Membrane reactors-Integrated fixed film reactors.

Anaerobic Processes: Septic Tanks and Imhoff tanks- working Principles and Design-disposal of septic tank effluent.

UNIT - VI:

Bio-solids (Sludge) management: Characteristics- handling and treatment of sludge-thickening - anaerobic digestion of sludge.

Disposal of sewage: methods of disposal - disposal into water bodies Oxygen Sag Curve- disposal on land-sewage sickness.

TEXT BOOKS:

1. Wastewater Engineering Treatment and Reuse by Metcalf & Eddy, Tata McGraw-Hill edition.
2. Elements of Environmental Engineering by K.N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.
3. Environmental Engineering by Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus-Mc-Graw-Hill Book Company, New Delhi, 1985.
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Sham R Asolekar, Mc-GrawHill, New Delhi.

REFERENCES

1. Environmental Engineering -II: Sewage disposal and Air Pollution Engineering, by Garg, S.K.; Khanna Publishers.
2. Sewage treatment and disposal by Dr. P.N. Modi & Sethi.
3. Environmental Engineering, by Ruth F. Weiner and Robin Matthews - 4th Edition Elsevier, 2003.
4. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
16CE7E02: WATER RESOURCES SYSTEM PLANNING AND MANAGEMENT				

ELECTIVE-III

Course Outcomes:

Students are able to

1. enumerate the concepts of water resources planning and management
2. express the Formulation of linear programming
3. explain Dynamic programming in water resources.
4. solve the problems related to water resources systems using optimization techniques
5. demonstrate basic economic analysis to evaluate the economic feasibility of water resources projects.
6. use simulation models for planning and design of Water Resources Systems.

SYLLABUS:

UNIT – I

Introduction: Concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.

UNIT – II

Linear programming: Formulation of linear programming models, graphical method, simplex method, application of linear programming in water resources, revised simplex method, duality in linear programming, sensitivity analysis.

UNIT – III

Dynamic programming: Principles of optimality, forward and backward recursive dynamic programming, curse of dimensionality, application for resource allocation.

UNIT – VI

Non-linear optimization techniques: Classical optimization techniques, Lagrange methods, Kuhn Tucker conditions, Search techniques, overview of Genetic Algorithm

UNIT – V

Water Resources Economics: Basics of engineering economics, economic analysis, conditions of project optimality, benefit and cost analysis

UNIT – VI

Simulation and management: Application of simulation techniques in water resources, planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, conjunctive use of surface and sub-surface water resources.

TEXT BOOKS:

1. 'Water Resources System Analysis' by Vedula S and P P Mujumdar, McGraw Hill Company Ltd, 2005.
2. 'Water Resources Economics' by James D and R. Lee, Oxford Publishers, 2005.

REFERENCES:

1. 'Water Resources Systems Planning and Management – An Introduction to Methods, Models and Application's by Loucks D P and E V Bee, UNESCO Publications, 2005:
(http://ecommons.cornell.edu/bitstream/1813/2804/21/00_intro.pdf)
2. 'Optimal design of water distribution networks' by Bhawe, P. R, Narosa Publishing house, 2003.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
16CE7E03: PAVEMENT ANALYSIS AND DESIGN				

ELECTIVE-III

Course Outcomes:

Students are able to

1. design flexible and rigid pavements using various methods
2. design shoulders, overlays and drainage.
3. develop several designs of pavement structures
4. analyze traffic and geotechnical data from real-life projects
5. gain experience in calculating pavement response using state-of-the-art mechanistic software
6. complete a pavement design problem.

SYLLABUS:

UNIT-I

Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT-II

Stresses In Pavements: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements;

Stress in Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts;

Stresses in Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars, Introduction to DAMA, KENLAYER & KENSLABS Programs.

UNIT-III

Material Characterization & Mix Design Concepts: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates - Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics; Marshall's and Hveem's Methods of Bituminous Concrete Mix Design, Field Implications of Stability and Flow Values, Introduction to Super Pave Mix Design, IRC Cement Concrete Mix Design.

UNIT-IV

Design of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, Road Note No 29 & IRC Methods, Design of Runways & Taxiways, Design of Low Volume Rural Roads.

UNIT-V

Design of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Pre stressed and Continuously Reinforced Cement Concrete Pavement Design, Rigid Pavement Design for Low Volume Rural Roads.

UNIT-VI

Design of Shoulders, Overlays & Drainage: Shoulder Design Considerations, Traffic Prediction, Parking, Regular & Encroaching Traffic, Thickness Design Specifications for Flexible & Rigid Shoulders;

Types & Design of Overlays: AI's Principal Component Analysis & IRC Methods of Overlay Design, Importance of Profile Correction Course; Pavement Drainage Concepts, Drainage Related Failures, Inflow-Outflow Concepts, Condition of Continuity, Surface and Sub Surface Drainage Design Specifications.

TEXT BOOKS:

1. 'Pavement Analysis and Design' by Yang H. Huang, Pearson Education, Second Edition.
2. 'Principles of Pavement Design' by Yoder.J. & Witczak Mathew, W. John Wiley & Sons Inc.
3. 'Pavement Design' by Srinivasa Kumar R, Universities Press, Hyderabad.

REFERENCES:

1. 'Design of Functional Pavements' by Nai C. Yang, McGraw Hill Publications.
2. 'Concrete Pavements' by AF Stock, Elsevier, Applied Science Publishers.
3. 'Pavement and Surfacing for Highway & Airports' by Micheal Sargious, Applied Science Publishers Limited.
4. 'Dynamics of Pavement Structures' by G. Martineek, Chapman & Hall Inc.
5. 'Principles of Transportation Engineering' by Patha Chakroborty and Animesh Das, PHI Learning Private Limited, Delhi.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
16CE7E04: ADVANCED STRUCTURAL ANALYSIS				

ELECTIVE-III

Course Outcomes:

Students are able to

1. explain plane stress & plane strain & elasticity
2. discuss structural dynamics & free vibrations.
3. Solve multiple degree of freedom of two dimensional problems in rectangular co-ordinates.
4. develop multiple degree of freedom of two dimensional problems in polar co-ordinates.
5. determine structures using flexibility method.
6. analyze structures using stiffness methods.

SYLLABUS:

UNIT- I

Flexibility Method:

Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

UNIT- II

Stiffness method:

Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

UNIT- III

Introduction to theory of elasticity: notations for forces and stresses, components of stresses, components of strains, Hooke's law.

Plane stress and plane strain: Definitions, differential equations of equilibrium, boundary conditions, and compatibility equations.

UNIT- IV

Two dimensional problems in rectangular co-ordinates: Airy stress function, solution by polynomials, Saint Venant principle, solution of bi-harmonic equation using Fourier series.

