GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING

(AUTONOMOUS)

MADHURAWADA , VISAKHAPATNAM-530048

AFFILIATED TO JNTU-KAKINADA

COLLEGE OF ENGINEERING
(AUTONOMOUS)

REGULATIONS COURSE STRUCTURE AND SYLLABI OF B.TECH. PROGRAMME

(UNDER AUTONOMOUS STATUS)

FOR 2014-2015 ADMITTED BATCH

ALL BRANCHES ARE ACCREDITED BY **NBA** OF AICTE

ACCREDITED BY **NAAC** WITH **'A'** GRADE WITH A **CGPA** OF **3.47**/4.00

Vision

To evolve into and sustain as a Centre of Excellence in Technological Education and Research with a holistic approach.

Mission

To produce high quality engineering graduates with the requisite theoretical and practical knowledge and social awareness to be able to contribute effectively to the progress of the society through their chosen field of endeavour.

To undertake Research & Development, and extension activities in the fields of Science and Engineering in areas of relevance for immediate application as well as for strengthening or establishing fundamental knowledge.

FOREWORD

It gives immense satisfaction and strength, as two batches successfully completed the B.Tech. programme under the autonomous system. Based on the experiences and insight from the past performance, to catch up the changing trends in higher education, and to make the degree, to be more in tune with the global level requirements, a system of Outcome Based Education is introduced into the curriculum from 2013-14 admitted batch. The new approach is more focused towards learner centric. The expected outcomes are clearly stated, and levels of attainment are measured at each stage.

The experiences of the running of the new system for one year are taken and fine tuning of the system is done in the meetings of the Boards of studies and Academic Council held recently.

I take this opportunity to thank all the members of the Academic Council and the members of the respective Boards of Studies, representatives from the industry, who shared their valuable experiences to further sharpen the focus of the entire programme.

I thank the authorities of the affiliating University, JNTU, Kakinada, for their constant support, encouragement and guidance in successful running of the autonomous system at each step.

I thank the parents, who are giving constant moral support, and the students who are keeping the college flag high at every opportunity.

Finally I thank all the teaching and non-teaching staff for their hard work and dedication with single point focus towards the continuous betterment of the system.

Principal

B.TECH. ACADEMIC REGULATIONS

R 1.0 Qualification for Admission and duration:

R1.1 The selection for category A and B seats shall be as per Govt. of Andhra Pradesh rules.

R1.2 The duration of the programme for the Degree of Bachelor of Technology will be four academic years, with two semesters in each year. However if a student cannot complete within 4 years, he can do so by taking more time but not more than 8 years.

R1.3 The duration of each semester will normally be 20 weeks with 5 days a week. A working day shall have 7 periods each of 50 minutes.

R 2.0 Structure of the Programme:

Semester	No. of Courses per semester Theory + Lab	Credits
I	5 + 4 / 5 + 3 + Professional ethics	45
II	5+3+Professional ethics / 5 + 4	
III	6 + 2	44
IV	6 + 2	
V	6 + 2 / 6 + 2 + IPR	46
VI	4 + 2* + 2 + IPR / 4 + 2* + 2	
VII	Industry oriented Mini Project $ 5 + 1* + 2	45
VIII	1 + 1*+ 1#+ Seminar +Comprehensive viva + Project	
Total:		**180 credits**

*Core Electives, # Open Elective, $ Summer Programme to be carried out after VI semester and assessed in VII semester

i. The curriculum in the first and second semesters shall be common for all the B.Tech. programmes except for department specific courses.

ii. Each course is normally assigned a certain number of credits as follows:

· 3 credits for 4 lecture periods per week and no credits for tutorials.

· 2 credits for 3 laboratory periods per week.

· 2 credits for Industry oriented Mini Project.

· 2 credits for Seminar with 3 periods per week.

· 2 credits for comprehensive viva-voce.

· 8 credits for project work.

iii. Participation in Social Service for a minimum of 32 hours is compulsory.

Participation in extra/co-curricular activities like Sports, Cultural and Literary activities for a minimum of 32 hours is also compulsory.

The activities are monitored and grades are awarded as given below:

EXCELLENT

GOOD

SATISFACTORY

A student shall obtain a minimum of satisfactory grade in both social service and extra / co-curricular activities during the course of study to be eligible for the award of the degree.

R 3.0 Method of Evaluation:

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks each for theory and practical/drawing subjects. In addition, Industry oriented mini-project, Seminar, Comprehensive viva-voce and Project work shall be evaluated for 50, 50,100 and 200 marks, respectively.

R 3.1 Theory:

For all lecture based theory courses, the assessment shall be for 30 marks through internal evaluation and 70 marks through external end-semester examination of three hours duration.

R 3.1 a. Internal evaluation:

The 30 internal marks are awarded as follows

Two tests	20 marks
Four assessments by atleast any two of the following methods	10 marks

Assignment/ Quiz/Term paper/ Tutorial /Surprise test/Open book test/ Seminar/ Case study/Lab activity/projects etc. as notified by the teacher at the beginning of the semester and distributed evenly over the entire semester.

The internal marks for tests (20 marks) shall be computed as, the weighted average of the two tests at 2:1 with the higher score carrying a weightage of 2.

The remaining 10 internal marks shall be computed as the average of marks obtained in the four assessments.

R 3.1 b. External evaluation:

The question paper shall be set externally and valued both internally and externally. A chief examiner appointed for each subject shall monitor the valuation process.

If the difference between the first and second valuations is less than or equal to 10 marks, the better of the two valuations shall be awarded.

If the difference between the first and second valuation is more than 10 marks, the chief examiner shall value the script. The marks given by the chief examiner shall be final for award.

R 3.2 Practical / Drawing:

Practical / drawing shall be evaluated for 100 marks, out of which 50 marks are for external examination and 50 marks are for internal evaluation.

The 50 internal marks are distributed as 25 marks for day-to-day work in two cycles and 25 marks for internal examination. The internal examination shall be conducted by the teacher concerned and another faculty member of the same department once for each cycle of instruction period and average of the two shall be considered for award of marks. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

10 out of 12 to 16 experiments/exercises recommended are to be completed in a semester.

R 3.3 Industry Oriented Mini Project:

The industry oriented mini project shall be carried out during the summer break for a minimum of 4 weeks after the VI Semester and completed before the start of the VII semester. A report has to be submitted at the beginning of the VII 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% of maximum marks shall be obtained to earn the corresponding credits.

R 3.4 Seminar:

The seminar shall have two components, one chosen by the student from the course-work without repetition, from the topics taught / studied, and approved by the faculty advisor. The other component is suggested by the advisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before a committee comprising the Head, seminar advisor and a senior faculty of the department. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

R.3.5 Comprehensive viva-voce:

The comprehensive viva-voce will be conducted by a committee comprising Head of the Department, Senior faculty members of the respective department. This is aimed at assessing the student's understanding of various subjects studied during the entire programme of four years. The Comprehensive viva-voce shall be evaluated for 100 marks during VIII semester. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

R 4.0 Project:

The project work shall be spread over the entire VIII semester and of somewhat innovative in nature, with research / industry orientation. A project batch shall comprise of not more than four students. A mid-term evaluation is conducted on the progress by Head of the Department and the supervisor for 40 marks. On completion of the project, a second evaluation is conducted before the report is submitted for another 40 marks. The final evaluation shall be based on the report submitted and a viva-voce examination for 120 marks by an external examiner.

R 5.0 Attendance Requirements:

It is desirable for a candidate to put up 100% attendance in the class in all the subjects. However, a candidate shall be permitted to appear for the end semester examination provided he records a minimum of 75% attendance for each subject in any semester. However, condonation for shortage of attendance may be given on Medical grounds, if a certificate to the extent is submitted to the HOD when the candidate first returns to the classes. Certificates submitted afterwards shall not be entertained on any count. A condonation fee as fixed by the college for those who put in attendance between 65 and 74 per cent shall be charged before the student is permitted to the end examination.

Attendance may also be condoned as per the State Government rules for those who participate in prestigious sports, co- and extra-curricular activities provided their attendance is in the minimum prescribed limits for the purpose and recommended by the concerned authority.

Attendance will be indicated in the marks memo by a letter code as follows:

Grading of Attendance:

90% and above	A	(Very Good)
75% to 89%	B	(Good)
65% to 74%	C	(Satisfactory)
Below 65%	D	(Detained)

A student who gets less than 65% (D Grade) attendance in a maximum of two credit courses in any semester shall not be permitted to take the end semester examination in which he/she falls short.

A student who gets less than 65% (D Grade) attendance in non-credit mandatory courses shall not be permitted to take the end semester examination in which he/she falls short.

His/her registration for those subjects will be treated as cancelled. The student should re-register and repeat those subjects as and when offered next.

R 5.1:

i. A student shall acquire at least C grade in attendance to be eligible to appear for the end-semester examination in the concerned subject.

ii. If a student gets D grade in more than two credit courses in any semester he/she shall be detained and has to repeat the entire semester.

R 6.0 Minimum Academic Requirements:

The following academic requirements shall be met along with the attendance requirements mentioned above to be eligible for the award of the B.Tech. degree.

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, if he/she secures not less than 25 marks in external end examination, and a minimum of 40 marks on the aggregate of internal evaluation and external examination taken together.

ii. In case of practical / drawing / project, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if the student secures a minimum of 50% in the end examination and not less than 50% marks on the aggregate in the internal evaluation and external end examination taken together.

iii. For the non-credit mandatory courses viz., Professional Ethics, Environmental studies and Intellectual Property Rights and Patents, a student shall satisfy minimum attendance requirements on par with the other theory courses and secure a pass in the end semester examinations for which the evaluation shall be totally internal.

iv. A student shall be promoted from IV to V semester, if he / she acquires a minimum of 62 out of 89 credits (70%) up to the end of IV Semester (from I, II, III semesters regular and supplementary examinations & IV semester regular examinations).

v. A student shall be promoted from VI to VII semester, only if he / she fulfills the academic requirements of acquiring a minimum of 94 credits out of 135 credits (70%) up to the end of VI semester (from I to V semesters regular and supplementary examinations & VI semester regular examinations).

vi. Student shall register, put up minimum attendance in all courses including non-credit mandatory courses.

vii. A student shall earn all the 180 credits and secure a pass in non-credit mandatory courses to be eligible for the award of the degree.

viii. Marks obtained only from the credit courses shall be considered for the award of Percentage / Class / Division.

ix. A student who fails to earn 180 credits or secure a pass in non-credit mandatory courses within 8 academic years from the year of his / her admission shall forfeit his / her seat and his / her admission stands cancelled.

R 7.0 Make-up program for defaulters:

A make-up programme in subsequent semesters will be offered outside

the regular time table for the students who got detained due to shortage of attendance in not more than two credit courses and one non-credit mandatory course, if any. However, this facility shall not be extended to those candidates who are detained for want of attendance as per regulations R 5.1.(ii)

i. Make-up programme shall be announced at the beginning of every semester. The announcement of subjects offered for the make-up programme is at the discretion of the Principal. A student shall have to register within the time stipulated in the announcement by paying the prescribed fee.

ii. The number of total contact hours and method of evaluation for any make-up program shall be the same as those for a regular semester.

iii. It is desirable for a candidate to put up 100% attendance in all the subjects registered for the make-up programme. However, 25% concession in attendance may be permitted at the discretion of the principal based on the merits of the individual case under extraneous circumstances with proper evidence. No further condonation of attendance on par with the regular semester shall be permitted.

iv. If a candidate is failed to satisfy the attendance requirement in a course registered during make-up programme, then he has to repeat the course in the subsequent make-up programme when offered next.

v. The method of internal evaluation in the case of make-up programme is same as for the regular B.Tech. programme.

vi. For the courses registered in the make-up programme, the internal marks secured earlier are nullified and internal marks from the latest make-up programme shall be final.

vii. The credits for the courses registered during the make-up programme shall be earned from the end semester examinations following the corresponding regular semester.

viii. A pass in case of non-credit mandatory courses, for the courses registered during the make-up programme shall be secured from

the end semester examinations following the corresponding regular semester.

ix. Attendance and completion of courses during the make-up programme shall be suitably reflected in the consolidated marks memo.

No student can register for more than two credit courses and one non-credit mandatory course for a make-up programme.

Withdrawal from a make-up program after registration will no entitle for any refund of fees.

R 8.0 Supplementary examinations:

Supplementary examinations for the odd semester shall be conducted with the regular examinations of even semester and vice versa, for those who appeared and failed in regular examinations.

R 9.0 Class/Division:

70% and above	:	First Class with distinction
60% and above, but less than 70%	:	First Class
50% and above, but less than 60%	:	Second Class.
40% and above, but less than 50%	:	Pass Class
Less than 40%	:	Fail

R 10.0 General:

i. Where the words 'he', 'him', 'his', occur, they imply 'she', 'her', 'hers', also.

ii. The academic regulation should be read as a whole for the purpose of any interpretation.

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

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

REGULATIONS FOR B.TECH. (LATERAL ENTRY) STUDENTS ADMITTED INTO III SEMESTER (UNDER AUTONOMOUS STREAM)

RL 1.0

1.1 The selection and admission process shall be as per Government of Andhra Pradesh rules through ECET.

1.2 A student admitted to B.Tech. through lateral entry scheme joins the College in the III Semester of the respective 8-Semester program. The duration of the programme is 3 years / 6 semesters. However, if a student can not complete within 3 years, he can do so by taking more time but not more than 6 years / 12 semesters.

1.3 Participation in Social Service for a minimum of 24 hours is compulsory.

Participation in extra/co-curricular activities like Sports, Cultural and Literary activities for a minimum of 24 hours is also compulsory.

The activities are monitored and grades are awarded as given below:

EXCELLENT

GOOD

SATISFACTORY

A student shall obtain a minimum of satisfactory grade in both social service and extra / co-curricular activities during the course of study to be eligible for the award of the degree.

RL 2.0 The attendance requirements shall be same as those admitted into four year regular B.Tech. programme,

RL 3.0 Minimum Academic Requirements:

i. For the non-credit mandatory courses, Environmental studies and Intellectual Property Rights and Patents, a student shall satisfy minimum attendance requirements on par with the

other theory courses and secure a pass in the end semester examinations for which the evaluation shall be totally internal.

ii. A student shall be promoted from VI to VII semester, only if he / she fulfills the academic requirements of a minimum of 63 credits out of 90 credits (70%), upto the end of VI semester (from III to V semesters regular and supplementary examinations & VI semester regular examinations).

iii. To be eligible for the award of B.Tech. degree, a student shall register and satisfy the attendance requirements for all the courses including non-credit mandatory courses, and shall earn 135 credits, and secure a pass in the non-credit mandatory courses.

iv. A student who fails to earn 135 credits, and secure a pass in non-credit mandatory courses within six academic years from the year of his / her admission shall forfeit his / her seat and his / her admission stands cancelled.

RL 4.0 All other regulations are same as those applicable to the students admitted into B.Tech. I-Semester.

RL 5.0 Subjects are identified as exempted / compulsory / pre-requisites by the respective Chairman, Boards of Studies and recommended for study to make-up for any gaps in the curriculum for further study.

The student has to register for compulsory courses, attend the classes and qualify in examination.

The student has to register for the pre-requisite courses, attend the classes for which the evaluation is totally internal.

Compulsory and pre-requisite courses do not carry any credits.

RL 6.0 Marks obtained from the credit courses shall be considered for the award of class / division.

RL7.0 General:

i. Where the words 'he', 'him', 'his', occur, they imply 'she', 'her', 'hers', also.

ii. The academic regulation should be read as a whole for the purpose of any interpretation.

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

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

REVISED TRANSITORY REGULATIONS FOR STUDENTS SEEKING RE-ADMISSION INTO 2013 REGULATIONS

(detained due to shortage of attendance / lack of credits in earlier Regulations)

RT 1.0

1.1 The student has to continue the course work along with the regular students of the respective semester in which the student gets re-admission.

1.2 Substitute / compulsory subjects shall be offered in place of subjects that are already studied earlier. The student has to register for those courses.

1.3 The mode of internal evaluation (i.e., in-course assessments) and external evaluation (i.e., end-semester examinations) shall be on par with the regular students, i.e., the student has to follow the then mode of internal evaluation and the then question paper model for the end-semester examinations along with the regular students of the respective semester in which the student gets re-admission. The marks secured in the internal and external evaluation will be pro-rated in accordance with the regulations under which the student was first admitted.

1.4 For the subjects studied under earlier regulations but failed, the student has to appear, pass and acquire credits from the supplementary examinations as and when conducted. The question paper model shall remain same as that the student appeared under earlier regulations.

1.5 The promotion criteria based on attendance as well as credits shall be in accordance with the regulations under which the student was first admitted.

1.6 To be eligible for the award of the degree, the student shall complete the attendance requirements and appear for the end semester examination in all the courses for 224 credits, including the substitute/compulsory courses as prescribed in

the transitory course structure and shall acquire atleast 216 credits. The exemption of 8 credits is only from the four electives, namely, Elective-I, II, III, and IV.

1.7 All other academic requirements shall be in accordance with the regulations under which the student was first admitted.

1.8 The decision by the Principal is final on any other clarification in this regard.

RT 2.0 General:

2.1 Where the words 'he', 'him', 'his', occur, they imply 'she', 'her', 'hers', also.

2.2 The academic regulation should be read as a whole for the purpose of any interpretation.

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

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

DEPARTMENT OF CIVIL ENGINEERING

Vision

To provide excellent Civil Engineering Education which makes significant contribution to the economic development of the State, Region and Nation.

Mission

- To produce nationally-competitive undergraduate students for a successful career in Civil Engineering by imparting quality education
- To provide advanced skills and knowledge in state-of-the-art research and design in sub-areas of Civil Engineering and to prepare students to pursue higher studies to seek a professional career or entrepreneurship
- To inculcate in the students the importance of social service, through educational and professional activities, so that they become useful to the society

Programme Educational Objectives

The Graduates will be able to

PEO 1 Excel in professional career and/ or higher education by acquiring knowledge in Mathematical and Engineering principles.

PEO 2 Apply techniques, skills and modern engineering tools to work effectively as Civil Engineers.

PEO 3 Practice professional and ethical attitude, communicate and contribute effectively as part of a team and be able to adapt to current trends by engaging in lifelong learning.

Programme Outcomes

Graduates at the end of the programme will be able to :

PO 1 Apply the knowledge of mathematics, science, engineering fundamentals to solve complex civil engineering problems.

PO 2 Identify, formulate and analyse problems related to civil engineering and substantiate the conclusions.

PO 3 Design solutions for civil engineering problems and system components and processes that meet the specified needs with appropriate consideration to public health and safety.

PO 4 Perform analysis and interpretation of data by using research methods such as design of experiments to synthesize the information and to provide valid conclusions.

PO 5 Select and apply appropriate techniques from the available resources and modern civil engineering and software tools, and will be able to predict and model complex engineering activities with an understanding of the practical limitations.

PO 6 Carry out their professional practice in civil engineering by appropriately considering and weighing the issues related to society and culture.

PO 7 Understand the impact of the professional engineering solutions on environmental safety and legal issues.

PO 8 Transform into responsible citizens by resorting to professional ethics and norms of the engineering practice.

PO 9 Function effectively in individual capacity as well as a member in diverse teams and in multidisciplinary streams.

PO 10 Communicate effectively on complex engineering activities with the engineering community and society.

PO 11 Demonstrate knowledge and understanding of the engineering and management principles and apply the same while managing projects in multidisciplinary environments.

PO 12 Engage themselves in independent and life-long learning in the broadest context of technological change while continuing professional practice in their specialized areas of civil engineering.

COURSE STRUCTURE

SEMESTER - I

Code	COURSE TITLE	L	T	P	C
13BM1101	Mathematics-I	4	1	0	3
13CE1101	Surveying-I	4	1	0	3
13CT1102	Computer Programming through C	4	0	0	3
13BC1101	Chemistry	4	0	0	3
13CE1102	Elements of EE & ME	4	0	0	3
13BC1103	Chemistry Lab	0	0	3	2
13CT1103	Computer Programming Lab	0	0	3	2
13ME1103	Engineering Drawing	1	0	3	3
13NM1101	Professional Ethics	2	0	0	0
TOTAL		**23**	**2**	**9**	**22**

SEMESTER - II

Code	COURSE TITLE	L	T	P	C
13HE1101	English	4	0	0	3
13BM1102	Mathematics-II	4	1	0	3
13ME1102	Engineering Mechanics	4	1	0	3
13BP1101	Physics	4	0	0	3
13CE1103	Surveying-II	4	0	0	3
13HE1102	English Language Lab	0	0	3	2
13MT1101	Engineering Workshop	0	0	3	2
13BP1102	Physics Lab	0	0	3	2
13CE1104	Surveying Lab	0	0	3	2
TOTAL		**20**	**2**	**12**	**23**

SEMESTER - III

Code	COURSE TITLE	L	T	P	C
13BM1103	Probability Statistics and Numerical Methods	4	1	0	3
13CE1105	Building Materials and Construction	4	0	0	3
13CE1106	Strength of Materials- I	4	1	0	3
13CE1107	Fluid Mechanics	4	0	0	3
13CE1108	Concrete Technology	4	0	0	3
13CE1109	Building Planning and Design	4	0	0	3
13CE1110	Strength of Materials Lab	0	0	3	2
13CE1111	Concrete Technology Lab	0	0	3	2
13NM1102	Environmental Studies	2	0	0	0
	TOTAL	**26**	**2**	**6**	**22**

SEMESTER - IV

Code	COURSE TITLE	L	T	P	C
13HM1101	Managerial Economics and Financial Accounting	4	0	0	3
13CE1112	Strength of Materials - II	4	1	0	3
13CE1113	Hydraulics and Hydraulic Machinery	4	0	0	3
13CE1114	Structural Analysis- I	4	0	0	3
13CE1115	Reinforced Concrete Structures-I	4	1	0	3
13CE1116	Engineering Geology	4	0	0	3
13CE1117	Fluid Mechanics and Hydraulic Machines Lab	0	0	3	2
13CE1118	Engineering Geology Lab	0	0	3	2
	TOTAL	**26**	**02**	**6**	**22**

SEMESTER - V

Code	COURSE TITLE	L	T	P	C
13CE1119	Water Resources Engineering- I	4	0	0	3
13CE1120	Geotechnical Engineering- I	4	0	0	3
13CE1121	Structural Analysis- II	4	1	0	3
13CE1122	Transportation Engineering-I	4	0	0	3
13CE1123	Estimation and Quantity Surveying	4	0	0	3
13CE1124	Design of Steel Structures	4	1	0	3
13CE1125	Transportation Engineering Lab	0	0	3	2
13HE1103	Technical Communication and Soft Skills Lab	0	0	3	2
13ES11BC	Basic Computations Lab	0	0	3	2
TOTAL		**24**	**2**	**9**	**24**

SEMESTER - VI

Code	COURSE TITLE	L	T	P	C
13CE1126	Water Resources Engineering- II	4	0	0	3
13CE1127	Environmental Engineering- I	4	1	0	3
13CE1128	Transportation Engineering-II	4	0	0	3
13CE1129	Geotechnical Engineering- II	4	1	0	3
	ELECTIVE - I	4	0	0	3
13CE1130	Earthquake Resistant Design of Structures				
13CE1131	Industrial Waste and Waste Water Management				
13CE1132	Traffic Engineering				
13CE1133	Ports and Harbours				
	ELECTIVE - II	4	0	0	3
13CE1134	Air Pollution and Control				
13CE1135	Ground Improvement Techniques				
13CE1136	Advanced Structural Analysis				
13CE1137	Advanced Design of Steel Structures				
13CE1138	Computer Applications in Civil Engineering Lab	0	0	3	2
13CE1139	Geotechnical Engineering Lab	0	0	3	2
13NM1103	Intellectual Property Rights and Patents	2	0	0	0
TOTAL		**26**	**0**	**6**	**22**

SEMESTER - VII

Code	COURSE TITLE	L	T	P	C
13CE1140	Environmental Engineering-II	4	1	0	3
13CE1141	Prestressed Concrete	4	0	0	3
13CE1142	Construction Management	4	0	0	3
13CE1143	Reinforced Concrete Structures - II	4	1	0	3
13CE1144	Remote Sensing and GIS	4	0	0	3
	ELECTIVE - III	4	0	0	3
13CE1145	Introduction to Finite Element Method				
13CE1146	Transportation Planning and Design				
13CE1147	Soil Dynamics and Machine Foundations				
13CE1148	Design of Public Buildings				
13CE1149	Environmental Engineering Lab	0	0	3	2
13CE1150	Geomatics Lab	0	0	3	2
13CE11MP	Industry Oriented Mini-project	0	0	0	2
	TOTAL	**24**	**2**	**6**	**24**

SEMESTER - VIII

Code	COURSE TITLE	L	T	P	C
13CE1151	Reinforced Concrete Bridges	4	0	0	3
	ELECTIVE - IV	4	0	0	3
13CE1152	Environmental Impact Assessment				
13CE1153	Advanced Foundation Engineering				
13CE1154	Advanced Structural Design				
	OPEN ELECTIVE	4	0	0	3
13CE11SM	SEMINAR	0	0	3	2
13CE11CV	COMPREHENSIVE VIVA	0	0	0	2
13CE11PW	PROJECT WORK	0	0	16	8
	TOTAL	**12**	**0**	**19**	**21**

LIST OF OPEN ELECTIVES

CODE	COURSE TITLE	OFFERING DEPARTMENT
13CH1128	Design and Analysis of Experiments*	Chemical Engineering
13CE1155	Green Buildings and Infrastructure	Civil Engineering
13CE1156	Disaster Management	Civil Engineering
13CS1113	E-Commerce	Computer Science and Engineering
13CT1132	Software Project Management*	Computer Science and Engineering
13EC1140	Bio-Medical Instrumentation	Electronics and Communications Engineering
13EE1138	Electrical Safety Management	Electrical and Electronics Engineering
13EE1139	Reliability Evaluation of Engineering Systems	Electrical and Electronics Engineering
13EE1140	Design Concepts for Engineers	Electrical and Electronics Engineering
13EE1141	Special Electrical Machines for Industrial Applications	Electrical and Electronics Engineering
13IT1113	Neural Networks	InformationTechnology
13IT1114	Biometrics	InformationTechnology
13ME1143	Renewable Sources Of Energy*	Mechanical Engineering
13ME1153	Project Management*	Mechanical Engineering
13BP1103	Nano Technology	Physics
13HM 1104	Entrepreneurship and Small Business Management	Management Studies
13HM 1105	Financial Management	Management Studies
13HM 1106	Indian and International Business Environment	Management Studies

*These courses can be taken by the students of respective departments if they are not offered /opted earlier in the structure.

SYLLABI FOR I SEMESTER

MATHEMATICS-I
(Common to all Branches)

Course Code: 13BM1101

L	T	P	C
4	1	0	3

Pre requisites:

- Basic formulae of differentiation, product rule and quotient rule.
- Basic Integration formulae, integration by parts, definite integrals and properties.
- Basic concept of partial differentiation.

Course Outcomes:

At the end of the Course, Student will be able to

CO 1 Develop the ability to solve linear differential equations of first and higher order and use the knowledge gain to certain engineering problems

CO 2 Appraise the Laplace transform technique and use it to solve various engineering problems.

CO 3 Apply the techniques of multivariable differential calculus to determine extrema and series expansions etc. of functions of several variables.

CO 4 Extend the concept of integration to two and three dimensions and support it through applications in engineering mechanics.

CO 5 Generalize calculus to vector functions and interpret vector integral theorems.

UNIT-I **(12 Lectures)**

ORDINARY DIFFERENTIAL EQUATIONS:

Linear equations of first order, Bernoulli differential equation, Linear differential equations of higher order with constant coefficients, Method of Variation of parameters, Linear differential equations with

variable coefficients (Cauchy's homogeneous linear equation, Legendre's linear equation).

APPLICATIONS OF LINEAR DIFFERENTIAL EQUATIONS:

Orthogonal trajectories, Models on R-L-C circuits, Newton's law of cooling.
(11.9, 11.10, 13.1—13.7, 13.8(1), 13.9, 12.3, 12.5, 12.6)

UNIT-II (12 Lectures)

LAPLACE TRANSFORMS:

Laplace transform of elementary functions, properties, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, division by t, evolution of integrals by Laplace transforms.

INVERSE TRANSFORM:

Introduction, Finding inverse transforms by the method of partial fractions, other methods of finding Inverse Transform, Convolution theorem, Unit step function, and Unit impulse function.

APPLICATION OF LAPLACE TRANSFORMS:

Initial and Boundary Value Problems.
(21.1-21.5, 21.7-21.15, 21.17, 21.18)

UNIT-III (12 Lectures)

PARTIAL DIFFERENTIATION:

Total derivative, change of variables, Jacobians, Tangent Plane and Normal to the Surface, Taylor's theorem for functions of two variables.

APPLICATIONS OF PARTIAL DIFFERENTIATION:

Maxima and Minima of functions of two variables, Lagrange method of undetermined multipliers.
(5.5 – 5.9, 5.11, 5.12)

UNIT-IV (12 Lectures)

MULTIPLE INTEGRALS:

Introduction to Non-Cartesian Coordinates, Double integrals, Change of order of integration, Double integral in polar co-ordinates, Triple

integrals, Change of variables in double integrals, Change of variables in triple integrals. Simple Applications of Multiple Integrals**:** Area enclosed by plane curves, Volumes of solids.
(8.19-8.21, 7.1-7.7)

UNIT-V (12 Lectures)

VECTOR DIFFERENTIATION:

Differentiation of vectors, curves in space, velocity, acceleration, Scalar and Vector point functions. Gradient of a scalar field and directional derivatives- Divergence and curl of a Vector field and it's physical interpretation.

VECTOR INTEGRATION:

Line integral, Circulation, work done, surface and volume integrals.

Vector integral theorems: Green's, Stoke's and Gauss Divergence theorems (without proofs) and related problems.
(8.1- 8.16)

TEXT BOOK:

Dr.B.S.Grewal *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
2. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
3. Peter V. O'Neil, "*Advanced Engineering Mathematics*", 7th Edition, Cengage Learning, 2011.

SURVEYING - I

Course Code: 13CE1101

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Describe the principles and classification of surveying.

CO 2 Calculate angular measurement including true and magnetic bearings.

CO 3 Associate with plane table surveying.

CO 4 Measure levels and draw contours.

CO 5 Assess areas of irregular boundaries, volumes of borrow pits, embankments and capacity of reservoirs.

UNIT-I (15 Lectures)

INTRODUCTION:

Definition of Surveying- Primary divisions - Classification and principles of surveying- Difference between plan and map. Sources of errors-Linear and Direct measurements.

CHAIN SURVEYING:

Instrumentation for chaining – Types of Chains – Principles of chain surveying- Well conditioned triangle - Selection of Survey Stations - Check lines, Tie lines, Offsets. Errors due to incorrect chain-Chaining on un-even and sloping ground- Errors in chaining - Obstacles in chaining -Conventional signs.

UNIT-II (10 Lectures)

COMPASS SURVEYING :

Types of compass – Temporary adjustments – Types of Meridians and bearings – W.C.B. and R.B. – Conversion of bearings from one system to the other– Calculation of angles from bearings, Calculation

of bearing from angles - Calculations of included angle from bearings – Dip of a magnetic needle – Magnetic declination – Local attraction and its Corrections – Chain and compass traversing - Checks in closed and open traverse - closed traverse and its adjustment by Bowditch's rule.

UNIT-III (8 Lectures)

PLANE TABLE SURVEYING:

Introduction - Accessories- Working operations. Methods of plane tabling- Plane table traversing- Three point problem – Two point problem- Errors in plane tabling.

UNIT-IV (16 Lectures)

LEVELLING AND CONTOURING:

Levelling: Introduction and Terminology, Temporary and permanent adjustments- methods of leveling - Differential leveling, Profile levelling-Cross sections-Reciprocal leveling- Precise levelling . Booking and reduction of levels, H.I. methods - Rise and fall method-Checks, plotting of L.S & C.S.

Contouring: Contours- Uses of contours- Methods of conducting contour surveys and their plotting. Contour gradient-Uses of contour maps.

UNIT-V (12 Lectures)

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. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *"Surveying"* (Vol – 1), 18th Edition by Laxmi Publications (P) ltd., New Delhi, 2011.
2. Duggal S K, *"Surveying"* (Vol – 1), 10th Edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.

REFERENCES:

1. Arthur R Benton and Philip J Taety, *"Elements of Plane Surveying"* 8th Edition, McGraw Hill – 2000, 2010.
2. Arora K R *"Surveying"* (Vol 1, 2 & 3) 9th Edition, Standard Book House, Delhi, 2008.
3. Chandra A M, *"Plane Surveying"*, New age International Pvt. Ltd., Publishers, New Delhi, 2009.

COMPUTER PROGRAMMING THROUGH C

(Common to all Branches)

Course Code : 13CT1102

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Design Algorithms and draw Flowcharts.

CO 2 Develop Programs using functions.

CO 3 Develop Programs for Arrays and String manipulations.

CO 4 Use pointers in programs.

CO 5 Discuss structures, unions, files.

UNIT-I (12 Lectures)

Introduction to Computers , Algorithm/ Pseudo code, Flow chart, Program Development steps, Basic structure of C Program, Input and Output statements (printf() & scanf()), A Simple C Program, Identifiers, Basic data types and sizes, Constants, Variables, Operators, Type Conversion, Expression Evaluation, Precedence & Associativity of operators.

CONTROL STATEMENTS:

If, switch, for, while and do- while statements, break, continue and goto statements.Sample programs covering all the above topics.

UNIT-II (12 Lectures)

FUNCTIONS:

Definition, Advantages, types of functions- user defined and standard library functions, categories of functions, scope rules, recursion, storage classes. Sample programs covering all the above topics.

UNIT-III (12 Lectures)

ARRAYS:

Introduction to arrays, one dimentional arrays: Definition, Declaration, Initialization, Accessing & storing the elements, two dimentional arrays: Definition, Declaration, Initialization, Accessing & storing the elements, C Pre processors.

STRINGS:

String- Declaration, Initialization, pointers and strings, standard library string functions, array of pointers to strings. Sample programs covering all the above topics.