UNIT- V

Two dimensional problems in polar co-ordinates: general equations in polar co-ordinates, solution of bi-harmonic equation for axial symmetry, general solution of bi-harmonic equation, bending of a curved bar, analysis of thick cylinder.

UNIT – VI

Introduction to structural dynamics: Dynamic loadings, formulation of equation of motion-Newton's second law of motion, D'Alembert's principle, solution of undamped single degree of freedom system.

Free Vibrations: Damped single degree of freedom system, Viscous damping, equation of motion, critically damped, over damped and under damped system, logarithmic decrement.

TEXT BOOKS

1. Mechanics of solids by Arbind Kumar Singh, Prentice-Hall of India, New Delhi.
2. Theory of Elasticity by Timoshenko and Goodier, McGraw Hill Book Company, New Delhi.
3. Structural Dynamics by Mario Paz, CBS Publishers, New Delhi.

REFERENCES

1. Theory of Elasticity by sadhu singh, Khanna Publishers.
2. Dynamics of structures by A.K.Chopra, Prentice Hall of India.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
16CE7E05: GROUND IMPROVEMENT TECHNIQUES				

ELECTIVE-III

Course Outcomes:

Students are able to

1. differentiate various methods of ground improvement and their suitability to different field situations.
2. design a reinforced earth embankment and check its stability.
3. review various functions of Geosynthetics and their applications in Civil Engineering practice.
4. conclude the concepts and applications of grouting.
5. develop method for geo membranes.
6. evaluate hydraulic fracturing in soils.

SYLLABUS:

UNIT- I

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth - in situ densification of cohesive soils – pre loading - vertical drains - sand drains and geo drains - stone columns.

UNIT -II

Dewatering - sumps and interceptor ditches - single and multi stage well points – vacuum well points - horizontal wells - criteria for choice of filler material around drains – electro osmosis.

UNIT- III

Stabilization of soils - methods of soil stabilization - mechanical - cement - lime - bitumen and polymer stabilization - use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT- IV

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

UNIT- V

Geo synthetics – geo textiles - types - functions, properties and applications - geogrids, geo membranes and gabions - properties and applications.

UNIT-VI

Grouting - objectives of grouting - grouts and their applications - methods of grouting – stage of grouting - hydraulic fracturing in soils and rocks - post grout tests.

TEXT BOOKS:

1. 'Ground Improvement Techniques' by Purushotham Raj, Laxmi Publications, New Delhi.
2. 'Ground Improvement Techniques' by Nihar Ranjan Patro, Vikas Publishing House (P) Limited, New Delhi.

3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, Universities Press.
4. "Handbook of Geosynthetic Engineering" by Shukla. S. K. (2012), ICE Publishing, London, UK.

REFERENCE BOOKS:

1. 'Ground Improvement' by MP Moseley, Blackie Academic and Professional, USA.
2. 'Designing with Geosynthetics' by RM Koerner, Prentice Hall.

B. TECH 7th SEMESTER	L	T	P	C
	-	-	4	2
16CE7L01: ENVIRONMENTAL ENGINEERING LAB				

Course Outcomes:

Students are able to

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

SYLLABUS:

List of Experiments:

1. Determination of total suspended and dissolved solids in water / sewage sample.
2. Determination of fixed and volatile solids in water/ sewage sample.
3. Determination of turbidity of water / sewage sample.
4. Determination of alkalinity of water sample.
5. Determination of acidity of water sample.
6. Determination of temporary and permanent hardness of water sample.
7. Determination of chloride concentration of water / sewage sample.
8. Determination of pH value of water / sewage sample.
9. Determination of optimum dose of coagulant.
10. Determination of dissolved oxygen of water / sewage sample.
11. Determination of conductivity of water sample.
12. Determination of Biochemical Oxygen Demand (BOD) of waste water.
13. Determination of Chemical Oxygen Demand (COD) of waste water.
14. Determination of chlorine demand and residual chlorine.
15. Determination of nitrogen in water sample

Note: At least 8 Experiments shall be conducted.

List of Equipments

- 1) pH meter
- 2) Turbidity meter
- 3) Conductivity meter
- 4) Hot air oven
- 5) Muffle furnace
- 6) Dissolved Oxygen meter
- 7) Jar Test Apparatus
- 8) BOD incubator

Text Books:

1. Standard Methods for Analysis of Water and Waste Water – APHA.
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi.

Reference:

1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty.

B. TECH 7th SEMESTER	L	T	P	C
	-	-	4	2
16CE7L02: GEO TECHNICAL ENGINEERING LAB - II				

Course Outcomes:

Students are able to

1. Determine Compaction characteristics of soil.
2. Determine Consolidation characteristics of soils.
3. Determine the shear strength characteristics of soils.
4. Determine the relative density of sand.

SYLLABUS:

LIST OF EXPERIMENTS

1. Determination of OMC, MOD- Standard proctor compaction test.
2. Determination of OMC, MOD- Modified proctor compaction test.
3. Determination of Relative Density of Sand
4. CBR test.
5. Determination of C and ϕ by direct shear test.
6. Determination of C and ϕ -Unconfined compression test.
7. Determination of Shear strength by Vane shear test.
8. Triaxial shear test.
9. Consolidation test
10. Determination of p^H value of Soil

At least eight experiments shall be conducted.

LIST OF EQUIPMENT:

1. Apparatus for I.S light and heavy compaction tests.
2. Shaking table, funnel for sand raining technique.
3. Apparatus for CBR test
4. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
5. One dimensional consolidation test apparatus with all accessories.
6. Box shear test apparatus
7. Triaxial cell with provision for accommodating 38 mm diameter specimens.
8. Laboratory vane Shear apparatus
9. Hot air ovens (range of temperature 50)

REFERENCE BOOK:

1. IS 2720 –relevant parts.

Skill based Laboratory (Elective)

B. TECH 7 th SEMESTER	L	T	P	C
	-	-	4	2

16CE7LE01: GIS and CAD Lab

Course outcomes:

Students are able to

1. work comfortably on GIS software
2. digitize and create thematic map and extract important features
3. develop digital elevation model
4. use structural analysis software to analyse and design 2D and 3D frames.
5. design and analyze retaining wall and simple towers using CADD software.

SYLLABUS:

LIST OF EXPERIMENTS:

GIS:

SOFTWARE:

1. Arc GIS 9.0
 2. ERDAS 8.7
 3. Mapinfo 6.5
- Any one or Equivalent.

EXCERCISES:

1. Geo-referencing & Rectifying the given Map/Toposheet
2. Digitization of Map/Toposheet
3. Creation of thematic maps.
4. Study of features estimation
5. Simple applications of GIS in water Resources Engineering or Transportation Engineering.