UNIT-IV (12 Lectures)

POINTERS:

Definition, Declaration of Pointer variables, the & and * operators, Pointer Expressions, Char, int, and float pointers, Pointer arithmetic, Passing addresses to functions, Functions returning pointers, Pointers & Arrays: Passing array elements to functions, pointer to pointer, array of pointers, Dynamic memory allocation functions, Sample programs covering all the above topics

UNIT-V (12 Lectures)

STRUCTURES & UNIONS:

Structures: Definition, Initialization, Accessing structures, nested structures, array of structures, additional features of structures, self referential structures, unions, type-def, bit fields, enum data type.

FILES:

Concept of a file, Text and Binary files, file I/O operations, Command line arguments. (Let Us C, Yashwant Kanetkar)

Sample programs covering all the above topics.

TEXT BOOKS:

1. B.A Forouzan and R.F. Gilberg, *"Computer science, A structured programming approach using C"*, 3rd Edition, Cengage Learning.

2. Yashwant Kanetkar, *"Let Us C"*, 12th Edition, BPB Publications, 2012.
3. Yashwant Kanetkar, *"Understanding pointers in C"*, 4th Edition, BPB Publications, 2009.

REFERENCES:

1. N. B. Venkateswarlu, E.V. Prasad, *"C & Data Structures"*, 1st Edition, S. Chand Publications, 2010.
2. K.R.Venugopal, S.R.Prasad, *"Mastering C"*, 1st Edition, TMH, 2007.

CHEMISTRY

(Common to all Branches)

Course Code: 13BC1101

L	T	P	C
4	0	0	3

Course Outcomes :

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

CO 1 Recall the principles, explain the working and design of energy storage devises.

CO 2 Extend the principles involved in corrosion to predict and control the corrosion in real life system.

CO 3 Classify the polymers and can apply to specific purposes.

CO 4 Analyze and determine the water quality and prescribe the remedial measures for domestic as well as industrial usage.

CO 5 Recite, explain and classify the characteristics of various engineering materials and explain their functioning

UNIT-I **(10 Lectures)**

ELECTROCHEMICAL CELLS:

Electrode potential, Nernst equation, EMF of electrochemical cell, Reference electrodes-Standard hydrogen electrode, calomel electrode. Electrochemical series, Concentration cell, Construction of glass electrode, determination of P^H of given solution using glass electrode

Batteries-Primary cell-Dry or Leclanche cell, alkaline battery; secondary cells (storage batteries or accumulators) – Lead-acid Accumulator, Nickel-cadmium battery, Lithium ion battery (LIB) and redox flow battery.

Fuel cells - hydrogen - oxygen fuel cell, phosphoric acid fuel cell, solid oxide fuel cells

UNIT-II (12 Lectures)

CORROSION AND ITS CONTROL:

Introduction - Direct chemical corrosion and electrochemical corrosion and its mechanisms, Types of electrochemical corrosion-Differential aeration corrosion, galvanic corrosion, concentration cell corrosion, pitting corrosion and stress corrosion, Galvanic series, passivity, factors influencing corrosion.

Corrosion control-proper designing, cathodic protection-sacrificial anodic protection and impressed current cathodic protection, modifying the environment and use of inhibitors.

Protective coatings- Anodic and cathodic coatings, Hot dipping-Galvanizing and Tinning, Metal cladding, Electroplating, Electroless plating, cementation or diffusion coatings.

UNIT-III (10 Lectures)

POLYMER TECHNOLOGY:

Polymerization, classification, degree of polymerization, functionality and tacticity of polymer, Types of polymerization addition and condensation polymerization, Mechanism of addition polymerization, Condensation polymerization, Preparation, properties and uses of polythene, PVC, Teflon, nylons-6,6, Polyester, Bakelite and Silicones.

Plastics- Thermo plastics and thermosetting plastics, compounding of plastics.

Elastomers-Natural and synthetic rubbers, Manufacture, properties and applications of natural rubber-vulcanization, compounding of rubber, Synthetic rubbers-Preparation, properties and applications of Buna-S and Buna-N.

UNIT-IV (12 Lectures)

WATER TECHNOLOGY:

Introduction-characteristics imparted by impurities, hardness of water –Temporary and permanent hardness- units, Determination of hardness by EDTA method, Disadvantages of hard water, Chemical aspects of scale and sludge formation in boilers, caustic embrittlement,boiler corrosion, priming and foaming, Municipal water treatment-

sedimentation, coagulation, and filtration, Desalination of brackish water, Water softening methods- lime -soda method, zeolite method and ion exchange process.

UNIT-V: (16 Lectures)

ENGINEERING MATERIALS:

Fuels- classification, characteristics of fuel, calorific value – determination of calorific value by Bomb calorimeter and Junkers gas calorimeter, theoretical calculation of calorific value, Types and Analysis of coal - Proximate and ultimate analysis of coal, Manufacture of coke- Petroleum: classification based on sources of petroleum, Refining of petroleum, Knocking, octane value, cetane value, Cracking -thermal cracking and catalytic cracking-fixed bed & moving bed catalytic cracking, reforming.

Cement: Classification of cement, chemical composition, functions of ingredients in Portland cement, Manufacture of Portland cement-raw materials, setting and hardening of Portland cement.

Refractories- Classification and properties of refractories, Failures of refractory materials.

Lubricants-friction, lubrication, functions of lubricants, mechanism of lubrication-thick film, thin film and extreme pressure lubrication, types of lubricants- solid, semisolid and liquid lubricants and their properties .

TEXT BOOKS:

1. Jain& Jain, *"A text book of Engineering Chemistry"*, 15th Edition, Dhanapat Roy publishing company, 2010.
2. Sasichawla, *"Engineering Chemistry"*, 3rd Edition, Dhanapat Roy publishing company, 2004.

REFERENCES:

1, S.S. Dara, *"A Text book of Engineering Chemistry"*, 11th Edition, S.Chand & Co, 2006.
2. C. Parameswara Murthy, C.V. Agarwal and Andhra Naidu, *"A Text Book of Engineering Chemistry"*, 1st Edition, B.S. Publications, 2006.

ELEMENTS OF EE AND ME

Course Code:13CE1102

L	T	P	C
4	0	0	3

Course Outcomes:

After completion of this subject, the students shall have knowledge about electrical circuits and equipments.

Students will be able to

CO 1 Solve different topologies of networks.

CO 2 Analyze the performance characteristics of transformers on different loading conditions.

CO 3 Describe and analyze the constructional features of Induction machine, Synchronous machine with their characteristics.

CO 4 Differentiate various welding processes.

CO 5 Differentiate various power transmissions drives.

UNIT-I (12 Lectures)

FUNDAMENTALS OF ELECTRICAL ENGINEERING:

Basic circuit elements - Resistance, Inductance and capacitance - Ohm's law, Kirchhoff's laws - Faraday's law of Electromagnetic Induction. AC fundamentals- Average and effective value-Series RL and RC circuits - Active power, Reactive power, Apparent power, Power Factor - Simple problems.

UNIT-II (12 Lectures)

TRANSFORMERS:

Single phase and Three phase transformers – Operation and construction, EMF equation, losses and efficiency - Simple Problems.

UNIT-III (12 Lectures)

AC MACHINES:

Construction and Principle of operation of three phase and single phase induction motors - Torque slip characteristics - Applications. Principle of operation of Alternators - Types of Alternators

UNIT-IV (12 Lectures)

MACHINE TOOLS:

General purpose machine tools – lathe, drilling machine, shaping machine, planing machine, milling machine.

WELDING:

Principles of welding, fundamentals of arc welding and arc cutting, gas welding and gas cutting.

UNIT-V (12 Lectures)

I.C.ENGINES:

Introduction, classification of I.C. engines, I.C. engine-parts and terminology, four stroke cycle engines –petrol and diesel, two stroke cycle engines – petrol and diesel, comparison between four stroke and two stroke cycle engines, comparison between petrol engine and diesel engine.

POWER TRANSMISSION:

Types of drives – belt drives – flat and V belts, Rope and Chain drives.

TEXT BOOKS:

1. K.VenuGopal & V.PrabhuRaja, *"Basic Mechanical Engineering"*, 10 Edition, Anuradha Agencies, 2011. (UNIT I and UNIT II)
2. R.K. Rajput, *"Basic Mechanical Engineering"*, 3 Edition, University Science Press, 2012. (UNIT-I)
3. V.K.Mehta and Rohit Mehta, *"Principles of Electrical Engineering"*, S.Chand Publications, 2008.
4. M.S Naidu and S.Kamakshaiah, *"Electrical Technology"* , TMH Publishers, 2006.

REFERENCES:

1. Basant Agarwal and C.M. Agarwal, *"Basic Mechanical Engineering,"* 3rd Edition, Wiley India, 2011
2. S.K.Hajra Choudary and A.K. Hajra Choudary, *"Elements of Workshop Technology"*, Vol1: Manufacturing Processes, 2007.
3. I.J. Nagrath and D.P Kothari, "*Theory and Problems of Basic Electrical Engineering"*, PHI Publications.
4. David V. Kerns, JR. J. David Irwin, "*Essentials of Electrical and Computer Engineering"*.
5. Vincent Del Toro, *"Electrical Engineering Fundamentals"*, PHI Publishers second Edition.

CHEMISTRY LAB
(Common to all Branches)

Course Code: 13BC1103

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Determine the metal ions by titrimetry

CO 2 Analyze various water quality parameters

CO 3 Determine the metal ions by reduction technique

CO 4 Apply instrumental methods to determine the characteristics of lubricants and fuels

CO 5 Determine the concentration of metal ions by potentiometry and spectrophotometry.

LIST OF EXPERIMENTS :

1. Determination of ferrous iron.
2. Determination of ferric iron.
3. Determination of total hardness of water.
4. Determination of carbonate and bicarbonate of water.
5. Determination of dissolved oxygen.
6. Determination of available chlorine in bleaching powder.
7. Determination of zinc by potassium ferrocyanide.
8. Determination of copper by EDTA method
9. Determination of calcium by permanganate.
10. Determination of iron-II by potentiometric method.
11. Determination of viscosity of lubricant by viscometer.
12. Determination of flash and fire points of lubricant.

13. Determination of percentage residue of carbon in oils.

14. Determination of calorific value of solid fuels.

15. Determination of fluoride by spectrophotometric method.

16. Determination of iron in cement by spectrophotometric method.

REFERENCE:

A.I.Vogel, *"A Text book of quantitive chemical analysis"*, 6th Edition, Pearson Education, Pvt. Ltd., 2002.

COMPUTER PROGRAMMING LAB

(Common to all Branches)

Course Code : 13CT1103

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Use RAPTOR tool in program development.

CO 2 Program mathematical operations using control statements.

CO 3 Develop Programs for Arrays and String manipulations.

CO 4 Implement Programs using functions, pointers, structures and unions.

CO 5 Implement Programs for File I/O operations

LIST OF PROGRAMS:

1. Demonstration of RAPTOR Tool to generate flowcharts by considering simple algorithms. Generation of flow charts to solve problems such as Temperature Conversion, Swapping of Two numbers etc. using RAPTOR Tool.
2. Write C Programs to solve problems such as Student Grading, Income Tax Calculation, and Largest of three Numbers etc., which expose students to various categories of IF Statements. Generate flowcharts using RAPTOR Tool.
3. a) Write a C program to find the roots of a quadratic equation.

   b) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

4. a) The total distance travelled by vehicle in 't' seconds is given by distance = $ut+1/2at^2$

   where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec^2). Write a C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.

   b) Write a C program to determine whether a given number is an Armstrong or not.

   (If the sum of the cubes of digits in the number is equal to the original number, then the number is called Armstrong number. Eg: 371 is Armstrong number ($3^3+7^3+1^3= 371$))

5. a) Write a C program to find the sum of individual digits of a positive integer.

   b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

6. a) Write a C program to calculate the following sum:

   Sum=$1-x^2/2! +x^4/4!-x^6/6! +x^8/8! -x^{10}/10!$

   b) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

7. a) Write a C program to generate Pascal's Triangle.

   b) Write a C program to construct a Pyramid of Numbers.

8. Write C programs that use both recursive and non-recursive functions for the following

   a) To find the factorial of a given integer.

   b) To find the GCD (greatest common divisor) of two given integers.

9. a) Write a C function to read in two numbers, x and n, and then compute the sum of this geometric progression:

   $1+x+x^2+x^3+\ldots\ldots\ldots\ldots + x^n$. Also perform error checking by considering negative values for n and also check for illegal values of x.

   b) Write a C function to read in two numbers, x and n (no. of terms), and then compute sin(x) and cos(x).

10. a) Write a C program to find the largest and smallest number in a list of integers.

    b) Write a C program to perform Matrix Addition & Matrix Multiplication.

    c) Write a C program to compute Transpose of a Matrix.

11. a) Write a C program to exchange value of two integers using call by value and call by reference.

    b) Write C programs to demonstrate the use of Pointers.

12. Write user defined string handling functions to implement the following standard library functions: strlen(), strcpy(), strcat(), strrev(), strcmp().

13. a) Write a C program that displays the position/ index in the string S where the string T begins, or –1 if S doesn't contain T.

    c) Write a C program to determine whether a given string is Palindrome or not.

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

    a) To insert a sub-string in to given main string from a given position.

    b) To delete n Characters from a given position in a given string.

    c) To replace a character of string either from beginning or ending or at a specified location.

15. a) Write a C program to find the two's complement of a binary number.

b) Write a C program to convert a Roman numeral to its decimal equivalent.

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

a) Reading a complex number.

b) Writing a complex number.

c) Addition of two complex numbers.

d) Multiplication of two complex numbers.

17. a) Write a C program which copies one file to another.

b) Write a C program to count the number of characters, lines, words, tabs and spaces in a given file.

ENGINEERING DRAWING

(Common to all Branches)

Course Code:13ME1103

L	T	P	C
1	0	3	3

Course Outcomes:

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

CO 1 Draw geometrical constructions, conics and cycloidal curves

CO 2 Draw projections of lines

CO 3 Draw projections of planes

CO 4 Draw projection of solids

CO 5 Draw isometric views

LIST OF EXERCISES

1. Introduction to engineering drawing & basics of geometrical construction
2. Construction of parabola, ellipse, hyperbola- general method
3. Cycloid, epicycloids, hypocycloid, involutes of circle and square
4. Projections of points
5. Projections of lines inclined to one plane
6. Projections of lines inclined to both the planes
7. Projections of planes inclined to one plane
8. Projections of planes inclined to both the planes
9. Projections of solids in simple positions
10. Projections of solids inclined to both the planes
11. Isometric views

TEXT BOOK:

N.D. Bhatt and V.M. Panchal, *"Engineering Drawing"*, Charotar Publication House, 49th Edition, 2008.

PROFESSIONAL ETHICS

(Common to all Branches)

Course Code: 13NM1101

L	T	P	C
2	0	0	0

Course Outcomes:

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

CO 1 Explain how to deal with complex situations arising out of interaction with people (Parents, friends and Co-professionals) in making the work environment congenial, encouraging and loving.

CO 2 Discriminate when he is forced through certain undesirable and ambiguous situations either in his day to day life as a student and as a professional in his career.

CO 3 Identify the basic tenets of leadership and to become a worthy professional.

CO 4 Relate codes of different professional bodies.

CO 5 Excellent job satisfaction.

UNIT-I (6 Lectures)

BASIC HUMAN VALUES:

'Be a Human First and then one can become a good Professional'; so the basic Human Values-Truth, Right Conduct (Righteousness), Love, Non-violence and Peace, Humility and character. What is ethics? Core areas of ethics: Social ethics, personal ethics Integrity and Trustworthiness, Honesty, Loyalty, Courage, Prudence, Confidence, Confidentiality.

Character: definition, 'A bundle of Virtues and weaknesses of Head and Heart- the resulting individuality of a person from the balance sheet of 'good' and 'bad qualities' is his/her character.

TRAITS OF GOOD CHARACTER:

Honesty and integrity, sense of duties and obligations to one's own profession, Adherence to truth and principles, excellent team work with a good rapport with the subordinates and colleagues, self-discipline, Responsibilities and accountability, self-lessness. Unity in thought, word and deed (Case studies relating to these aspects can be drawn from history & epics or from one's own experience)

Human values as practiced in the Indian societal context-past and present. (Examples drawn from any standard scriptures and many other sources available may be illustrated, debated and discussed).