CAD:

SOFTWARE:

1. STAAD PRO or Equivalent

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design

TEXT BOOK:

1. Concept and Techniques of GIS by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

B. TECH 7th SEMESTER	L	T	P	C
	-	-	4	2
16CE7LE2: ETAB Lab				

ELECTIVE-LAB

COURSE OUTCOMES:

Students are able to

1. develop the knowledge about specialized software such as ETABS to model and analyze for buildings.
2. demonstrate model, analyze, solve structural models and access analysis results such as force, displacement etc for structural design.
3. tabulate the work in the group flexibly and efficiently.
4. identify foundation analysis using SAFE.

LIST OF EXPERIMENTS

1. Basics of Structures.
2. Basics about the ETABS.
3. Introduction to various commands of ETABS and their applications in detail.
4. 2D model, analysis and design for Trusses, Beams and Frames
5. 3D model and analysis for Steel and RC Buildings.
6. Earthquake load application to RC and steel structures along with the design.
7. Members grouping
8. Design Grouping in Steel structures
9. Application of different building codes in the design of concrete and steel structures
10. Foundation analysis using SAFE, independent as well as importing results from the ETABS.

At least eight experiments shall be conducted.

SYSTEMS REQUIREMENTS:

Processor: Minimum: Intel Pentium 4 or AMD Athlon 64

Operating System: Microsoft® Windows Vista, Microsoft® Windows 7, Microsoft® Windows 8 or Microsoft® Windows 10

Video Card: Minimum: Supporting 1024 by 768 resolution and 16 bits colors for standard (GDI+) graphics mode.

B. TECH 7th SEMESTER	L	T	P	C
	-	-	4	2
16CE7LE3: Rivet Lab				

ELECTIVE-LAB

Course outcomes:

Students are able to

1. examine basic knowledge of BIM (Building Information Modeling)
2. report Autodesk Revit Architecture program modeling.
3. familiarized with Revit Architecture user interface and its basic functions and properties.
4. create and edit basic objects, make cross-sections, elevations, axonometries, and perspectives.

LIST OF EXPERIMENTS

1. Introduction to BIM and familiarization with Autodesk Revit user interface
2. File management
3. Creation and editing of basic objects (walls, roofs, staircases, floors)
4. Working with 2D elements (lines, hatches, dimensions, details)
5. Creation and editing of cross-sections, elevations, axonometry and perspectives
6. Working with construction features, special properties of walls and terrain modeling
7. Creation of reports (room, area, elements reports)
8. Creating Roofs by footprint
9. Adding room tags and working with schedules creating legend
10. Setting up Detail Views Creating and annotating details.

TEXT BOOK:

1. Duell, R., Hathorn T., Reist Hathorn T.: Autodesk Revit Architecture 2014 Essentials: Autodesk Official Press. John Wiley & Sons, Inc., Indianapolis, India, 2013. ISBN: 978-1-118-57508-6

B. TECH 7th SEMESTER	L	T	P	C
	-	-	4	2
16CS7LE5: Java Programming Lab				

ELECTIVE-LAB

Course Outcomes:

Students are able to

1. develop solutions for a range of problems using object-oriented programming.
2. operate Java programs that solve simple business applications.
3. select Java programs that implement concept of various types of inheritance.
4. create Java programs using packages and interfaces.
5. implement Exception handling in java.

Note: Use JDK 1.7 or above on any platform.

LIST OF EXPERIMENTS

1. Installation of JDK, setting CLASSPATH and executing simple java program.
2. Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object.
3. Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object.
4. Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.
5. Write a Java Program to demonstrate use of sub class.
6. Write a Java Program to implement array of objects.
7. Write a Java program to practice using String class and its methods.
8. Write a Java program to practice using String Buffer class and its methods.
9. Write a Java Program to implement inheritance and demonstrate use of method overriding.
10. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
11. Write a program to demonstrate use of implementing interfaces.
12. Write a Java program to implement the concept of importing classes from user defined package and creating packages.
13. Write a program to implement the concept of Exception Handling using predefined exception.
14. Write a program to implement the concept of Exception Handling by creating user defined exceptions.

Text Books

1. Herbert Schildt: "Java The complete reference", 7th Edition, Tata McGraw Hill, 2011.
2. E.Balaguruswamy: "Programming with Java A Primer", 4th Edition, Tata McGraw Hill, 2009.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
16CE8E01: DESIGN AND DRAWING OF IRRIGATION STRUCTURES				

ELECTIVE-IV

Course Outcomes:

Students are able to

1. design & drawing of Sloping glacis weir
2. design & drawing of Sloping glacis weir
3. design & drawing of Type III Syphon aqueduct.
4. design & drawing of Surplus weir.
5. design & drawing of Trapezoidal notch fall.
6. design & drawing of Canal regulator.

SYLLABUS:

Design and drawing of the following hydraulic structures.

1. Sloping glacis weir.
2. Tank sluice with tower head
3. Type III Syphon aqueduct.
4. Surplus weir.
5. Trapezoidal notch fall.
6. Canal regulator.

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. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Stand book house.

REFERENCE BOOKS:

1. Irrigation and water power engineering by B.C. Punmia & Lal, Laxmi publications pvt. Ltd. New Delhi.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
16CE8E02: GROUND WATER DEVELOPMENT AND MANAGEMENT				

ELECTIVE-IV

Course Outcomes:

Students are able to

1. estimate aquifer parameters and yield of wells.
2. analyse radial flow towards wells in confined and unconfined aquifers.
3. design wells and understand the construction practices.
4. interpret geophysical exploration data for scientific source finding of aquifers.
5. determine the process of artificial recharge for increasing groundwater potential.
6. apply appropriate measures for groundwater management.

SYLLABUS:

UNIT - I

Introduction: Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.

Well Hydraulics: Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jacob and Chow's methods, Leaky aquifers.

UNIT-II

Well Design: Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

UNIT III

Well Construction and Development: Water wells, drilling methods-rotary drilling, percussion drilling, well construction installation of well screens-pull-back method, open- hole, bail- down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT IV

Artificial Recharge: Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge. Saline Water Intrusion Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT - V

Geophysics: Surface methods of exploration of groundwater - Electrical resistivity and Seismic refraction methods, Sub-surface methods - Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

UNIT - VI

Groundwater Modeling and Management: Basic principles of groundwater modeling- Analog models- viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use case studies.

TEXT BOOKS:

1. 'Groundwater' by Raghunath H M, New Age International Publishers, 2005.
2. 'Groundwater Hydrology' by Todd D.K., Wiley India Pvt Ltd., 2014.
3. 'Groundwater Hydrology' by Todd D K and L W Mays, CBS Publications, 2005.

REFERENCES:

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

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
16CE8E03: URBAN TRANSPORTATION PLANNING				

ELECTIVE-IV

Course Outcomes:

Students are able to

1. estimate travel demand for an urban area.
2. design the transportation network for a city.
3. Identify the corridor and plan for providing good transportation facilities.
4. Evaluate various alternative transportation proposals.
5. evaluate traffic assignment in a town
6. develop Corridor identification.