Spirit of Nationalism and Patriotism with examples from 'struggle for Freedom' (Case studies in the lives of Mahatma Gandhi & His team who strived for Freedom from the British, Scientists and Engineers like Bhaha, Sarabhai, Dhavan, Abdul J Kalam, and Benjamin Franklin, Martin Luther King, or any renowned personalities)

UNIT-II (6 Lectures)

What is a profession? Who is a Professional? Special criteria to meet the definition of professional, criteria to be a 'professional engineer (Pages 24-36) of Mike W Martin and Roland Schinzinger)

The 5 Ds (Discipline, Devotion, Dedication, Discrimination and Determination) against 3 Ps (Pay-Prospects and Promotion)

Personal ethics-Social ethics and professional ethics – are they different-How would you distinguish? –A debate

General and Applied ethics, Relationship between these two in day-to-day functioning of an Engineering Professional- (Pages 10-12 of Mike W Martin and Roland Schinzinger)

PROFESSIONAL AND ENGINEERING ETHICS:

Why Engineering ethics? Moral issues encountered by professional engineers during their day-to-day operations both at home and office/ workplace- Moral problems that frequently arise in ones Profession, (case studies from Chapter 1 pages 2-9, analysis of the case studies on pages 13 &14)

MORAL AUTONOMY:

Moral integrity and social and professional behavior. Different theories proposed under moral autonomy-Kohlberg's and Gilligan's Theory. Heinz's Dilemma- Motive behind aggression (16-23 Pages)

LEADERSHIP IN PROFESSIONALISM:

Characteristics of a Leader? Case studies and examples (Leadership by Dr M L Chibber)

UNIT-III (6 Lectures)

Religion and Ethics and Morals-Debate and discussion- Spirituality, social consciousness and ethics

THEORY ABOUT MORALITY:

Virtue ethics, Utilitarianism, Duty ethics, Right ethics based on the concepts of Virtues and vices, most good for most people, Duties to respect for persons, Human rights respectively (pages 53-61, Study Questions for analysis and discussion on pages 60 &61)

Engineering Profession as a social responsibility, His responsibility and accountability while dealing with public issues such as safety, risk, hazards, Risk Analysis and assessment-a brief discussion (risk assessment problem on Page (Chapter 4, specified topics and Case studies)

(Present the case studies on Challenger space shuttle(97), Chernobyl (173), Bhopal tragedy (299), Titanic disaster (p 83), SLV-3, the Indian Space Shuttle (Wings of Fire) recent nuclear holocaust in Japan recent floods and other man-made and natural calamities or accidents we come across frequently in our society)

Environmental ethics (304-308) & Computer ethics 319-323328-330) (All Pages from Mike W Martin and Roland Schinzinger)

UNIT-IV (6 Lectures)

RESPONSIBILITIES AND RIGHTS OF ENGINEERS:

Collegiality (Ones attitude) towards other engineers working in the same Organization or outside) and Loyalty (to the Employer), obligation of Loyalty and misguided loyalty, Respect for authority

and its limitations, Bootlegging, Collective bargaining, Commitments and Convictions (APJ Abdul Kalam's "Wings of Fire") Confidentiality while changing jobs, Conflicts of interests, Gifts, bribes, kickbacks -case studies related, Occupational Crime and industrial espionage

Whistle blowing and moral guide line (case studies), Discrimination, preferential treatment and harassment Rights of Engineers (page 284-286)

Selected topics from Ch 5 and 6 and case studies on pages 200-201,

UNIT-V **(6 Lectures)**

Engineers as Managers and leaders promoting ethical climate (350-358)

–Ethics in Engineering by Mike W Martin and Roland Schinzinger)

Why a code of Ethics for professional Engineers? ('A code of ethics is not something you post on the Bulletin board; it is something you live every day in your life and career)

Code of ethics for Engineers, Organizational Culture, and Guidelines for use with the Fundamental canons of ethics; (pages 142-162 Indian Culture and Professional Ethics by P S R Murty and 399-414 0f Mike W Martin and Roland Schinzinger)

PROFESSIONAL BODIES:

IEEE, IETE, IE, ASME, ASCE, ABET, NSPE, ISTE Etc…

{** Any topic can be discussed and debated with known live examples and illustrations we find in our day-to-day -living circumstances.}

TEXT BOOKS :

1. Mike W Martin and Ronald Schinzinger : *"Ethics in Engineering"*, 3rd Edition, Tata McGraw Hill Education Pvt. Ltd., 2003.
2. P S R Murthy : *"Indian Culture, Values and Professional Ethics"*, 2nd Edition, B S Publications, Hyderabad. 2013.

REFERENCES:

1. M. Govindarajan, S Natarajan and V.S. Senthil Kumar : *"Engineering Ethics and Human Values"*, 1st Edition, PHI Publications , 2013.
2. A. Alavudden, R. Kalil Rahaman & M . Jayakumaran : *"Professional Ethics & Human Values"*, 1st Edition, University Science Press (An Imprint of Laxmi Publications Pvt Ltd., Chennai, Bangalore. 2008.
3. Lieunt Gen Dr. M. L. Chibber : *"Leadership-Education in Human Values"*, Sri Sathya Sai Books and Publications Trust, Prasantinilayam, 1st Edition, 2009.
4. Kalam A P J : *"Wings of Fire"*, Universities Press Publications, 2013.
5. Charles B. Fleddermann : *"Engineering Ethics"*, 4th Edition, PHI, 2012.

SYLLABI FOR II SEMESTER

ENGLISH

(Common to all Branches)

Course Code: 13HE1101

L	T	P	C
4	0	0	3

Course Outcomes:

The Students will be able to

CO 1 Read and answer questions (orally and in writing) based on passages.

CO 2 Identify and use selective vocabulary to enrich their writing.

CO 3 Discuss and evaluate textual and authentic materials

CO 4 Analyse facts, ideas and compose them as instructed.

CO 5 Write notes, summaries, and essays in descriptive and narrative modes.

SYLLABUS

UNIT-I **(13 Lectures)**

1. Story of Insects (English Today)
2. Bringing up Boys & Girls (Academic Encounters)
3. The Lunatic, the Lover and the Poet (The Siren's Song)
4. Vocabulary Building: Prefixes, Suffixes, One-Word Substitutes etc.

UNIT-II **(14 Lectures)**

1. Unity of Minds (English Today)
2. On His Blindness (The Siren's Song)
3. Cultural Variation & Change (Academic Encounters)
4. Grammar: Tenses & Concord

UNIT-III **(11 Lectures)**

1. Three Years She Grew in Sun and Shower (The Siren's Song)
2. Advertising in the Media (Academic Encounters)
3. Grammar: Articles & Prepositions
4. Paragraph Writing; Technical Description-Process, Object

UNIT-IV **(12 Lectures)**

1. A Special Kind of Blessing (English Today)
2. Techniques of Solving Crimes (Academic Encounters)
3. La Belle Dame Sans Merci (The Siren's Song)
4. Précis writing &Letter Writing

UNIT-V **(10 Lectures)**

1. I Have A Dream (English Today)
2. Because I Could not Stop for Death (The Siren's Song)
3. Writing: Note Taking & Note Making ,Essay writing
4. Grammar: Simple, Compound & Complex Sentences

TEXTBOOKS:

1. Kristine Brown & Susan Hood, *"Academic Encounters: Life in Society Reading, Study Skills, Writing, London"*, Cambridge University Press/ Foundation Books, 2006.
2. K Durga Bhavani, G. K. Subbarayuydu, C. Vijayasree, D. Prema Kumari & Y. L. Srinivas, *"English Today: A Course in Reading and Writing"*, Foundation Books, 2005.
3. David Murdoch, The Siren's Song, "*An Anthology of British and American Verse"*, Madras, Orient Longman, 1993.

REFERENCES:

1. Alec Fisher, *"Critical Thinking An Introduction"*, New Delhi: CUP, First South Asian Edition, 2011.
2. Bikram K. Das, Kalyani Samantray, Rath Nayak, Susmita Pani & Saveeta Mohanty, "*An Introduction to Professional English and Soft Skills"*, New Delhi, Foundation Books, 2009.

3. *"Regional Institute of English, English for Engineers"*, New Delhi, Foundation Books, 2006.
4. Sharon J.Gerson, Steven M.Gerson, *"Technical Writing"*, New Delhi, Pearson education, 2007.

SUGGESTED READING:

Stories of humour, adventure, mystery and autobiographies of eminent scientists.

MATHEMATICS-II
(Common to all Branches)

Course Code:13BM1102

L	T	P	C
4	1	0	3

Pre requisites:

- Basic formulae of differentiation and integrations.
- Basic terminology and elementary operations on Matrices.
- Basic concept of partial differentiation.

Course Outcomes:

At the end of the Course, Student will be able to:

CO 1 Solve the linear system of equations analytically and compute Eigen values and eigenvectors of a square matrix.

CO 2 Solve linear system of equations numerically and compute eigen values and eigenvectors of a square matrix.

CO 3 Discuss and demonstrate difference equations to discrete systems.

CO 4 Calculate Fourier series and Fourier transforms for certain functions.

CO 5 Classify and solve partial differential equations and apply it to heat flow and wave propagation problems.

UNIT-I **(12 Lectures)**

MATRICES:

Rank, Normal form, Echelon form, Consistency and Solution of system of simultaneous linear homogeneous and non-homogeneous equations. Finding eigenvalues and eigen vectors, properties, Cayley-Hamilton theorem, computing inverse and powers of a matrix by applying Cayley-Hamilton theorem, Diagonalisation of matrix.

(2.7, 2.10, 2.13 -2.16)

UNIT-II (12 Lectures)

NUMERICAL METHODS IN LINEAR ALGEBRA:

Solution of linear simultaneous equations: LU decomposition, Jacobi iteration and Gauss-Seidel methods. Determination of eigenvalues and eigen vectors by iteration (Rayleigh's Power Method) .

(28.5, 28.6(3), 28.7(1)(2), 28.9)

UNIT-III (12 Lectures)

DIFFERENCE EQUATIONS AND APPLICATIONS:

Difference operators (forward, backward and shift operators), Introduction to difference equation, formation of difference equation, Linear difference equations and it's complete solution. Rules for finding the complementary function and complete integral, Deflection of a loaded string.

(29.1, 29.4, 31.1 - 31.6, 31.8)

UNIT-IV (12 Lectures)

FOURIER SERIES:

Euler's formulae, Dirichlet's Conditions for a Fourier expansion, functions having points of discontinuities, Change of interval, even and odd functions, half range series, wave forms.

FOURIER TRANSFORMS :

Fourier integral theorem, Fourier transform and inverse Fourier transform, Fourier sine and cosine integrals. – Fourier sine and cosine transforms – properties of Fourier Transforms – Finite Fourier transforms.

(10.1 – 10.9, 22.1 – 22.5)

UNIT-V (12 Lectures)

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 first order (standard type) equations.

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS:

Method of separation of variables, Classification of second order linear Partial Differential Equations. Solutions of one dimensional heat equation, wave equation and two-dimensional Laplace's equation under initial and boundary conditions. (17.1 – 17.3, 17.5, 17.6, 18.1-18.7)

TEXT BOOK:

Dr.B.S.Grewal *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
2. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
3. Peter V. O'Neil, "*Advanced Engineering Mathematics*", 7th Edition, Cengage Learning, 2011.

ENGINEERING MECHANICS

(Common to all Branches)

Course Code: 13ME1102

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Convert a given physical problem into a suitable force system, Draw the Free Body Diagrams and find the resultant force.

CO 2 Solve problems involving static and kinetic friction.

CO 3 Identify the centroid of a given plane area and find its area/ mass moment of inertia.

CO 4 Calculate the displacement, velocity and acceleration of a body subjected to rectilinear, curvilinear translation, fixed axis rotation.

CO 5 Apply the work-energy principle to particles and connected systems.

UNIT-I (13 Lectures)

RESULTANTS OF FORCE SYSTEM:

Parallelogram law, forces and components, resultant of coplanar concurrent forces, components of forces in space, moment of force, principle of moments, coplanar applications, couples, resultant of any force system (coplanar concurrent cases only).

Equilibrium of force systems: Free body diagram, equations of equilibrium, equilibrium of planar systems, further discussion of planar equilibrium.

UNIT-II (09 Lectures)

FRICTION:

Theory of friction, angle of friction, laws of friction, static friction,

kinetic friction, friction in bodies moving up or down on an inclined plane, wedge friction, screw friction and screw jack.

UNIT-III (14 Lectures)

CENTROIDS AND CENTERS OF GRAVITY:

Center of gravity of flat plate, centroids of areas and lines, importance of centroids of areas and lines, importance of centroids and moments of area, centroids determined by integration, centroids of composite figures, theorem of Pappus, center of gravity of bodies.

MOMENT OF INERTIA:

Definition of moment of inertia, polar moment of inertia, radius of gyration, parallel axis theorem, moments of inertia by integration, moments of inertia for composite areas.

UNIT-IV (12 Lectures)

MASS MOMENT OF INERTIA:

Introduction, radius of gyration, parallel axis theorem, mass moments of inertia by integration, moments of inertia of composite bodies.

KINEMATICS AND KINETICS OF A PARTICLE:

Motion of a particle, rectilinear motion, rectangular components of curvilinear motion, normal and tangential components of acceleration, radial and transverse components, cylindrical coordinates, translation-analysis as a particle, further discussion of particle kinematics.

UNIT-V (10 Lectures)

KINEMATICS AND KINETICS OF A BODY UNDERGOING FIXED AXIS ROTATION:

Types of rigid-body motion, angular motion-fixed axis rotation, application of kinematic equations, kinetics of fixed axis rotation.

WORK-ENERGY METHOD:

Work-energy equation for translation, interpretation and computation of work, work-energy applied to particle motion, power, efficiency, applied to fixed-axis rotation, work-energy applied to connected systems, work-energy method.

TEXT BOOK:

Vijaya Kumar Reddy K and Suresh Kumar J(Adapters), "*Singer`s Engineering Mechanics : Statics and Dynamics*", Third edition (SI Units), BS Publications, Hyderabad, 2011.

REFERENCES :

1. Timoshenko S.P and Young DH, Rao and Pytel, "*Engineering Mechanics*", fourth edition, McGraw Hill international editions, 2013.
2. Hibbeler RC, " *Engineering Mechanics : Statics* ", low price edition, Pearson Education,2000.
3. Hibbeler RC, " *Engineering Mechanics : Dynamics* ", low price edition, Pearson Education,2000.
4. Tayal AK "*Engineering Mechanics: Statics and Dynamics*", Thirteenth edition, Umesh Publications, Delhi, 2005.

PHYSICS

(Common to all Branches)

Course Code: 13BP1101

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Interpolate the knowledge of elastic and acoustic response of materials for various applications.

CO 2 Summarize the basic theories of electrostatics and dielectrics to solve a variety of problems.

CO 3 Convert the knowledge of basic principles of electromagnetism to design electrical and electronic devices

CO 4 Resolve the discrepancies in classical estimates through quantum principles and classify the solids.

CO 5 Realize the principles of optics in designing optical devices.

UNIT-I **(10 Lectures)**

ELASTIC PROPERTIES OF MATERIALS & ARCHITECTURAL ACOUSTICS:

Introduction – classification of stress, strain and Hooke's law – Elastic behavior of materials – Poisson's ratio and relationship between modulus of elasticity – Twisting couple on a solid shaft – bending of beams – bending moment - Y by cantilever – Uniform bending - Reverberation and reverberation time – absorption coefficient – Sabine's law (quantitative treatment) – Factors affecting the acoustics of buildings and their remedies – Acoustical design of a hall.

UNIT-II **(15 Lectures)**

ELECTROSTATICS AND DIELECTRICS:

Vectors - unit vectors - Gradient of a scalar field – divergence & curl

of a vector field – Coulombs law - Electric flux - Gauss law in electrostatics – differential form of Gauss law – derivation of Coulombs law from Gauss Law – Applications of Gauss Law (Electric Field due to a solid charged sphere and thin sheet of charge) - Gauss law in dielectric medium - Dipole - Electric displacement vector - Dielectric permittivity and susceptibility- Dielectric constant and dielectric polarization in materials - Types of polarizabilities - Electronic polarizability derivation - Internal fields in solids and Claussius - Mosotti equation - frequency dependence of dielectric constant - Dielectric loss - Dielectric Strength and dielectric breakdown - important dielectric materials in electrical engineering.

UNIT-III (10 Lectures)

ELECTROMAGNETICS:

Biot-Savart Law - Magnetic flux – Magnetic scalar potential - Magnetic Vector Potential - Ampere's law – Force and torque on a magnetic dipole due to external magnetic field, Magnetization - Bound volume and surface current densities - auxiliary field H (Ampere's law in magnetized materials) - Magnetic susceptibility and permeability - Force on charged particle under electric and magnetic fields - Faraday's law of electromagnetic induction - Self and mutual Inductances - Displacement current density - Maxwell's equations – Physical Significance of Maxwell's equations.

UNIT-IV (10 Lectures)

WAVE MECHANICS & BAND THEORY OF SOLIDS:

Introduction to wave mechanics – wave particle duality – de-Broglie matter waves – Wave function characteristics and significance – Schrodinger's time independent wave equation – particle in one dimensional rigid box - Fermi-Dirac distribution function – Fermi level - Effect of temperature on Fermi function - Bloch theorem (Qualitative), Kronig - Penny model (Qualitative treatment) – Concept of effective mass, Origin of energy band formation in solids – Classification of materials into conductors, semi-conductors and insulators based on number of effective electrons.

UNIT-V (15 Lectures)

OPTICS & LASERS

Introduction to optics – Interference phenomenon - interference through thin films in reflected light – Newton's rings – determination of wave length of a source – Diffraction due to single slit – intensity pattern discussion – Diffraction grating – Resolving Power of grating (qualitative) - Polarization – Law of Malus - Brewster's law – double refraction – Nicol prism - Basic principle of a LASER – Induced absorption, spontaneous and stimulated emissions – Einstein's coefficients – Population inversion – Ruby laser, CO_2 laser and Semiconductor laser – Laser Applications – Introduction to optical fibers – Classification of fibers on the basis of refractive index profile – Acceptance angle and numerical aperture definitions and expression for Numerical aperture – Applications relating to communication and sensors (force and temperature).

TEXT BOOKS:

1. D.J. Griffiths, *"Introduction to Electrodynamics"*, 3rd Edition, PHI (EEE series), 2009.
2. M.N. Avadhanulu, P.G. Kshirasagar, *"A Text book of Engineering Physics"*, 10th Edition, S. Chand & Company Limited, 2013.
3. V. Rajendran, *"Engineering Physics"*. 2011 Edition, TMH Publishing Company, 2011.

REFERENCES:

1. A.J. Dekker, *"Electrical Engineering Materials"*, 1st Edition, Macmillan Publishers, 2007.
2. C. Kittel, *"Introduction to Solid State Physics"*, John Wiley Publishers, 2007.
3. M.N.Sadiku, *"Elements of Electromagnetics"*, 4th Edition, Oxford University Press, 2007.
4. V. Raghavan, *"Materials Science"*, 5th Edition, PHI Publishers, 2007.

5. R.K. Gaur, S.L. Gupta, *"Engineering Physics"*, 8th Edition, Dhanapat Rai Publishers, 2003.
6. P.K. Palanisamy, *"Applied Physics"*, 2nd Edition, Scitech Publishers, 2010.
7. M. R. Srinivasan, *"Engineering Physics"*, New Age Publishers, 2012.

SURVEYING - II

Course Code: 13CE1103

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Describe the various components of Theodolite and temporary adjustments.

CO 2 Prepare theodolite traversing including closing error and trigonometric levelling.

CO 3 Operate tacheometry both stadia and tangential and also of triangulation.

CO 4 Prepare different types of horizontal curves as simple circular, compound, reverse and transition curves.

CO 5 Apply the importance of geodetic surveying, GPS, GIS and Total station.

UNIT-I (12 Lectures)

THEODOLITE:

Types of theodolites – Temporary Adjustments of theodolite, Measurement of horizontal angle - Method of repetition and reiteration, Measurement of vertical angle – Uses of theodolite – Errors and Permanent adjustments of a theodolite.

UNIT-II (10 Lectures)

TRAVERSING :

Theodolite traversing – Open and closed traverse – Closing errors, balancing the error – Bowditch method – Transit method, omitted measurements.

Trigonometric levelling – Elevation of top of the tower - same plane - Different planes – Axis signal correction.

UNIT-III (14 Lectures)

TACHEOMETRY:

Tacheometry – Principle of tacheometry – Stadia methods – Fixed hair method – Movable hair method – Tangential method – Subtense bar – Beaman's stadia Arc.

Triangulation – Classification-inter visibility of station – Signals and towers-base line measurements – Corrections – Satellite station and Reduction to centre – Base net.

UNIT-IV (15 Lectures)

CURVES

TYPES OF CURVES:

Simple curves – Elements of simple curves – Methods of setting simple curves – Rankine's method – Two theodolite method– Compound curves – Elements of compound curves. Reverse curves – Elements of reverse curve – Determination of various elements of a Transition curves - Setting out methods.

UNIT-V (08 Lectures)

ADVANCED SURVEYING:

Introduction to geodetic surveying, Total station and global positioning system- Introduction to Geographic Information System (GIS)

TEXT BOOKS :

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain *"Surveying"* (Vol – 1&2) 18th Edition, by Laxmi Publications (P) ltd., New Delhi, 2011.
2. Duggal S K, *"Surveying"* (Vol – 1&2), 10th Edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.

REFERENCES:

1. Arthur R Benton and Philip J Taety, *"Elements of Plane Surveying"* 8th edition, McGraw Hill – 2000, 2010.
2. Arora K R *"Surveying"* (Vol 1, 2 & 3), 9th Edition, Standard Book House, Delhi, 2008.

3. Chandra A M, *"Plane Surveying"*, 4th Edition, New Age International Pvt. Ltd. New Delhi, 2009.

ENGLISH LANGUAGE LAB
(Common to all Branches)

Course Code : 13HE1102

L	T	P	C
0	0	3	2

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Course Outcomes :

The Students will be able to:

CO 1 Distinguish and use spoken English and respond appropriately.

CO 2 Use language in formal and informal contexts.

CO 3 Demonstrate oral skills in debates and group discussions.

CO 4 Show fluency in speech

CO 5 Identify the sounds of English and use stress and intonation in connected speech

SYLLABUS:

The following course content is prescribed for the English Language Laboratory sessions:

1. Introduction to the Sounds of English- Vowels, Diphthongs & Consonants.
2. Introduction to Stress and Intonation.
3. Listening for Comprehension
4. Situational Dialogues.
5. Oral Presentations- Prepared & Extempore
6. 'Just A Minute' Sessions (JAM)
7. Telephonic communication
8. Group Discussions

9. Debate
10. Team Presentations (PPTs).
11. Reference Skills

REFERENCES:

1. E. Suresh Kumar , P. Sreehari, *"A Handbook for English Language Laboratories"*, Foundation Books, Revised Edition 2010.
2. Simon Sweeny, *"English for Business Communication"*, CUP, 2nd Edition, 2003.
3. Daniel Jones, English Pronouncing Dictionary with CD, 17th Edition, 2006.
4. T. Balasubramanian, *"A Text book of English Phonetics for Indian Students"*, 2nd Edition, Trinity Press/Lakshmi Publications, 2013..
5. Jeremy Comfort, Pamela Rogerson, Trish Stott & Derek Utley, *"Speaking Effectively : Developing Speaking Skills for Business English"*, Cambridge University Press, First South Asian Edition,2002.Reprint 2011.
6. T Samson, *"Innovate With English"*, New Delhi: Foundation Books, 2010.
7. Meenakshi Raman & Sangeeta Sharma, *"Technical Communication Principles & Practice"*, 2nd Edition, New Delhi: OUP, 2012.
8. E. Suresh Kumar, P. Sreehari, J. Savithri, "English for Success", New Delhi, Foundation Books, 2012.

ENGINEERING WORKSHOP

(Common to all Branches)

Course Code :13MT1101

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Identify components of computer, components in CPU and demonstrate the assembly and disassembly of personal computer, troubleshooting and install MS Windows, Linux.

CO 2 Create word documents, spreadsheets and power point presentations.

CO 3 Create basic animations using adobe flash.

CO 4 Prepare the wooden pieces into lap, mortise and tennon joints. Prepare different forms of fit on metal pieces and identify different types of patterns used for mould preparations providing necessary allowances.

CO 5 Identify different types of tools used in black smithy and tin smithy. Prepare the models by solid metals and sheet form metals and discuss the types of welding processes and equipments for preparing welded joints.

COMPULSORY EXERCISES:

1. Identification of the peripherals of a computer, components in a CPU and its function – Block diagram of the CPU along with the configuration of each peripheral. Disassembly and assembly of a personal computer.
2. Installation of MS windows on the personal computer.
3. One lamp controlled by a one-way switch and (b) Two-way switching for stair-case lamp.

ANY NINE EXPERIMENTS FROM THE FOLLOWING:

Carpentry: Making a Cross-half lap joint using wooden pieces.

Carpentry: Making a Mortise and Tenon joint using wooden pieces.

Fitting: Preparation of a V-fit between mild steel flat pieces.

Fitting: Preparation of a Square-fit between mild steel flat pieces.

Foundry: Preparation of a sand mould using a single piece pattern

Foundry: Preparation of a sand mould using a split piece pattern.

Tin-Smithy: Preparation of a sheet metal pipe-joint using tin-smithy tools.

Tin-Smithy: Preparation of a sheet metal funnel using tin-smithy tools.

Welding: Making a Lap joint through arc welding.

Lathe Machine: Demonstration of turning related activities on Lathe machine.

Black smithy: Demonstration of Plumbing trade.

Plumbing: Demonstration of plumbing trade

Operating System: Changing Boot Device Priority, Installation of Linux, putting passwords, Enabling and disabling external devices, Connectivity Boot Camp.

Hands on Exposure on Linux shell commands: Using man, info commands for finding information about commands. Using file processing commands (ls, cp, mv, ln, mkdir, rmdir, chmod etc..), Using text processing commands (grep, egrep, sed etc…), Using disk utility commands, mount commands (du, df, mount etc..), Vi-Editor.

MS-Word: Using Ms-Word, creating project abstract, creating newsletter, creating feedback form

MS- Excel: Excel orientation, creating scheduler, calculating CGPA, Performance Analysis

MS-PowerPoint: PPT Orientation, Slide Layouts, Custom Animation, Hyperlinks, inserting Images, Clip Art, Audio, Video, Objects, Tables, Charts.

System tools, Hardware Troubleshooting, Software Troubleshooting and Installations of Anti Virus.

Multimedia Flash (Adobe)

a. Introduction to Flash interface

b. Introducing the tools

c. Putting text into Flash

d. Smoothen/straighten drawings

e. Animation Part 1: Using layers, key frames and motion tweening

f. Animation Part 2: Shape tweening, motion guide and frame by frame animation

PHYSICS LAB

(Common to all Branches)

Course Code: 13BP1102

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Demonstrate the elastic response of loaded beams; estimate the frequency of a vibrating system using standing wave pattern.

CO 2 Familiarize with CRO; assess the resonant frequency and quality factor of electrical oscillations.

CO 3 Estimate the strength of the magnetic field due to a current carrying coil.

CO 4 Interpolate some of the physical parameters based on optical phenomena.

CO 5 Realize explicit knowledge on the working and performance of photocells.

ANY TEN OF THE FOLLOWING 15 EXPERIMENTS

ERROR ANALYSIS AND GRAPH DRAWING (LECTURE - DEMO)

1. Bending of beams – Elliptical and Hyperbolic fringes - Determination of 'Y'.
2. Torsional pendulum - comparison of rigidity modulii of various wires.
3. Melde's experiment – determination of frequency of electrically maintained tuning fork.
4. Determination of wavelength of laser light using diffraction through a graded scale.
5. Particle size determination using He-Ne laser (Lycopodium powder).

6. Diffraction grating – determination of wavelengths of spectral lines of Mercury spectrum by minimum deviation method.
7. Spectrometer – determination of dispersive power of the material of a prism.
8. Polarization of light – verification of Malu's law and to determine the Brewster's Angle for glass.
9. Determination of Planck's constant.
10. Solar cell characteristics – I-V characteristics, measurement of efficiency and Fill factor.
11. Stewart – Gee apparatus – study of variation of magnetic field along the axis of circular current carrying loop.
12. LCR series and parallel resonance circuit to study the frequency response.
13. Familiarity of CRO – Lissajjou's figures - determination of time period, voltage, frequency and phase of a wave.
14. Newton's Rings- determination of wavelength of the source/ radius of curvature of given convex lens.
15. Optical fibres- determination of Numerical aperture, acceptance angle and bending losses.

SURVEYING LAB

Course Code : 13CE1104

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Calculate the area using conventional surveying instruments.

CO 2 Measure bearings of lines with a prismatic compass for open and closed traverses.

CO 3 Compute level differences between different stations by dumpy level.

CO 4 Operate theodolite to find heights and distances as well as conducting tacheometric surveying.

CO 5 Prepare horizontal, circular curves (simple, compound & reverse) by Rankine's method of deflection angles using theodolite.

LIST OF EXERCISES:

1. Measuring of an area by Chain Surveying and Plotting.
2. An exercise on Chaining/ Ranging across obstacles.
3. Determination of distance between two in accessible points using compass.
4. Closed Traversing by compass & graphical adjustment.
5. Open traversing by compass and plotting.
6. Measurement of elevation difference between two points using dumpy level by Height of Instrument & Rise and fall methods (by taking atleast two change points)
7. Profile levelling – an exercise of Longitudinal Section and Cross Section and plot the profile.

8. Contouring of a small area by method of blocks / grids.
9. Measurement of horizontal angles by method of repetition and reiteration by Theodolite.
10. Trignometric levelling – determination of a given Tower / Building height with base is accessible and in-accessible.
11. Heights and distance using principle of tachometric surveying.
12. Setting out simple curve.

NOTES

SYLLABI FOR III SEMESTER

PROBABILITY, STATISTICS AND NUMERICAL METHODS
(Common to CSE, IT & CE)

Course Code: 13BM1103

L	T	P	C
4	1	0	3

Pre requisites:

- Fundamentals of Set theory and calculus.
- Basic concepts of Probability and Discrete Random Variables.

Course Outcomes:

At the end of the course student will be able to

CO 1 Examine, analyze, and compare Probability distributions.

CO 2 Determine confidence intervals for population parameters.

CO 3 Prepare null and alternative hypothesis and test its validity based on random samples.

CO 4 Determine numerical solution of algebraic and transcendental equations and discuss different difference operators.

CO 5 Use interpolation techniques for data analysis and numerically solve initial value problems.

UNIT-I **(12 Lectures)**

Review of basic concepts in Probability and Discrete Random variables, Continuous Random variables - Probability density, Distribution. Calculating probabilities from Probability density, Determining Mean and Variance using Probability density, Normal Distribution- Density and Properties. Calculating Normal Probabilities, Normal Approximation to Binomial Distribution, Uniform Distribution.

(5.1, 5.2, 5.3, 5.5 of [1])

UNIT-II (12 Lectures)

Population and sample, Sampling distribution of the mean(s known), Central Limit theorem

(without Proof) and Problems, Sampling distribution of the mean(s unknown), Point Estimation, Maximum error and determination of sample size, Interval Estimation (Large sample and small sample)

(6.1, 6.2, 6.3, 7.1, 7.2 of [1])

UNIT-III (12 Lectures)

Tests of Hypotheses (Introduction, Null hypotheses, Alternative hypotheses, Type –I,II errors, Level of significance, Hypotheses concerning one mean (Large and Small samples), Inference concerning two means (Large and Small samples), Paired t-test.

Estimation of Variances (point and Interval estimation), Hypotheses concerning one variance, Hypotheses concerning two variance, Estimation of Proportions, Hypotheses concerning one Proportion, Hypotheses concerning several Proportions.
(7.3, 7.4, 7.5, 7.8, 8.1, 8.2, 8.3, 9.1, 9.2, 9.3 of [1])

UNIT-IV (12 Lectures)

Introduction to Numerical Methods, Solution of algebraic and transcendental equations-Bisection method, Method of false position Newton's method.

Finite differences-Forward differences Backward differences, Central differences, Differences of a polynomial, Other Difference operators – Shift operator, Average operator, Relations between the operators.

(28.1 to 28.3, 29.1, 29.2, 29.4, 29.5 of Text book [2])

UNIT-V (12 Lectures)

Newton's interpolation formulae- Newton's forward interpolation formula Newton's backward interpolation formula, Interpolation with un equal intervals: Lagrange interpolation, Divided differences,

Newton's divided difference formula, Inverse interpolation.

Numerical solutions of Ordinary differential equations: Euler's Method, Modified Euler's Method, Runge-Kutta method of order 4.

(29.6, 29.9 - 29.13, 32.4, 32.5, 32.7 of Text book [2])

TEXT BOOKS:

1. Richard A.Johnson, C.B.Gupta, "*Miller. Freund's Probability and Statistics for Engineers",* Seventh Edition, Pearson Education, 2005.
2. Dr.B.S.Grewal, *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. S. S. Sastry, *"Introductory Methods of Numerical Analysis",* 4th Edition, Prentice Hall India Pvt., Limited, 2005.
2. S.C. Gupta and V.K. Kapoor, *"Fundamentals of Mathematical Statistics",* Ninth Revised Edition , Sultan Chand & Sons Educational Publishers, 2007.

BUILDING MATERIALS AND CONSTRUCTION

Course Code: 13CE1105

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Distinguish various types of bricks & stones used in construction and their requirement.

CO 2 Determine the principal properties of structural steel and insulating materials as wood.

CO 3 Associate with construction of brick & stone masonry

CO 4 Explain different components & systems of buildings

CO 5 Infer the concept of water proofing, damp proofing materials and construction techniques

UNIT-I (15 Lectures)

BRICKS & STONES:

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, Qualities of a good brick, Various methods of manufacture of bricks. Comparison between clamp burning and kiln burning, Other types of bricks.

FERROUS AND NON-FERROUS METALS:

Ferrous metals: Desirable characteristics of reinforcing steel. Principles of cold working. Detailed discussion on reinforcing steel, Mechanical and Physical properties, Chemical composition. Non-Ferrous Metals: Aluminum- Brief description on properties and uses.

UNIT-II (8 Lectures)

TIMBER:

Timber Structure – Properties – Seasoning of timber, Classification

of various types of timbers used in buildings – Defects in timber, Preservation of timber, Fire resistance of timber and Testing of timber.

UNIT-III (15 Lectures)

MASONRY:

Brick masonry – Bonding of bricks, Method of laying of bricks, Inspection of brick work, Construction of half brick masonry wall, Height of walls in brick masonry and brick piers. Stone masonry – Classification of stone masonry – Random Rubble, Coursed Rubble and Ashlar masonry.

UNIT-IV (12 Lectures)

BUILDING COMPONENTS:

Lintels, Arches and Vaults - Staircases – Types. Different types of flooring-Concrete, Mosaic, Terrazo floors; Different types of roofs-Pitched, Flat and Curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. Doors & Windows – Types, Sizes and Rate.

UNIT-V (10 Lectures)

OTHER CONSTRUCTION TECHNIQUES:

Damp Proofing and Water Proofing- Materials used- Specifications of Damp Proof Course in walls, Basic principles of water proofing of basements, Plastering, Pointing, White washing, Distempering and Painting, Form work and Scaffolding.

TEXT BOOKS:

1. S K Duggal, *"Building Materials"*, 2nd Edition, New Age International Publishers, 2010.
2. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *"Building Construction"* - Laxmi Publications (P) Ltd., New Delhi.
3. P.C. Varghese, *"Building Construction"*, Prentice-Hall of India Private Ltd, New Delhi.