SYLLABUS:

UNIT -I

Urban Transportation Problems & Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand –Systems approach; Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

UNIT -II

Data Collection And Inventories: Collection of data – Organization of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment –Vehicle Owner Ship.

UNIT -III

Trip Generation & Distribution: UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models.

UNIT -IV

Mode Choice Analysis: Mode Choice behavior, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation

UNIT -V

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

UNIT -VI

Corridor Identification, Plan Preparation & Evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Pivot Point Analysis, Environmental and Energy Analysis; Case studies

TEXT BOOKS:

1. 'Introduction to Urban System Planning' by Hutchinson, B.G., McGraw Hill.
2. 'Transportation Engineering - An Introduction' by Khisty C.J., Prentice Hall.
3. 'Fundamentals of Transportation Planning' by Papacostas, Tata McGraw Hill.

REFERENCES:

1. 'Urban Transportation Planning: A decision oriented Approach' by Mayer M and Miller E, McGraw Hill.
2. 'Introduction to Transportation Planning' by Bruton M.J., Hutchinson of London.
3. 'Metropolitan Transportation Planning' by Dicky, J.W., Tata McGraw Hill.
4. 'Traffic Engineering and Transportation Planning' by Kadiyali.L.R, Khanna Publishers, New Delhi.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
16CE8E04: AIR POLLUTION AND CONTROL				

ELECTIVE-IV

Course Learning Outcomes:

Students are able to

1. define the ambient air quality based the analysis of air pollutants.
2. design principles of particulate and gaseous control measures for an industry.
3. judge the plume behavior in a prevailing environmental condition
4. estimate carbon credits for various day to day activities.
5. outline the air pollution control methods/
6. describe control of NO_x and SO_x emissions.

SYLLABUS:

UNIT - I

Air Pollution: Sampling and analysis of air pollutants, conversion of ppm into $\mu\text{g}/\text{m}^3$. Definition of terms related to air pollution and control - secondary pollutants - Indoor air pollution - Climate Change and its impact - Carbon Trade.

UNIT-II

Thermodynamics and Kinetics of Air-pollution: Applications in the removal of gases like SO_x, NO_x, CO and HC - Air-fuel ratio- Computation and Control of products of combustion, Automobile pollution. Odor pollution control, Flares.

UNIT - III

Meteorology and Air Pollution: Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behavior and Air Quality - Wind rose diagrams, Plume Rise Models.

UNIT-IV

Ambient Air Quality Management: Monitoring of SPM, SO₂; NO_x and CO – Stack Monitoring for flue gases - Micro-meteorological monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion.

UNIT-V

Air Pollution Control: Control of particulates - Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipments - Settling Chambers, Cyclone separators -Fabric filters- Scrubbers, Electrostatic precipitators.

UNIT - VI

Air Pollution Control Methods: Control of NO_x and SO_x emissions - Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

TEXT BOOKS:

1. Air Pollution by M.N. Rao and H.V.N. Rao - Tata McGraw Hill Company.
2. Air Pollution and Control by KVSG Murali Krishna, Laxmi Publications, New Delhi.

REFERENCE:

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

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
16CE8E05 : SOIL DYNAMICS AND MACHINE FOUNDATIONS				

ELECTIVE-IV

Course Outcomes:

Students are able to

1. define theory of vibrations to find the behavior of soil under dynamic loading.
2. design machine foundations under different loads and soil conditions.
3. describe the liquefaction phenomena.
4. perform various laboratory and filed tests to determine the dynamic soil prosperities and its interpretation.
5. design vibration isolators under any vibratory machines.
6. develop methods of liquefaction of soils, CSR, CRR

SYLLABUS:

UNIT-I

Introduction: Types of motion- SHM- Fundamental definitions- SDOF systems- Free and forced vibration with and without damping - Constant force and rotating mass type excitation -Types of damping-Equivalent stiffness of springs in series and parallel. - Resonance and its effect - magnification-logarithmic decrement - Transmissibility.

UNIT-II

Theories of Vibration Analysis- EHS Theory and lumped parameter model- Different modes of vibration- Natural frequency of foundation soil system - Barkan and IS methods- Pressure bulb concept- Reisner Theory - Limitations of Reisner theory - Sung's solutions-- Pauw's Analogy - Heigh's Theory.

UNIT-III

Dynamic properties of soils, Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests.- Block vibration test - Determination of Damping factor.

UNIT-IV

Types of machine foundations - general requirements design - criteria for machine foundations, permissible amplitudes and bearing pressure Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.

UNIT-V

Design data, design criteria, IS code provisions for the design foundations of Impact type of machines.

UNIT-VI

Vibration Isolation: Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators- Types and their characterizes Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction - Dynamic bearing capacity, Earth retaining structures under dynamic loads.

TEXT BOOK:

1. 'Vibrations of Soils and Foundations' by Richart Hall and Woods.
2. 'Fundamentals of Soil Dynamics' by B M Das

REFERENCES:

1. 'Vibration Analysis and Foundation Dynamics' by NSV KameswaraRao, Wheeler Publishing, NewDelhi.
 2. 'Foundations of Machines- Analysis and Design' by Prakash andPuri.
 3. 'Analysis and design of Foundations for Vibrations' by P J Moore
 4. 'Dynamics of bases and Foundations' by D D Barkar.
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B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16CEX001: GREEN BUILDINGS AND INFRASTRUCTURE				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

1. recognize existing energy codes, green building codes and green rating systems.
2. compare cost and performance of building materials with recycled components.
3. list out construction materials and methods that more easily allow for salvage and re-use of building materials.
4. list out available renewable energy resources.
5. develop the techniques and benefits of building performance testing, monitoring and metering.
6. identify techniques for weatherization and sustainable remodeling of existing structures.

Unit – I

Green Buildings: Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings- Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage.

Unit - II

Environmentally friendly building materials and technologies: Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime-pozzolana cements, materials from agro and industrial waste, Ferro-cement and Ferro-concrete.

Unit - III

Energy and resource conservation: Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings.

Unit - IV

Use of renewable energy resources: Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances, success case studies of fully solar energy based buildings in India.

Unit – V

Climate Design: Local climatic conditions-temperature, humidity, wind speed and direction-impact of climate change on built environment - comforts: the desirable conditions - Principles of thermal design - means of thermal -light and lighting-building acoustics- energy efficient lighting, Ventilation and air quality requirement, various techniques for passive cooling, case studies for passive cooling and thermal comfort.

Unit - VI

Green Building Rating Systems: Introduction to Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment - Modular wastewater treatment systems for built environment.

TEXT BOOKS:

1. “Alternative building materials and technologies” by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao, New age international publishers, New Delhi.
2. “Non-Conventional Energy Resources” by G. D. Rai, Khanna Publishers.