REFERENCES:

1. R.Chudly *"Construction Technology"*, (Volumes I and II), 2nd Edition, Longman, UK, 1987.
2. P.C. Varghese *"Building Materials"* by Prentice-Hall of India Private Ltd, New Delhi
3. P.C. Varghese, *"Building Construction"*, Prentice-Hall of India private Ltd, New Delhi.

STRENGTH OF MATERIALS-I

Course Code : 13CE1106

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Associate with the stress-strain diagrams and the relationship between the elastic constants

CO 2 Draw Shear force and Bending moment diagrams for statistically determinate beams

CO 3 Calculate the Bending and shear stresses and draw the distribution diagrams for various cross sections.

CO 4 Estimate the slope and deflection of beams using different methods.

CO 5 Analyse the trusses using different methods

UNIT-I (15 Lectures)

SIMPLE STRESSES AND STRAINS:

Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel and HYSD-bars Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT-II (12 Lectures)

SHEAR FORCE AND BENDING MOMENT:

Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these loads – Point of

contra flexure – Relation between S.F, B.M and rate of loading at a section of a beam.

UNIT-III (14 Lectures)

FLEXURAL STRESSES:

Theory of simple bending – Assumptions – Derivation of bending equations, Neutral axis – Determination of bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections.

SHEAR STRESSES:

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

UNIT-IV (10 Lectures)

DEFLECTION OF BEAMS:

Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - UDL, UVL - Moment area method – application to simple cases.

UNIT-V (12 Lectures)

ANALYSIS OF PIN-JOINTED PLANE FRAMES:

Determination of Forces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply – supported trusses- by method of joints, method of sections.

TEXT BOOKS:

1. R.K.Bansal, *"Introduction to text book of Strength of Materials"*, 4th Edition, Laxmi Publications Pvt. Ltd., New Delhi, 2008.
2. Sadhu Singh, *"Strength of Materials"*, 2nd Edition, Khanna Publications, 2001.

3. S.Ramamrutham and R.Narayanan *"Strength of Materials"* 11th Edition, Dhanpat Rai publications, 2009.
4. Timoshenko & Gere *"Mechanics of Materials"*, 4th Edition, Mc Graw hill, 2003.

REFERENCES:

1. Ferdinand Beer and Johnston, *"Mechanics of Solids"*, 6th Edition, Tata Mc Graw hill Publications, 2000.
2. Schaum's out line series, *"Strength of Materials"* 10th Edition, Mc Graw hill International Editions, 2007.
3. R. Subramanian, *"Strength of Materials"*, 1st Edition, Oxford university press, New Delhi, 2011.
4. Bhavi Katti, *"Strength of Materials"*, 7th Edition, 2010.
5. Timoshenko & Young, *"Strength of Materials"*, 4th Edition, Tata Mc Graw hill, 2003.

FLUID MECHANICS

Course Code: 13CE1107

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Analyse various fluid properties in the fluid flow problems and determine the hydrostatic forces acting on the bodies

CO 2 Identify fluid flows and draw flow net and analyse it.

CO 3 Differentiate between pipe flow and open channel flow.

CO 4 Differentiate between turbulent and laminar fluid flows and also discuss the laws of fluid friction.

CO 5 Explain concepts of boundary layer theory

UNIT-I (10 Lectures)

INTRODUCTION :

Dimensions and units – Physical properties of fluids, density, specific weight, specific volume, specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion- fluid continuum-pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vaccum pressure- measurement of pressure, Pressure gauges, Manometers: Differential and Micro Manometers.

HYDROSTATIC FORCES:

Hydrostatic forces on submerged plane (Horizontal, Vertical, inclined) and curved surfaces – Center of pressure, Derivations and problems.

UNIT-II (14 Lectures)

FLUID KINEMATICS:

Description of fluid flow, velocity, acceleration – convective, local and total, 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- one, two, three dimensional flows – stream and velocity potential functions, flownet analysis.

UNIT-III (15 Lectures)

FLUID DYNAMICS:

Surface and body forces, Lagrangean and Eularian approaches – Concepts of fluid system and control volume – control volume approach for fluid flow problems – Euler's and Bernoulli's equations for flow for 2-D flow, Momentum equation and its application – forces on pipe bend.

MEASUREMENT OF FLOW:

Pitot tube, Venturi meter and Orifice meter – classification of orifices and mouth pieces–flow over rectangular, triangular and trapezoidal notches–Broad crested weirs.

UNIT-IV (15 Lectures)

VISCOUS FLOW:

Reynolds experiment – Classification of Laminar & Turbulent flows. Flow between two parallel plates, Flow through long pipes.

CLOSED CONDUIT FLOW:

Laws of Fluid friction – Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynolds number – Moody's Chart.

UNIT-V (10 Lectures)

BOUNDARY LAYER (BL) THEORY:

Concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers (no derivations), BL in transition, separation of BL, control of BL separation, flow around submerged objects-Drag and Lift- Magnus effect.

TEXT BOOKS:

1. V.L.Streeter, E. Benjamin Wiley and W. Bedford, *"Fluid Mechanics"*, 9th Edition, McGraw-Hill Companies, 1997.
2. P.N Modi and S.M. Seth, *"Hydraulics and Fluid Mechanics Including Hydraulic Machines"*, 14th Edition, Standard Book House, 2002.
3. K.L. Kumar, *"Fluid Mechanics"*, 6th Edition, Eurasia Publishing House, 1995.

REFERENCES:

1. Frank.M. White, *"Fluid Mechanics"*, 14th Edition, Tata McGraw hill Pvt. Ltd, 2002.
2. A.K. Mohanty, *"Fluid Mechanics"*, 14th Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2002.
3. J.F. Douglas, J.M. Gasirock and J.A. Swaffield, *"Fluid Mechanics"*, 14th Edition, Pearson Education Publishers, 2002.
4. A.K.Jain, *"Fluid Mechanics Including Hydraulic Machines"*, 8th Edition, Khanna Publishers, New Delhi, 2003.

CONCRETE TECHNOLOGY

Course Code: 13CE1108

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Identify the characteristics of basic ingredients and properties of concrete

CO 2 Distinguish the properties of fresh and hardened concrete

CO 3 Assess the quality of hardened concrete

CO 4 Select various admixtures of concrete

CO 5 Justify the significance of special concretes

UNIT-I (10 Lectures)

CONSTITUENTS OF CONCRETE:

Concrete as a Building Material

CEMENT:

Chemical Composition, Chemical and Physical processes of Hydration, Structure of Hydrated Cement, Blended Cements, Properties of cement and their effect on properties of Concrete. (Test procedures not required)

Aggregates: Classification, Mechanical, Physical and Thermal properties of Fine and Coarse aggregates that affect the properties of concrete. (Test procedures not required) Quality of mixing water: Specifications for quality of mixing water and Curing water (test procedures not required)

MANUFACTURING OF CONCRETE AND SPECIAL PROCESSES OF CONCRETING:

Manufacture of Concrete: Mixing – Transporting – Placing – Compacting – Curing, Safe Stripping Time.

SPECIAL PROCESSES OF CONCRETING:

Hot and cold weather concreting – Sprayed Concrete – Underwater Concrete –Grouted concrete – Mass concrete – Pumped concrete – Concrete for Liquid Retaining Structures – Slip form construction – Concrete coatings & surface treatments.

UNIT-II (15 Lectures)

FRESH CONCRETE:

Properties of Fresh Concrete: Need for study

WORKABILITY:

Definition, Factors affecting workability, significance, Tests available for measurement (test procedures not required)

SEGREGATION AND BLEEDING :

Definitions – causes and effects, measurement – Laittance, Factors effecting performance of Hardened concrete, Water/ Cement Ratio, Abram's law, Powers law, Gel space ratio, Maturity concept.

HARDENED CONCRETE:

Properties of Hardened concrete: Compressive strength – Tensile Strength – Flexural Strength – Young's Modulus and Poisson's ratio, Deformation characteristics: Creep – Shrinkage – Soundness & Thermal properties, Durability.

UNIT-III (12 Lectures)

TESTING OF HARDENED CONCRETE QUALITY CONTROL:

Destructive, partially destructive and Non- Destructive testing of concrete, Codal provisions, relationship between tensile strength and compressive strength, cube strength and cylinder strength.

Variability of Concrete Strength, Concept of Quality, Stages and means of Control, Statistical methods of measuring Variability, Acceptance Criteria, applications. Mix design as per IS code.

UNIT-IV (10 Lectures)

ADMIXTURES:

Mineral Admixtures: Fly ash, GGBS, Silica Fume – origin and manufacture, Chemical Composition, Chemical and Physical processes

of hydration, effects on properties of concrete.

Chemical Admixtures: Classification, origin and manufacture, chemical composition, actions and interactions, applications.

UNIT-V (15 Lectures)

SPECIAL CONCRETE-I :

Plain concrete – Reinforced Concrete – Pre-stressed Concrete – Light weight concrete – Cellular concrete – No fines concrete – Aerated and foamed concrete – Smart Concrete – Fiber reinforced concrete – Polymer concrete – Fly ash concrete – Self compacting concrete.

SPECIAL CONCRETE-II:

High performance concrete – Very high strength concrete – High density concrete – Lime concrete – Sulphur impregnated concrete – Refractory concrete – Radiation shielding concrete – Recycled concrete – Roller compacted concrete-Ready Mix Concrete.

TEXT BOOKS:

1. A.M.Neville, J.J.Brookes, *"Concrete Technology"*, 5th Edition, Pearson Education, 2009.
2. M.S.Shetty, *"Concrete Technology"*, 6th Edition, Chand Publication, 2010.

REFERENCES:

1. A.M.Neville, *"Properties of Concrete"*, 2nd Edition, Pearson Education, 2000.
2. A.R.Shanta Kumar, *"Concrete Technology"*, 1st Edition, Oxford University Press, New Delhi, 2010.
3. N.Krishna Raju, *"Design of Concrete Mixes"*, 2nd Edition, CBS Publishers and distributors, 2007.
4. M.L.Gambhir, *"Concrete Technology"*, 3rd Edition, Tata McGraw hill Publishers, New Delhi, 2008.
5. IS456:2000, *"Code of practice of plain and reinforced concrete"* 4th Revision, August 2000.

BUILDING PLANNING AND DESIGN

Course Code: 13CE1109

L	T	P	C
4	0	0	3

Course Outcome:

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

CO 1 Distinguish the different income groups in India and their housing requirements

CO 2 Apply the concept of climatology for housing layouts and principles of planning

CO 3 Design the individual rooms with reference to functional and furniture requirements.

CO 4 Develop the skills of Drawing Plans, Sections and Elevations of different houses.

CO 5 Design and draw various rooms with the given data

UNIT-I (10 Lectures)

RESIDENTIAL BUILDINGS :

Different types – Selection of site – Brief information about housing colonies for HIG, MIG, LIG and EWS in India – Sizes of plots – Public spaces – Evolutionary housing concept.

UNIT-II (12 Lectures)

CLIMATOLOGY:

ELEMENTS OF CLIMATES:

SUN, WIND, Relative Humidity, Temperature effects, Comfort conditions for a house, Macroclimatic zones. Design of houses and layouts with reference to climate, Orientation of buildings. Solar charts, Ventilation wind rose, Principles of planning of a house such as 1) Aspect 2) Prospect 3) Privacy 4) Grouping 5) Roominess 6) Furniture requirements 7) Flexibility 8) Circulation 9) Sanitation

10) Practical considerations 11) Elegance 12) Economy– Anthropometric data.

UNIT-III **(10 Lectures)**

Design of House: Design of Individual rooms with the particular attention to functional and furniture requirements. Building regulations and byelaws of residences including National Building code rules.

UNIT-IV **(20 Lectures)**

Practice Drawing: (Copying exercises)

a) Conventional signs of materials, various equipment used in residences relevant I.S.Codes.

b) Plan, Section and Elevation of a small house comprising of one room and verandah (load bearing structure).

c) Plan, Section and Elevation of two or three bed room house.

d) Plan, Section, and Elevation of a two or three bed roomed house in hot and arid zone.

e) Plan, Section, and Elevation of a two or three bed roomed house in hot and humid zone.

f) Plan, Section, and Elevation of a two or three bed roomed house in cold zone.

g) Plan, Section and Elevation of a duplex house in hot and humid zone.

h) Plan of one apartment floor comprising of at least four dwelling units (not included for examination purpose)

UNIT-V **(10 Lectures)**

Drawing of plan section and elevation of houses with given functional requirements and climatic data (on drawing sheets and in AutoCAD). Emphasis shall be given to hot and humid zones.

TEXT BOOK:

N. Kumara Swamy and. A. Kameswara Rao, *"Building Planning and Drawing"*, 8th Edition, Charotar Publications, 2010.

REFERENCE:

Gurucharan Singh, *"Building Planning, Scheduling and Design"*, 2nd Edition, Khanna Publishers, 2010.

STRENGTH OF MATERIALS LAB

Course Code: 13CE1110

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Demonstrate the basic knowledge of the mechanical properties of materials

CO 2 Calculate the hardness of the given steel specimen.

CO 3 Determine the stiffness and deflection of the given spring material.

CO 4 Compute the toughness of the given steel specimen.

CO 5 Determine the shear strength of the steel specimen by conducting the double shear test

LIST OF EXPERIMENTS:

1. Tension test.
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Hardness test.
6. Helical Spring test.
7. Compression test on wood.
8. Impact test.
9. Shear test.
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of Electrical Resistance Strain gauges.
12. Compression test on Bricks.

CONCRETE TECHNOLOGY LAB

Course Code: 13CE1111

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Outline the importance of testing of cement and its properties

CO 2 Assess the different properties of aggregate

CO 3 Summarise the concept of workability and testing of concrete

CO 4 Describe the preparation of green concrete

CO 5 Describe the properties of hardened concrete

LIST OF EXPERIMENTS:

Tests on Cement

1. Determination of Fineness of Cement.
2. Determination of Specific Gravity of Cement.
3. Determination of Normal Consistency of Cement.
4. Determination of Initial and Final Setting time of Cement.
5. Determination of Soundness of Cement.
6. Determination of Compressive Strength of Cement. Tests on Aggregate
7. Determination of Fineness Modulus and Zoning of Sand.
8. Determination of Fineness Modulus of Coarse Aggregate.
9. Determination of Bulk Density of Fine Aggregate.
10. Determination of Bulk density of Coarse Aggregate.
11. Test on Fresh concrete
12. Test on Hardened concrete

ENVIRONMENTAL STUDIES
(Common to all Branches)

Course Code: 13NM1102

L	T	P	C
2	0	0	0

Course Outcomes:

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

CO 1 Identify the various resources available and explain their conservation techniques.

CO 2 Classify, describe and explain the concepts of ecosystem, biodiversity and their conservation.

CO 3 Categorize and explain different types of pollution and their control methods.

CO 4 Identify the different social issues caused due to today's development and also describe the relevant Acts.

CO 5 Assess the effects of population and its growth on environment and human health.

UNIT-I **(8 Lectures)**

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES & NATURAL RESOURCES

Definition, Scope and Importance – Need for Public Awareness. Renewable and non-renewable resources– Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – 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, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case

studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT-II (7 Lectures)

ECOSYSTEMS, BIODIVERSITY 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 the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Definition: genetic, species and ecosystem diversity.- Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a mega diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts. - Endangered and endemic species of India Conservation of biodiversity: In-situ and Exsitu conservation of biodiversity.

UNIT-III (7 Lectures)

ENVIRONMENTAL POLLUTION:

Definition, Cause, effects and control measures of a) Air pollution b) Water pollution c) Soil pollution d) Marine pollution e) Noise pollution f) Thermal pollution g) Nuclear hazards.

SOLID WASTE MANAGEMENT:

Causes, effects and control measures of urban and industrial wastes. – Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV (6 Lectures)

SOCIAL ISSUES AND THE ENVIRONMENT:

From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, and watershed management -Resettlement and rehabilitation of people;

its problems and concerns. Case Studies Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. -Consumerism and waste products. – Environment.

Protection Act. -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution)

Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT-V (8 Lectures)

HUMAN POPULATION AND THE ENVIRONMENT:

Population growth, variation among nations. Population explosion -Family Welfare Programme. -Environment and human health. -Human Rights. -Value Education. -HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. – Case Studies.

FIELD WORK:

Visit to a local area to document environmental assets

River /forest grassland/hill/mountain -Visit to a local polluted site-

Urban/ Rural/industrial/ Agricultural Study of common plants, insects, birds. - Study of simple ecosystems-pond, river, hill slopes, etc.

TEXT BOOKS:

1. Bharucha. E., "*Textbook of Environmental Studies for Undergraduate Courses*", University Press, 2005.
2. Rajagopalan. R., "*Environmental Studies*", Oxford University Press, 2005.

REFERENCE:

AnjiReddy. M., "*Textbook of Environmental Sciences and Technology*", BS Publications, 2010.

NOTES

SYLLABI FOR IV SEMESTER

MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTING

Course Code : 13HM1101

L	T	P	C
4	0	0	3

Course Outcomes :

At the end of the course a students should be able to

CO 1 Apply the Managerial Economic concepts for decision making and forward planning and identify factors influencing Law of demand and exceptions to Law of demand and use different Forecasting methods for predicting demand for various products and services.