REFERENCES:

1. Kibert, C. (2005) Sustainable Construction: Green Building Design and Delivery (Hoboken, NJ: John Wiley & Sons).
2. McDonough, W. and M. Braungart (2002) Cradle to Cradle: Remaking the Way We Make Things (New York: Farrar, Straus and Giroux).

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16CEXO02: DISASTER MANAGEMENT				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

1. Identify the tools of integrating disaster management principles in disaster mitigation process.
2. Distinguish between the different approaches needed to manage pre and post- disaster activities.
3. Explain the process of risk management.
4. Recognize the 'relief system', 'disaster victim' and relate them.
5. Evaluate the planning strategies useful in risk mitigation processes.
6. Explain about public awareness and economic incentive possibilities.

UNIT-I

Natural Hazards and Disaster management: Introduction of DM – Inter Disciplinary -nature of the subject- Disaster Management cycle- Five priorities for action. Case study methods of the following: floods, draughts -Earthquakes- global warming, cyclones & Tsunamis- Post Tsunami hazards along the Indian coast - landslides.

UNIT-II

Man Made Disaster and their management along with case study methods of the following: Fire hazards - transport hazard dynamics -Solid waste management- post disaster – bio terrorism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

UNIT-III

Risk and Vulnerability: Building codes and land use planning - social vulnerability - environmental vulnerability - Macroeconomic management and sustainable development, climate change risk rendition - financial management of disaster - related losses.

UNIT-IV

Role of Technology in Disaster managements: Disaster management for infra structures, taxonomy of infrastructure - treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes -flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training transformable indigenous knowledge in disaster reduction.

UNIT-V

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

UNIT-VI

Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction.-Institutional capacity in disaster management -The Red cross and red crescent movement.-Corporate sector and disaster risk reduction-A community focused approach.

TEXTBOOKS:

1. 'Disaster Management - Global Challenges and Local Solutions' by Rajib shah & R. Krishnamurthy (2009), Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. 'Disaster Management - Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCE BOOKS:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. "Disaster Management and Mitigation" by Prof. R.B. Singh (2016), World Focus

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16EEXO01: ELECTRICAL SAFETY MANAGEMENT				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

1. Explain the objectives and precautions of Electrical safety, effects of shocks and their prevention.
2. Summarize the safety aspects during installation of plant and equipment.
3. Describe the electrical safety in residential, commercial and agricultural installations.
4. Describe the various Electrical safety in hazardous areas, Equipment earthing and system neutral earthing.
5. State the electrical systems safety management and IE rules.

UNIT-I

Introduction to Electrical Safety, Shocks and their Prevention: Terms and definitions- objectives of safety and security measures- Hazards associated with electric current, and voltage who is exposed, principles of electrical safety- Approaches to prevent Accidents- scope of subject electrical safety. Primary and secondary electrical shocks -possibilities of getting electrical shock and its severity- medical analysis of electric shocks and its effects - shocks due to flash/ Spark over's - prevention and safety precautions against contact shocks - flash shocks, burns, residential buildings and shops.

UNIT-II

Safety during Installation of Plant and Equipment: Introduction, preliminary preparations, preconditions during installation electrical plant and equipment, safety aspects. Field quality and safety during erection, personal protective equipment installation of a large oil immersed power transformer, installation of outdoor switchyard equipment, safety during installation of electrical rotating machines, drying out and insulation resistance measurement of rotating machines.

UNIT-III

Electrical Safety In Residential, Commercial And Agricultural Installations Wiring and fitting – Domestic appliances – shock from wet wall and water taps – fan firing shock – multi-storied building – Temporary installations – Agricultural pump installation – Do's and Don'ts for safety in the use of domestic electrical appliances.

UNIT-IV

Electrical Safety In Hazardous Areas : Hazardous zones – class 0,1 and 2 – spark, flashovers and corona discharge and functional requirements – Specifications of electrical plants, equipments for hazardous locations Classification of equipment provided for various hazardous gases and vapours – classification of equipment/enclosure for hazardous locations.

UNIT-V

Equipment Earthing and System Neutral Earthing : Introduction description of earth system between system grounding and Equipment Grounding, Equipment Earthing, Functional Requirement of earthing system, neutral grounding(System Grounding), Types of Grounding, Methods of Earthing Generators Neutrals.

UNIT-VI

Safety Management of Electrical Systems: Principles of Safety Management, Management Safety Policy, Safety organization, safety auditing, Motivation to managers, supervisors, employees towards safety.

TEXT BOOKS:

1. S. Rao, Prof. H.L. Saluja, “Electrical safety, fire safety Engineering and safety management”, Khanna Publishers. New Delhi, 1988.(units-I to V)

REFERENCE BOOK:

1. Pradeep Chaturvedi, “Energy management policy, planning and utilization”, Concept Publishing company, New Delhi, 1997.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16EEXO02: NON CONVENTIONAL ENERGY SOURCES				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

1. Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
2. Design solar thermal collections.
3. Design solar photo voltaic systems.
4. Develop maximum power point techniques in solar PV and wind.
5. Explain wind energy conversion systems, Betz coefficient , tip speed ratio.
6. Explain basic principle and working of hydro, tidal, biomass ,fuel cell and geothermal systems.

UNIT-I

Fundamentals of Energy Systems: Energy conservation principle – Energy scenario (world and India) – Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT-II

Solar Thermal Systems: Liquid flat plate collections: Performance analysis – Transmissivity – Absorptivity – Product collector efficiency factor – Collector heat removal factor – Numerical problems – Introduction to solar air heaters – Concentrating collectors and solar pond.

UNIT-III

Solar Photovoltaic Systems: Balance of systems – IV characteristics – System design: Storage sizing, PV system sizing, Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT-IV

Wind Energy: Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip-speed ratio – efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

UNIT-V

Hydro and Tidal power systems: Basic working principle – Classification of hydro systems: large, small, micro – Measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

UNIT-VI

Biomass, fuel cells and geothermal systems: Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

- **Fuel cell:** classification – Efficiency – VI characteristics.
- **Geothermal:** classification – Dry rock and aquifer – Energy analysis.

Text Books

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis.
3. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

Reference Books

1. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore.
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
3. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16MEXO01: COMPOSITE MATERIALS				

OPEN ELECTIVE

COURSE OUTCOMES: Student are able to

CO1: Summarize the basic terminology and advantages of composite materials. [K2]

CO2: Classify and **analyze** various types of laminates. [K2, K4]

CO3: Analyze the mechanical behavior of composite material as well as summarize various manufacturing methods of Laminated Fiber Reinforced Composite Material. [K4]

CO4: Analyze the micromechanical behavior of composite material. [K4]

CO5: Analyze the macro mechanical behavior of composite material. [K4]

CO6: Explain various applications of Composite material in detail. [K2]

UNIT – I

INTRODUCTION TO COMPOSITE MATERIALS:

Definitions: Composite material, Fiber, Matrix. Types of fibers and Raw Fiber Properties, Types of Matrix, Prepregs, Fillers and other Additives. Advantages of Composite Materials and Structures – Strength and Stiffness advantages, Cost advantages, Weight advantages, Applications.

UNIT – II

ANALYSIS OF LAMINATED COMPOSITES:

Laminates, Basic Assumptions, Strain-Displacement Relationship, Stress-Strain Relationships, Equilibrium Equations, Laminate Stiffness, Determination of Lamina Stresses and Strains, Types of Laminate Configuration, Balanced Laminate, Anti-symmetric Laminate, Examples.

UNIT – III

BASICS OF COMPOSITE MATERIALS:

Mechanical Behavior of Composite Materials - Lamina, Laminate: The basic building block of a composite material. Manufacturing of Laminated Fiber-Reinforced Composite Materials.

UNIT – IV

MICRO MECHANICAL ANALYSIS OF COMPOSITE STRENGTH AND STIFFNESS:

Properties of typical composite materials, Volume and Weight Fractions, Longitudinal Strength and Stiffness. Transverse Modulus, In-plane shear Modulus, Poisson's ratio.

UNIT – V

ELASTIC PROPERTIES OF UNIDIRECTIONAL LAMINA:

Stress-strain relationships. Engineering Constants. Stress strain relations of a Thin Lamina. Examples.

UNIT – VI

APPLICATIONS OF COMPOSITE MATERIALS:

Use of Composite materials in present world – Aeronautical Applications, Space applications, Automotive applications and commercial applications.

TEXT BOOKS:

1. Mechanics of Composite Materials - R M Jones / Taylor & Francis.
2. Mechanics of Composite Materials and Structures - Madhujit Mukhopadhyay / Universities Press.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16MEX002: INTRODUCTION TO OPERATION RESEARCH				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

CO1: Apply linear programming techniques to solve industrial optimization problems.[K3]

CO2: solve transportation and assignment problems using operation research techniques. [K3]

CO3: Solve sequencing problems using operation research techniques. [K3]

CO4: Solve replacement problems for optimization. [K3]

CO5: Analyze game theory and apply them for optimization. [K4]

CO6: Analyze queuing theory and apply it for optimization and also analyze inventory models for various industrial problems. [K4]

UNIT—I

LINEAR PROGRAMMING: Linear programming problem formulation – Graphical solution – simplex method- artificial variables techniques -two–phase method, Big-M method – Duality principle.

UNIT – II

TRANSPORTATION PROBLEM: Formulation – optimal solution, unbalanced transportation problem
Degeneracy

ASSIGNMENT PROBLEM- Formulation – optimal solution - variants of assignment problem- traveling salesman problem.

UNIT – III

SEQUENCING PROBLEM: Introduction – Optimal Solution for processing n jobs through two machines - processing n jobs through three machines - processing n jobs through m machines - processing two jobs through m machines.

UNIT – IV

REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

UNIT – V

THEORY OF GAMES: Introduction – minimax (maxmin) – criterion and optimal strategy –solution of games with saddle points – rectangular games without saddle points – 2 x 2 games– dominance principle – m x 2 & 2 x n games -graphical method.

UNIT – VI

WAITING LINES: Introduction- Single channel-Poisson arrivals-Exponential service times-with infinite population model (M/M/1: FIFO/∞/∞)

INVENTORY: Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed.

TEXT BOOKS:

1. Operations Research / S.D.Sharma, Ramnath co, Meerut
2. Operations Research, P.K.Gupta, D.S.Hira, S.Chand

REFERENCE BOOKS:

1. Operations Research /A.M.Natarajan,P.Balasubramani, A. Tamilarasi/PearsonEducation.

B. TECH 6 th / 8 th SEMESTER	L	T	P	C
	3	-	-	3

16ECX001 : INTRODUCTION TO NANO TECHNOLOGY AND ITS APPLICATIONS

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

- CO1.** Define Nano materials and Nano Technology with properties
- CO2.** Explain Synthesis as Fabrication methods of Nano Technology
- CO3.** Demonstrate Characterization techniques of Nano Materials
- CO4.** Analyze carbon Nano technology and application of Nano technology.

UNIT-I: INTRODUCTION: History of nano science, definition of nano meter, nano materials, nano technology. Classification of nano materials. Crystal symmetries, crystal directions, crystal planes. Band structure. **(T1)**

UNIT-II: PROPERTIES OF MATERIALS: Mechanical properties, electrical properties, dielectric properties, thermal properties, magnetic properties, opto electronic properties. Effect of size reduction on properties, electronic structure of nano materials. **(T1)**

UNIT-III: SYNTHESIS & FABRICATION METHODS: Synthesis of bulk polycrystalline samples, growth of single crystals. Synthesis techniques for preparation of nano particle – Bottom Up Approach – sol gel synthesis, hydro thermal growth, thin film growth, PVD and CVD; Top Down Approach – Ball milling, micro fabrication, lithography. **.(T1)**

UNIT-IV : CHARECTERIZATION TECHNIQUES: X-Ray diffraction and Scherrer method, scanning electron microscopy, transmission electron microscopy, scanning probe microscopy, atomic force microscopy, piezoresponse microscopy, X-ray photoelectron spectroscopy, XANES and XAFS, angle resolved photoemission spectroscopy, diffuse reflectance spectra, photoluminescence spectra, Raman spectroscopy. **.(T2)**

UNIT-V: CARBON NANO TECHNOLOGY: Characterization of carbon allotropes, synthesis of diamond – nucleation of diamond, growth and morphology. Applications of nanocrystalline diamond films, grapheme, applications of carbon nanotubes, carbon nanotubes for nanoelectronics devices. **.(T2)**

UNIT-VI: NANO TECHNOLOGY APPLICATIONS: Applications in material science, biology and medicine, surface science, energy and environment. Applications of nano structured thin fins, applications of quantum dots. **.(T2)**

TEXT BOOKS

1. Nano science and nano technology by M.S RamachandraRao, Shubra Singh, Wiley publishers. **(Unit-I, II, III)**
2. Fundamentals of nanoelectronics by George W Hanson Pearson publications, India 2008. **(Unit-IV, V, VI)**

REFERENCE BOOKS

1. Introduction to Nano Technology by Charles P. Poole, Jr., Frank J.Owens, Wiley publishers.

B. TECH 6 th / 8 th SEMESTER	L	T	P	C
	3	-	-	3

16ECX002 :INTRODUCTION TO GLOBAL POSITIONING AND NAVIGATION SATELLITE SYSTEMS

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

- CO1: Describe the principles of GNSS based positioning methods, the main components in a satellite navigation system and their functions.
- CO2: Estimate and represent the GPS coordinate frames & GPS orbits..
- CO3: Analyze the influence of different error sources on the positioning precision.
- CO4: Describe examples of the role of GNSS, or GNSS based products and services, in sustainable development.

UNIT - I

Overview of GPS: Basic concept, system architecture, space segment, user segment, services of GPS, applications of GPS.

UNIT - II

GPS Signals: Signal structure, anti spoofing (AS), selective availability, Difference between GPS and GALILEO satellite construction.

UNIT - III

GPS coordinate frames, Time references: Geodetic and Geo centric coordinate systems, ECEF coordinate world geodetic 1984 (WGS 84), GPS time.

UNIT - IV

GPS orbits and satellite position determination: GPS orbital parameters, description of receiver independent exchange format (RINEX) – Observation data and navigation message data parameters, GPS position determination.

UNIT - V

GPS Errors: GPS error sources – clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver.

UNIT - VI

GPS Aided Geo-Augmented Navigation (GAGAN) architecture, Indian Regional Navigation Satellite System. GNSS augmentation, Wide Area Augmentation System (WAAS), applications

TEXT BOOKS:

1. G S RAO, Global Navigation Satellite Systems, McGraw-Hill publications, New Delhi, 2010 (**Unit-I,III,IV,V,VI**)
2. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, ‘GPS – Theory and Practice’, Springer – Wien, New York (2001). (**Unit-I,II,IV**)

REFERENCE BOOKS:

1. James Ba – Yen Tsui, ‘Fundamentals of GPS receivers – A software Approach’, John Wiley & Sons, 2001.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	1	-	4
16CSXO01:INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS				

OPEN ELECTIVE

COURSE OUTCOMES: Student are able to

1. Identify the different issues involved in the design and implementation of a database system
2. Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
3. Predict different concurrency control techniques while implementing real time applications
4. Solve real time database issues through SQL concepts
5. Organize the data from unstructured to structured using different normal forms
6. Justify various kinds of secondary storage devices to store data

UNIT-I

History of DBMS, File Systems vs DBMS, Advantages of DBMS, Describing and Storing Data in DBMS, Transaction Management, Structure of a DBMS, people who work with Databases, Data Models, Database Languages, Database Administrator, Database Users, Three Schema architecture of DBMS.

UNIT-II

Entity-Relationship Model: Basic concepts, Design Issues, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

UNIT-III

Relational Model: Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database.

UNIT-IV

SQL and Integrity Constraint:

Basic SQL Query, Nested Queries, Correlated Nested Queries, Set Comparison Operators, Aggregate Operators, Logical Connectivity Operators, Joins and Types, introduction to Triggers.

UNIT-V

Relational Database Design: Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF

UNIT –VI

Internals of RDBMS : Physical data structures, Query optimization : join algorithm, statistics and cost based optimization. Transaction processing, Concurrency control and Recovery Management : transaction model properties, state serializability, lock based protocols, two phase locking.

Text Books:

1. Database Management Systems- Raghurama Krishnan, Johannes Gehrke, Tata McGraw-Hill., 3rd Edition.
- 2.

Reference Books:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, 5th edition.
2. Database Management Systems, Elmasri Navathe-5th Edition.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16CSXO02: INTRODUCTION HADOOPBIG DATA				

OPEN ELECTIVE

COURSE OUTCOMES: students are able to

1. Explain the basic concepts of Big Data
2. Access and Process Data on Distributed File System
3. Design and explain Hadoop architecture
4. Develop the Map Reduce application
5. Identify the various tools in Hadoop Ecosystem
6. Develop Big Data Solutions using Hadoop Eco System

UNIT-I

Introduction to Big Data

Topics - What is Big Data and where it is produced? Rise of Big Data, Compare Hadoopvs traditional systems, Limitations and Solutions of existing Data Analytics Architecture, Attributes of Big Data, Types of data, other technologies vs Big Data.

UNIT-II

Hadoop Architecture and HDFS

Topics - What is Hadoop? Hadoop History, Distributing Processing System, Core Components of Hadoop, HDFS Architecture, Hadoop Master – Slave Architecture, Daemon types - Learn Name node, Data node, Secondary Name node.

UNIT –III

Hadoop Clusters and the Hadoop Ecosystem

Topics - What is Hadoop Cluster? Pseudo Distributed mode, Type of clusters, Hadoop Ecosystem, Pig, Hive, Oozie, Flume, SQOOP. Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-IV

HadoopMapReduce Framework

Topics - Overview of MapReduce Framework, MapReduce Architecture, Learn about Job tracker and Task tracker.A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New),Basic programs of HadoopMapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

UNIT-V

Hadoop Ecosystem - I:Using Query Languages HIVE and PIG for data analytics,

Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

UNIT-VI

Hadoop Ecosystem – II

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and

Big SQL : Introduction

Text Books:

1. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
2. Hadoop in Action by Chuck Lam, MANNING Publ.
3. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss.

Reference Books:

1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. HadoopMapReduce Cookbook, SrinathPerera, ThilinaGunarathne .
Software Links:
3. Hadoop:<http://hadoop.apache.org/>
4. Hive: <https://cwiki.apache.org/confluence/display/Hive/Home>
6. Piglatin: <http://pig.apache.org/docs/r0.7.0/tutorial.html>

B. TECH 6th & 8th SEMESTER	L	T	P	C
	3	-	-	3
16ITX001: INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

1. Explain the basic concepts of Software Engineering and Process framework.
2. Define the various software process models and its requirements.
3. Outline software project management principles based on conventional software project Management.
4. Distinguish different Software Management life cycle phases.
5. Define the artifacts and knowledge on Model Based Software Architecture.
6. Illustrate various software workflows and checkpoints of the process.

UNIT-I

Introduction to Software Engineering: The evolving role of software, Software Characteristics, Changing Nature of Software, Software myths.

A Generic view of Process: Software engineering- A layered technology, a Process framework, The Capability Maturity Model Integration (CMMI), Process assessment, Product and Process.

UNIT-II

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

Software Requirements: User requirements, System requirements, Functional and non-functional requirements, the Software Requirements Document (SRS).

UNIT-III

Conventional Software Management and Economics: Conventional software Management performance, Software Economics.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT-IV

The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

UNIT-V

Artifacts of the process: The artifacts sets, Management artifacts, Engineering artifacts, programmatic artifacts.

Model based software architectures: A Management perspective and technical perspective.

UNIT-VI

Work Flows of the process: Software process' workflows, Iteration workflows.

Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Project Management, Walker Royce: Pearson Education, 2005.

Reference Books:

1. Software Engineering- Somerville, 9th edition, Pearson education.
2. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.
3. Software Project Management, Joel Henry, Pearson Education.

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16ITXO02: INTRODUCTION TO INTERNET OF THINGS				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

1. Define the fundamentals of IoT.
2. Illustrate the IoT design methodology.
3. Explain the Microcontroller and various IoT Platforms.
4. Construct the IoT using Raspberry Pi
5. Explain the basics of IoT sensors and communications.
6. Analyze applications of IoT in real time scenario.

UNIT-I

Fundamentals of IoT: Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs. M2M.

UNIT-II

IoT Design Methodology: IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

UNIT-III

8051 Microcontroller: Introduction to Microcontrollers, The 8051 Instruction Set, AT89S8253 Microcontroller, Assembly Language, Examples, Development systems.

IoT Platform: IoT Platform overview, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

UNIT-IV

Building IoT With Raspberry PI: Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services.

UNIT-V

Programming The Microcontroller For IoT Basics of Sensors & Actuators: Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IoT – RASPBERRY PI /Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors;

Communication: Connecting microcontroller with mobile devices – communication through Bluetooth and USB – connection with the internet using wifi / Ethernet.

UNIT-VI

Case Studies and Advanced Topics: Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT

Text Books:

1. ArshdeepBahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. Charalampos Doukas “Building Internet of Things With the Arduino”, CreateSpace Independent Publishing Platform, 2012.
3. Milan Verle, “Architecture and Programming of 8051 Microcontrollers” 1st Edition mikro.
4. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011
5. Matt Richardson & Shawn Wallace, “Getting Started with Raspberry Pi” O’Reilly (SPD), 2014.

Reference Books:

1. Luigi Atzor et.al, “The Internet of Things: A survey“, Journal on Networks, Elsevier Publications, October, 2010
2. Web Link 1: <http://postscapes.com/>(Accessed on 16 February 2016).
3. Web Link 2: <http://www.theinternetofthings.eu/what-is-the-internet-of-things>(Accessed on 16 February 2016).

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16BMXO01: INNOVATION AND ENTREPRENEURSHIP				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

CO1: Comprehend the concept and levels of Innovation. [K2]

CO2: Discriminate the Micro & Macro perspectives & Innovation. [K4]

CO3: Appraise the creative Intelligence abilities. [K4]

CO4: Define and explain the basic concepts of Entrepreneurship & social responsibilities of an entrepreneur [K1 & K2]

CO5: Estimates the importance of training for Entrepreneurs, Use feedback and Performance of trainees. [K2 & K3]

CO6: Discover the Challenges and Sickness in MSMEs. [K2]

UNIT-I Innovation Management: Concept of Innovation –Levels of Innovation –Incremental Vs Radical Innovation -Inbound and Outbound Ideation –Open and Other Innovative Ideation Methods- Systems approach to innovation- Innovation in the context of emerging economies-leadership and innovation.

UNIT-II Creative Intelligence: Creative Intelligence Abilities – A Model Of Creative Intelligence – Convergent Thinking Ability – Traits Congenial To Creativity – Creative Personality And Forms Of Creativity.

UNIT-III Entrepreneurship: Entrepreneurship characteristics –classification Of Entrepreneurship – Incorporation of Business - Role of Entrepreneurship in economic development – startups.

UNIT-IV Idea generation and opportunity assessment: Ideas in entrepreneurship – sources of new ideas- Techniques for generating ideas- Opportunity recognition – Steps in tapping opportunities

UNIT-V Project Formulation and Appraisal: Preparation of Detailed project Report (DPR) – content-Guidelines for Report preparation – project Appraisal techniques-economic- steps Analysis; Financial analysis; Market analysis; Technical feasibility.

UNIT-VI Institutions promoting small Business Enterprises: Central level Institutions; NABARD, SIDBI,NIC,KVIC,SIDIO,NSIC - State level Institutions- DICs – SFC- SSIDC- other financial assistance, Government policy and taxation benefits- government policy for SSIs – tax incentives and concessions- Non – tax concessions- Rehabilitation investment and Allowances

Text Books:

1. Vasanth Desai, “Entrepreneurship’ Himalaya Publishing House, New Delhi, 2012
2. Arya Kumar: “Entrepreneurship”, Pearson, Publishing House, New Delhi, 2012.

REFERENCES:

1. Pradip N Khandwalla, Lifelong Creativity, An Unending Quest, Tata McGraw Hill, 2004.
2. Vinnie Jauhari, Sudanshu Bhushan, Innovation Management, Oxford Higher Education, 2014

B. TECH 6th / 8th SEMESTER	L	T	P	C
	3	-	-	3
16BMX002: INDUSTRIAL SOCIOLOGY AND PSYCHOLOGY				

OPEN ELECTIVE

COURSE OUTCOMES: Students are able to

CO1: Demonstrate an appreciation on different areas of Industrial Psychology and Sociology that have contributed to organizational effectiveness. (K3)

CO2: Identify critical factors that affect behavior of individual and groups in an organization. (K2)

CO3: Analyze the importance of organizational design and culture prevailing in an organization. (K4)

CO4: Interpret the role and importance of Leadership and Motivation towards achieving objectives of individuals and groups in work environment. (K3)

CO5: Appraise the concept of change in the dynamic business organization. (K5)

UNIT I: Industrial Sociology : Nature and Scope of Industrial Sociology-Development of Industrial Sociology, Factors of social change – the technological factors, the cultural factors, effects of technology on major social institutions, social status system, social relations in industry.

UNIT II: Group Dynamics: Work Teams & Groups, Group Behavior, Group formation & development, Decision Making by Individuals , Groups Decision making process, individual influences, group decision process, Group dynamics

UNIT III: Organizational Conflicts: Concept - Causes and Consequences of Conflict-Conflict handling techniques-Emotional Intelligence - Inter Group Behavior and Collaboration.

UNIT IV Industrial Psychology : Nature and Meaning of Industrial Psychology, Role of Industrial Psychology, Organizational Attitude, Motivation at work-Theories of Motivation (Theory X and Y, McClelland's Theory, Maslow's Need Theory, Herzberg's Two Factor Theory) Cultural Differences in Motivation

UNIT V: Organizational Design and Leadership : Organizational Design & Structure- Key organizational design process, Structural differentiations, factors influencing design of organizations, Leadership, Leadership vs. Management, Leadership Theories, Emerging issues in Leadership.

UNIT VI: Organizational Culture: Functions of organizational culture, Organizational Socialization, Assessing Cultural Values and Fit, Cross Cultural issues, Managing Change Forces for change in Organization, Resistance to change and change management.

Text Books:

1. Nelson, Quick and Khandelwal, ORGB: An innovative approach to learning and teaching Organizational Behaviour. A South Asian Perspective, Cengage Learning, 2012
2. Luthans, Fred, Organizational Behavior, McGraw Hill 2008.

REFERENCES:

1. Gisbert Pascal, Fundamentals of Industrial sociology, Tata McGraw Hill Publishing Co., New Delhi, 1972.
2. Schneider Engno V., Industrial Sociology 2nd Edition, McGraw Hill Publishing Co., New Delhi.