CO 2 Assess the functional relationship between Production and factors of Production, and identify the various economies of scale attached with large scale production, list out various costs associated with production and to compute Breakeven point and to illustrate the various uses of breakeven analysis.

CO 3 Analyze the impact of environment on business.

CO 4 Apply the principles of accounting at the time of maintaining the books of accounts.

CO 5 Prepare final accounts and apply various techniques for assessing the financial position of the business concern.

UNIT-I (12 Lectures)

INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND:

Definition, Nature and Scope of Managerial Economics, Factors influencing managerial decision making process

Demand Analysis: Definition-types of demand - Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Significance of Elasticity of Demand. Demand Forecasting: definition, methods of demand

forecasting (survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, judgmental approach to demand forecasting)

UNIT-II (12 Lectures)

THEORY OF PRODUCTION AND COST ANALYSIS:

Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Types of Cost, Break-even Analysis (BEA)- Determination of Break-Even Point (Simple numerical problems) - Managerial Significance and limitations of BEA.

UNIT-III (10 Lectures)

BUSINESS & ENVIRONMENT:

Features of Business Organization, Features, Advantages & limitations of Sole Proprietorship, Partnership, and Joint Stock Company, Steps for formation and Registration of the company- Internal and External factors affecting business environment (PESTLE analysis)- Impact of environment on business

UNIT-IV (12 Lectures)

INTRODUCTION TO FINANCIAL ACCOUNTING:

Accounting Principles, Concepts & conventions, Double-Entry Book Keeping, Journal, Ledger, Trial Balance

UNIT-V (18 Lectures)

PREPARATION AND ANALYSIS OF FINANCIAL STATEMENTS:

Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments) - Financial statement Analysis (Comparative and Common Size Statements)- Ratio analysis (Liquidity Ratios, Activity ratios, Solvency and Profitability ratios)

TEXTBOOKS :

1 A R Aryasri, *"Managerial Economics and Financial Analysis"*, 2nd Edition, TMH, 2009

2 S A Siddiqui & A. S. Siddiqui, *"Managerial Economics & Financial Analysis"*, 1st Edition, New Age Publishers, 2005.

3 P Venkata Rao, J.V.Prabhakar Rao *"Managerial Economics and Financial Analysis"*, 1st Edition, Maruti Publications, 2012.

4 R.L.Varshney & K.L Maheswari, *"Managerial Economics"*, 5th Edition, S.Chand Publishers, 2005.

REFERENCES :

1 D N Dwivedi, *"Managerial Economics"*, 8th Edition, PHI, 2010.

2 S P Jain & KL Narang , *"Cost and Management Accounting"*, 3rd Edition Kalyani Publishers, 2004.

3 P.K.Sharma & Shashi K. Gupta, *"Management Accounting Principles and Practice"*, 1st Edition, Kalyani Publishers, 2004.

STRENGTH OF MATERIALS – II

Course Code: 13CE1112

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Analyse principal stresses and strains using theories of failure

CO 2 Compute direct and bending stresses in chimneys and assess their stability

CO 3 Estimate pure torsion and power transmitted by shaft under different loading conditions and stiffness of springs

CO 4 Calculate crushing load of various columns with different end conditions

CO 5 Analyse cylinders and shells and calculate the stresses and strains developed

UNIT-I (16 Lectures)

PRINCIPAL STRESSES AND STRAINS:

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

THEORIES OF FAILURES:

Introduction –Various Theories of failures like Maximum Principal Stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT-II (10 Lectures)

DIRECT AND BENDING STRESSES:

Stresses under the combined action of direct loading and B.M, core of a section – determination of stresses in the case of chimneys – conditions for stability – stresses due to direct loading and B.M. about both axis.

UNIT-III (14 Lectures)

TORSION OF CIRCULAR SHAFTS:

Theory of pure torsion – Derivation of Torsional Rigidity equation – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

SPRINGS:

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

UNIT-IV (10 Lectures)

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.

UNIT-V (14 Lectures)

THIN CYLINDERS:

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and

volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells.

THICK CYLINDERS:

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

TEXT BOOKS:

1. R.K.Bansal, *"A Text book of Strength of Materials"*, 4th Edition, Laxmi Publications (P) ltd., New Delhi, 2008.
2. Sadhu Singh, *"Strength of Materials"*, 2nd Edition, Khanna Publications, 2001.
3. S. Ramamrutham and R.Narayanan, *"Strength of Materials"*, 11th Edition, Dhanpat Rai Publications, 2009.
4. Ferdinand Beer and Johnston, *"Mechanics of Solids"*, 6th Edition, Tata Mc Graw Hill Publications, 2000.
5. Schaum's out line series, *"Strength of Materials"*, 10th Edition, Mc Graw Hill International Editions, 2007.

REFERENCES:

1. R.K.Rajput, *"Strength of Materials"*, 4th Edition, S.Chand & Co, New Delhi, 2010.
2. A.R.Basu, *"Strength of Materials"*, 2nd Edition, Dhanpat Rai & Co, Nai Sarah, New Delhi, 2008.
3. L.S.Srinath et al., *"Strength of Materials"*, 1st Edition, Macmillan India Ltd., Delhi, 2001.
4. S.B. Junnarkar, *"Mechanics of Structures"*, 10th Edition, Charotar Publishing House, Anand, Gujarat, 2000.

HYDRAULICS AND HYDRAULIC MACHINERY

Course Code: 13CE1113

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Outline the similarities between model and prototype and their relations

CO 2 Explain the functioning of various turbines and their hydraulic designs

CO 3 Analyse the performance of various turbines under different operating conditions and governing of turbines.

CO 4 Determine the performance of centrifugal pumps under different operating conditions.

CO 5 Designing of the most economical section and determination of hydraulic jump for energy dissipation at the downstream of irrigation structures

UNIT-I (14 Lectures)

DIMENSIONAL ANALYSIS & SIMILITUDE:

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

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.

UNIT-II (10 Lectures)

HYDRAULIC TURBINES–I:

Layout of a typical Hydropower installation – Heads and efficiencies-classification of turbines-Pelton wheel-Francis turbine-Kaplan turbine-principle of working, working proportions, velocity diagrams, work done and efficiency, hydraulic design.

UNIT-III (14 Lectures)

HYDRAULIC TURBINES–II:

Draft tube – theory, functions and efficiency, modern developments in turbines, governing of turbines-Runaway speed of turbines–water hammer- surge tanks, Performance under unit head-unit quantities-specific speed - performance characteristics – Cavitation.

UNIT-IV (14 Lectures)

CENTRIFUGAL PUMPS:

Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed - multistage pumps-pumps in series and parallel- performance of pumps-characteristic curves- NPSH-cavitation.

UNIT-V (12 Lectures))

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. Specific energy-critical depth – computation of critical depth – critical, sub-critical and super critical flows.

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.

TEXT BOOKS:

1. A.K.Jain, *"Fluid Mechanics Including Hydraulic Machines"*, 8th Edition, Khanna Publishers, New Delhi, 2003.

2. P.N Modi and S.M. Seth, *"Hydraulics and Fluid Mechanics Including Hydraulic Machines"*, 14th Edition, Standard Book House, 2002.

3. K. Subramanya, *"Flow in Open Channels"*, 2nd Edition, Tata Mc Graw hill Publishing Company Ltd, New Delhi, 2003.

REFERENCES:

1. Ven Te Chow, *"Open Channel Flow"*, 2nd Edition, Mc Graw Hill Book Company, New Delhi, 1998.

2. Srivatsava, *"Open Channel Flow"*, 2nd Edition, Oxford publishers, New Delhi, 1998.

3. R.K. Bansal, *"A textbook of Fluid mechanics and hydraulic machines"*, 9th Edition, Laxmi Publications (P) Ltd., New Delhi, 2010.

4. J.F. Douglas, J.M. Gasirock and J.A. Swaffield, *"Fluid Mechanics"*, 4th Edition, Pearson Education Publishers,2001.

STRUCTURAL ANALYSIS – I

Course Code: 13CE1114

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Analyse Propped Cantilever and Fixed Beams under different loading and support conditions.

CO 2 Analyse Continuous Beams under different loading and support conditions.

CO 3 Apply Energy theorem for Simple Beams and Simple Portal Frames and calculate the deflections.

CO 4 Apply Energy theorem and analyse Indeterminate Structures.

CO 5 Analyse beams subjected to moving loads using Influence line diagrams.

UNIT-I (15 Lectures)

PROPPED CANTILEVERS:

Analysis of propped cantilever – Shear Force and Bending Moment diagrams-Deflection of propped cantilever.

FIXED BEAMS:

Introduction, Analysis of fixed beams, subjected to single and multiple point loads, UDL, UVL, couple and combination of loads. Draw SFD, BMD and deflection diagrams – Effect of sinking and rotation of supports.

UNIT-II (12 Lectures)

CONTINUOUS BEAMS:

Introduction- Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia, continuous beams with different M.I for different spans – Effects of sinking of supports – SF and BM diagrams.

UNIT-III (10 Lectures)

ENERGY THEOREMS:

Introduction – Strain energy in linear elastic system, expression of Strain Energy due to axial load, BM and SF. Castigliano's first theorem, deflections of simple beams of simple portal frames.

UNIT-IV (12 Lectures)

INDETERMINATE STRUCTURAL ANALYSIS:

Determination of Static and Kinematic indeterminacies – Trusses upto one degree of internal and external indeterminacy using Castigliano's theorem-II.

UNIT-V (16 Lectures)

INFLUENCE LINES:

Definition of Influence line for reactions, SF and BM at a given position of loading, number of point loads, UDL.

MOVING LOADS:

Introduction, maximum S.F and B.M at a given section and absolute maximum S.F. and B.M due to single concentrated load, UDL longer than the span, UDL shorter than the span, Two point loads with fixed distance between them and several point loads-Load position for maximum B.M at a given section, Load position for max S.F. at a given section.

TEXT BOOKS:

1. V.N. Vazirani & M.M.Ratwani, *"Analysis of Structures"*, (Vol I&II), Khanna Publications, New Delhi.
2. T.S. Thandavamoorthy, *"Analysis of Structures"*, Oxford University Press, New Delhi
3. Dr. R. Vaidyanathan & Dr. P.Perumal, *"Comprehensive Structural Analysis (Vol I & II)"*, Laxmi publications Pvt. Ltd., New Delhi.
4. C.S. Reddy, *"Basic structural Analysis"*, Tata Mc Graw hill, New Delhi.

REFERENCES:

1. S.B.Junnarkar, *"Mechanics of Structures"*, 10th Edition, Charotar Publishing House, Anand, Gujrat, 2000.
2. Pandit & Gupta, *"Theory of Structures"*, 3rd Edition, Tat McGraw – Hill Publishing Co. Ltd, New Delhi, 2006.
3. R.S. Khurmi, *"Theory of Structures"*, 2nd Edition, S. Chand Publishers, 2000.
4. B.C.Punmia, *"Strength of Materials and Mechanics of Structures"*, 2nd Edition, Khanna Publications, New Delhi, 2006.
5. B.D.Nautiyal, *"Introduction to Structural Analysis"*, 1st Edition, New age International Publishers, New Delhi, 2008.

REINFORCED CONCRETE STRUCTURES- I

Course Code: 13CE1115

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Design RC beams subjected to bending using Working Stress Method.

CO 2 Explain the concept of Limit State Design and apply it to beams

CO 3 Apply Limit state design for flanged sections subjected to shear, torsion and concept of bond

CO 4 Design one-way, two-way and continuous slabs

CO 5 Design columns and isolated footings subjected to axial load, uni-axial and bi-axial bending

UNIT-I (10 Lectures)

INTRODUCTION TO WORKING STRESS METHOD:

Introduction – Design for bending –Analysis and design of singly reinforced and doubly reinforced beams.

UNIT-II (12 Lectures)

INTRODUCTION TO LIMIT STATE DESIGN :

Concepts of limit state design- Characteristic loads-Characteristic strength- Partial loads and Material Safety factors- Representative stress- Strain curves- Assumptions in limit state design – Stress block parameters – Limiting moment of resistance.

SINGLY AND DOUBLY REINFORCED BEAMS:

Limit state analysis and design of singly reinforced, doubly reinforced beams.

UNIT-III (12 Lectures)

FLANGED SECTIONS:

Design of T and L beam sections.

SHEAR, TORSION AND BOND:

Limit state analysis and design of sections for shear and torsion – Concept of bond, anchorage and development length, I.S Code provisions. Design examples in simply supported and continuous beams.

UNIT-IV (15 Lectures))

SLABS:

Design of one way slabs – Two way slabs –Continuous slabs using IS coefficients.

UNIT-V (12 Lectures)

COLUMNS:

Short and long columns – Uni axial loads – Uni - axial bending and bi-axial bending – I.S code provisions.

FOOTINGS:

Footings: Different types of footings–Design of isolated, square, rectangular and circular footings.

NOTE: All the designs to be taught in Limit State Method. Following plates should be prepared by the students.

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

TEXT BOOKS:

1. Pillai & Devdas Menon, *"Reinforced concrete design"*, 3rd Edition, Tata McGraw Hill, New Delhi, 2009.
2. A.K.Jain, *"Reinforced Concrete dDesign"*, 5th edition, Charotor Publications, 2010.

REFERENCES:

1. N.C. Sinha and S.K Roy, *"Fundamentals of Reinforced Concrete"*, 4th Edition, S. Chand publishers, 2002
2. N. Krishna Raju and R.N. Pranesh, *"Reinforced Concrete Design"*, 8th Edition, New age International Publishers, New Delhi, 2004.

ENGINEERING GEOLOGY

Course Code: 13CE1116

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Describe various branches of geology and formation of rivers and soils.

CO 2 Recognize properties of various rocks and minerals.

CO 3 Explain the importance of structural geology and ground water occurrence.

CO 4 Interpret the causes and effects of earthquakes and landslides.

CO 5 Assess the geological considerations for selection of suitable sites for dams, reservoirs and tunnels.

UNIT-I (10 Lectures)

PHYSICAL GEOLOGY:

Branches of Natural Science, Earth Science, Weathering – Types of weathering, Formation of Rivers, River piracy – Various stages of a river. Delta formation, Meandering of river, Formation of Oxbow lakes, Action of Wind, Formation of Sand dunes, Formation of Soils, Different types of soils and their classification.

UNIT-II (15 Lectures)

MINERALOGY & PETROLOGY :

Definition of mineral, properties as colour, streak, luster, cleavage, fracture, hardness, specific gravity, structure, diaphinity, isomorphism, polymorphism, pseuodomorphism, special properties, diagnostic properties, chemical composition and uses.

Rock Forming minerals: Rock forming minerals and economic minerals – properties of: Calcite, Feldspar, Quartz, Olivine, Augite,

Hornblende, Muscovite, Biotite, Barites, Bauxite, Garnet, Talc, Hamatite, Magnetite, Chlorite, Galena, & Graphite. Difference between Rock and Mineral. Geological classification of rocks. Igneous Rocks : their structures, textures, concordant bodies, discordant bodies, sills, lopoliths, phacoliths, Bismalith, Dyke, Batholith, Plutonic, Hypabyssal and Volcanic Igneous rocks. Properties of Granite, Pegmatite, Gabbaro, Dolerite, Basalt. Sedimentary rocks: Mode of formation, texture and structures of sedimentary rocks; clastic, Rudaceous, Chemcial and Biological rocks. Structures of sedimentary rocks as Bedding, Ripple marks, Tracks and trails, Rain prints, Fossils, Calcareous, Argillaceous, Siliceous and Ferruginous rocks. Properties of Breccia, Conglomerate, Sand stone, Lime stone & Shale. Metamorphic rocks: Metamorphism, Dynamic Metamorphism, Thermal Metamorphism, Dynamo thermal metamorphism. Metasomatism. Structures and Textures of Metamorphic rocks as lineation, foliation, Cataclastic texture, Grannulose texture, Schistose texture, Gneissose textures. Properties of Slate, Marble, Schist, Gneiss and Quartzite.

UNIT-III (15 Lectures)

STRUCTURAL GEOLOGY:

Strike, Dip, folds – various types – Faults – Various types – Unconformities – Joints. GROUND WATER: Wells – Deep well, shallow well, Springs – Different types.

UNIT-IV (10 Lectures)

EARTHQUAKES:

Classification of seismic waves, Mercalli & Richter scales, causes and effects, Seismic belts, Seismic zones of India, precautions while constructing engineering structures. Land Slides: Causes, effects, methods of mitigating impact of landslides.

UNIT-V (12 Lectures)

DAMS AND TUNNELS:

Selection of site of dam construction, Gravity dams, Arch dams and

Earthen dams – Geological considerations for dam construction. Reservoirs: Geological consideration for Reservoirs, Long life and more usefulness. Tunnels: Necessity – Effects – Litho logical – Structural and Ground Water considerations.

TEXT BOOKS:

1. N.Chennkesavulu, *"Engineering Geology"*, Mc-Millan, India Ltd. 2nd Edition, 2014.
2. Parbin Singh, *"Engineering and General Geology",* SK Kataria & Sons, 2012.

REFERENCES:

1. F.G. Bell, *"Fundamentals of Engineering Geology"*, Butterworths, Publications, New Delhi, 1992.
2. Krynine & Judd, *"Principles of Engineering Geology & Geo-technics"*, CBS Publishers & Distribution.
3. K.V.G.K. Gokhale, *"Principles of Engineering Geology"*, B.S Publications, 2009.

FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Course Code: 13CE1117

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Determine the discharge using flow measuring devices

CO 2 Demonstrate the application of Bernoulli's Theorem.

CO 3 Illustrate different types of flow patterns.

CO 4 Estimate the loss of energy in pipes due to different flow conditions.

CO 5 Determine the performance of various turbines and pumps under varying operating conditions.

LIST OF EXPERIMENTS:

1. Calibration of Venturimeter.
2. Calibration of Orifice meter.
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch.
6. Calibration of contracted Triangular Notch.
7. Determination of friction factor for a given pipe line.
8. Determination of coefficient of loss of head due to pipe fittings.
9. Verification of Bernoulli's theorem.
10. Reynolds's Experiment- Demonstration of types of flows.

11. Impact of jet on vanes.
12. Performance test on Pelton Wheel Turbine.
13. Performance test on Francis Turbine.
14. Performance test on Single Stage Centrifugal Pump.
15. Performance test on Multi Stage Centrifugal Pump.
16. Performance Test on Reciprocating Pump
17. Performance Test on Kaplan Turbine

ENGINEERING GEOLOGY LAB

Course Code: 13CE1118

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Identify various minerals and their properties.

CO 2 Recognize various rocks and their properties

CO 3 Determine the behaviour of the bedding planes in terms of solving strike and dip.

CO 4 Draw sections for geological maps showing tilted beds

CO 5 Draw sections for geological maps showing fault beds

LIST OF EXPERIMENTS:

1. Study of physical properties and identification of Rock forming minerals.
2. Study of physical properties and identification of Economic minerals.
3. Megascopic description and identification of Igneous rocks.
4. Megascopic description and identification of Sedimentary rocks.
5. Megascopic description and identification of Metamorphic rocks.
6. Structural geology problems- Calculation of Thickness of Beds
7. Structural Geology problems – Faults
8. Structural Geology problems – Simple Strike & Dip problems (Calculation of amount of True Dip and direction).
9. Structural Geology problems – Simple Strike & Dip problems (Calculation of amount of Dip).

10. Calculation of Borehole Problems.
11. Interpretation and drawing of sections for geological maps showing Normal beds.
12 Interpretation and drawing of sections for geological maps showing Tilted beds.
13. Interpretation and drawing of sections for geological maps showing Fault beds.
14. Interpretation and drawing of sections for geological maps showing Folded beds.

SYLLABI FOR V SEMESTER

WATER RESOURCES ENGINEERING- I

Course Code: 13CE1119

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Describe the various hydrological parameters

CO 2 Apply the technique for developing hydrographs for estimating the peak runoff from different catchments

CO 3 Assess the aquifer properties and yield from a well

CO 4 Estimate the quantity of water required for different crops

CO 5 Design the unlined and lined channels

UNIT-I (10 Lectures)

HYDROLOGY:

Introduction to Engineering hydrology and its applications, Hydrologic cycle, types and forms of precipitation, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, processing of rainfall data and estimation of missing precipitation data.

Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation – evapotranspiration - Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT-II (12 Lectures)

DESCRIPTIVE HYDROLOGY AND HYDROGRAPH ANALYSIS:

Runoff-components of runoff, factors affecting runoff, computation of runoff- Infiltration method and rational method, Stream gauging: Necessity, selection of gauging sites, methods of measurement of depth, velocity and discharge. Hydrograph analysis - base flow separation, effective rain fall, Unit Hydrograph- definition, limitations

and applications, derivation of Unit Hydrograph, S-hydrograph, IUH, Synthetic Unit Hydrograph (concept only).

UNIT-III (12 Lectures)

GROUND WATER:

Ground water - Occurrence, types of aquifers, aquifer parameters-porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, radial flow to wells in confined and unconfined aquifers, Determination of hydraulic properties of aquifers, Yield of an open well- constant level pumping test, recuperation test.

UNIT-IV (14 Lectures)

IRRIGATION AND WATER REQUIREMENT OF CROPS:

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, Indian agricultural soils, methods of improving soil fertility, preparation of land for Irrigation, standards of quality for Irrigation water.

Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use, Crop seasons in India, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies, determination of irrigation requirements of crops.

UNIT-V (12 Lectures)

DESIGN OF CHANNELS:

Classification of canals, design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, Lining of irrigation channels- necessity, advantages and disadvantages, Types of lining, design of lined canal.

TEXT BOOKS:

1. Jayaram Reddy, *"Engineering Hydrology"*, 2nd Edition, Laxmi publications Pvt. Ltd., New Delhi reprint 2008.

2. B.C.Punmia, B.B.L. Pande, Ashok K.R. Jain, Arun K.R. Jain, *"Irrigation & Water Power Engineering"*, 16th Edition, Laxmi Publications (P) Ltd., New Delhi, 2009.

3. R.K.Sharma & T.K. Sharma, *"Hydrology and Water Resource Engineering"*, 5th Edition, Dhanapati Rai Publications, 2000.

4. K Subramanya, *"Engineering Hydrology"*, Tata Mc Graw-Hill Publishing Company Ltd., New Delhi, 3rd Edition, 2008.

REFERENCES:

1. V.P.Singh, *"Elementary Hydrology"*, 2nd Edition, PHI Publications, Prentice Hall, 1992.

2. P.N.Modi, *"Irrigation, Water Resources & Water Power Engineering"*, 2nd Edition, Standard Book House, Rajsons Publications Pvt. Ltd., 2008.

3. D.K.Majumdar, *"Irrigation Water Management"*, 3rd Printing, Prentice Hall of India, 2004.

4. S.K Garg, *"Irrigation engineering and hydraulic structures"*, 24th Edition, Khanna publishers, 2012.

GEOTECHNICAL ENGINEERING-I

Course Code: 13CE1120

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Classify soil and their engineering properties

CO 2 Discuss the importance of permeability, seepage and its effects

CO 3 Calculate the stresses in soils under external loads

CO 4 Analyse settlement behaviour of soil under compaction and consolidation

CO 5 Explain the failure mechanism under the influence of different loading and drainage Conditions.

UNIT-I (10 Lectures)

INTRODUCTION & INDEX PROPERTIES OF SOILS:

Soil formation – Soil structure and clay mineralogy – Adsorbed water – Mass- Volume relationships – Relative density. Grain size analysis – Sieve and Hydrometer methods – Consistency limits and indices – IS Classification of soils

UNIT-II (12 Lectures)

PERMEABILITY & SEEPAGE THROUGH SOILS:

Soil water – Capillary rise – Flow of water through soils – Darcy's law- Permeability – Factors affecting permeability, Capillary phenomenon soils – Laboratory determination of coefficient of permeability – Permeability of layered systems. Total, neutral and effective stresses – Quick sand condition – Seepage through soils – Flownets: Construction, Characteristics and Uses.

UNIT-III (12 Lectures)

STRESS DISTRIBUTION IN SOILS:

Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart.

UNIT-IV (14 Lectures)

COMPACTION & CONSOLIDATION:

Mechanism of compaction – Factors affecting compaction– Effects of compaction on soil properties – Field compaction Equipment – compaction control. Stress history of clay; Compressibility of soils, Terzaghi's one dimensional consolidation theory, Consolidation test, pre-consolidation pressure, e - p and e-log p curves, total settlement.

UNIT-V (12 Lectures)

SHEAR STRENGTH OF SOILS:

Mohr – Coulomb Failure theories – Types of laboratory strength tests – Strength tests based on drainage conditions – Shear strength of sands – Critical Void Ratio – Liquefaction- shear strength of clays, pore pressure coefficients.

TEXT BOOKS:

1. Venkataramiah. C, *"Geotechnical Engineering"*, 3rd Edition, New Age International Pvt. Ltd, 2008.
2. K.R. Arora, *"Soil Mechanics and Foundation Engineering"* 5th Edition, Standard Publishers and Distributors, Delhi, 2001.

REFERENCES:

1. 1 Muni Budhu, *"Soil Mechanics and Foundations"*, 3rd Edition, John Wiley and Sons, 2011
2. Purushotham Raj, *"Geotechnical Engineering"*, 2nd Edition, Pearson Edition, 2009.
3. NPTEL Video lectures.
4. IS 2720 all parts, and other relevant IS codes, special publications and handbooks.
5. Das. B.M., *"Principles of Geotechnical Engineering"*, 7th Edition, Cengage Learning, 2010.

STRUCTURAL ANALYSIS – II

Course Code: 13CE1121

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Analyse two hinged and three hinged arches

CO 2 Apply slope deflection method to analyse continuous beams and portal frames.

CO 3 Apply Moment Distribution Method for beams and portal frames

CO 4 Apply approximate method for skeletal structures.

CO 5 Analyse continuous and portal frames using flexibility and stiffness methods.

UNIT-I (12 Lectures)

THREE HINGED ARCHES:

Introduction – Eddy's theorem, determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature – moving loads on three hinged arches.

TWO HINGED ARCHES:

Determination of horizontal thrust, bending moment and radial shear – basic concepts of fixed and tied arches.

UNIT-II (10 Lectures)

SLOPE - DEFLECTION METHOD:

Introduction - Derivation of slope - deflection equation - application to continuous beams including settlement of supports, analysis of single bay- single storey portal frame including side sway.

UNIT-III (12 Lectures)

MOMENT DISTRIBUTION METHOD:

Introduction - stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports

– single bay-single storey portal frames – including sway.

UNIT-IV (15 Lectures)

APPROXIMATE METHODS:

Substitute frame analysis by two cycle method, approximate methods of analysis application to building frames by portal and cantilever method (up to two bays and two storeys only).

UNIT-V (15 Lectures)

FLEXIBILITY METHOD:

Introduction, calculations of S.I. - application to continuous beams including support settlements. Analysis portal frames upto 3 degree of freedom.

STIFFNESS METHOD:

Introduction, calculations of K.I - application to continuous beams including support settlements. Analysis portal frames up to 3 degree of indeterminacy.

TEXT BOOKS:

1. Bhavikatti S.S, *"Analysis of Structures"*, (Vol. I & II), 6th Edition, Vikas Publications, 2009.
2. Vazirani & Ratwani, *"Analysis of structures"*, 19th Edition, Khanna Publications, 2008.
3. B.C. Punmia, *"Strength of Materials and mechanics of solids"*, Vol-II, 10th Edition, Laxmi Publications, New Delhi, 2009.
4. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, *"Theory of Structures"*, 12th Edition, Laxmi Publications, 2004.

REFERENCES:

1. Pandit and Gupta, *"Structural Analysis (Matrix Approach)"*, Tata Mc Graw Hill, New Delhi, 2008.
2. S.Ramamurtham, R. Narayan, *"Theory of Structures"*, 9th Edition, Dhanapat Rai Publishing Company, 2010.
3. C.S.Reddy, *"Structural Analysis"*, Tata Mc Graw Hill, New Delhi, 2008.

TRANSPORTATION ENGINEERING – I

Course Code: 13CE1122

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Describe highway development programme and various types of road layouts.

CO 2 Distinguish pavement construction materials

CO 3 Design of highway geometrics

CO 4 Analyse the traffic characteristics, accidents and specify the traffic regulations

CO 5 Discuss the at-grade and grade-separated intersections.

UNIT-I (12 Lectures)

HIGHWAY DEVELOPMENT AND PLANNING:

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

UNIT-II (12 Lectures)

HIGHWAY MATERIALS:

Highway Materials- Soil, Aggregate and Bitumen –Test on Aggregate – Aggregate properties and their importance. Tests on Bitumen – Bituminous Concrete – Requirements of design mix – Marshall Method of Bituminous mix design.

UNIT-III (14 Lectures)

HIGHWAY GEOMETRIC DESIGN-I :

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.

HIGHWAY GEOMETRIC DESIGN-II:

Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment- Gradients- Vertical Curves.

UNIT-IV (12 Lectures)

TRAFFIC ENGINEERING:

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies-speed studies- Data Collection and Presentation-Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures-Accident Data Recording – Condition Diagram and Collision Diagrams.

TRAFFIC REGULATION AND MANAGEMENT:

Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method.

UNIT-V (14 Lectures)

AT GRADE INTERSECTION DESIGN:

Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections- Channelisation: Objectives –Traffic Islands and Design Criteria – Rotary - Types.

GRADE SEPARATED INTERSECTION DESIGN:

Types of Grade Separated Intersections- Rotary Intersection – Flyovers, ROB, Cloverleaf (partial, full). Criteria for selection, Advantage, Disadvantages of grade separated intersection.

TEXT BOOKS:

1. S.K.Khanna & C.E.G.Justo, *"Highway Engineering"*, 7th Edition, Nemchand & Bros., 2000.
2. L.R.Kadiyali and Lal, *"Principles & Practices of Highway Engineering"*, 4th Edition, Khanna Publications, 2004.

3. V.N.Vazirani and S.P.Chandra, *"Transportation Engineering"*, Vol. I, 4th Edition, Khanna Publications, 1994.

REFERENCES:

1. S.P.Bindra, *"Highway Engineering"*, 4th Edition, Dhanpat Rai & Sons, 1981
2. Dr.L.R.Kadyali, *"Traffic Engineering & Transportation Planning"*, 6th Edition, Khanna publications, 1997.
3. NPTEL Videos
4. Indian Road Congress, Ministry of Road Transport and Highways, and Special Publications.

ESTIMATION AND QUANTITY SURVEYING

Course Code: 13CE1123

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Apply basic concepts of estimation in evaluating construction cost

CO 2 Apply standard specifications to carry out rate analysis.

CO 3 Prepare bar bending schedule for different RC elements

CO 4 Prepare valuation of building using principles of valuation

CO 5 Estimate the quantities for roadwork items.

UNIT-I (20 Lectures)

INTRODUCTION:

General items of work in Building – Standard Units –Principles of working out quantities for detailed and abstract estimates –Methods of Estimates of Buildings – Detailed estimates of buildings.

UNIT-II (12 Lectures)

Standard specifications for different items of building construction. Rate Analysis – Working out data for various items of work, over head and contingent charges.

UNIT-III (10 Lectures)

Reinforcement bar bending schedules.

UNIT-IV (12 Lectures)

Valuation of buildings – Purpose and Principles of valuation – Technical terms – Methods of valuation.

UNIT-V (10 Lectures)

Estimation of quantities for road work items.

TEXT BOOKS:

1. B.N. Dutta, *"Estimating and Costing"*, 10th Edition, UBS Publishers, 2000.
2. A.K. Upadhyay, *"Civil Estimating and Costing"*, 8th Edition, S.K. Kataria and Sons Publishers, 2010.

REFERENCES:

1. Standard Schedule of Rates and Standard Data Book by Public Works Department, 2014.
2. IS. 1200 (Parts I to XXV – 1974, *"Method of Measurement of Building and Civil Engineering works"*, B.I.S.)
3. National Building Code - 2010.
4. M. Chakraborthi; *"Estimation, Costing and Specifications"*, 7th Edition, Laxmi Publications, 2008.
5. G.S. Birdie, *"Estimating and Costing"*, 6th Edition, Dhanapati Rai Publishing Company, 2005.

DESIGN OF STEEL STRUCTURES

Course Code: 13CE1124

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Analyse and design bolted and welded connections

CO 2 Design single and compound beams as per IS code

CO 3 Design simple and built-up columns as per IS code

CO 4 Design column base systems as per IS code

CO 5 Calculate wind forces and design roof trusses

UNIT-I (12 Lectures)

WELDED AND BOLTED CONNECTIONS:

Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and Fillet welds: Permissible stresses – IS Code requirements. Design of Butt weld and fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT-II (14 Lectures)

BEAMS:

Introduction to plastic analysis, Design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, check for deflection, shear, buckling and bearing, for laterally supported and unsupported beams.

UNIT-III (14 Lectures)

TENSION MEMBERS:

General design of members subjected to direct tension.

COMPRESSION MEMBERS:

Effective length of columns, Slenderness ratio – permissible stresses, Design of compression members, Struts etc.

BUILT UP COLUMNS:

Design of built up compression members – Design of lacings and battens. Design Principles of eccentrically loaded columns and splicing of columns.

UNIT-IV (12 Lectures)

DESIGN OF COLUMN BASES:

Design of slab base and gusset base. Column bases subjected to moment.

UNIT-V (14 Lectures)

ROOF TRUSSES:

Different types of trusses – Design loads – Load combinations, IS Code 800-2007 recommendations, structural details – Design of simple roof trusses involving the design of purlins.

Note: 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 gusset base

Plate 5 Detailing of steel roof trusses including particulars at joints.

TEXT BOOKS:

1. Bhavikatti, *"Design of Steel Structures"*, 6th Edition, University Press. Hyderabad, 2010.
2. S.K. Duggal, *"Limit state design of steel structures"*, 1st Edition, TMH publication, 2011
3. N.Subramaniyan, *"Design of Steel structures"*, 1st Edition, Oxford university press, 2008.

REFERENCES:

1. B.C. Punmia, *"Comprehensive Design of Steel structures"*, 10th Edition, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi, 2007.

2. P. Dayaratnam, *"Design of Steel Structures"*, 2nd Edition, S. Chand Publishers, 2009.
3. Prof. Dr. V.L. Shah, Prof. Veena Gore, "Limit State Design of Steel Structures", 1st Edition, Structures Publications, 2009.

IS Codes:

1. IS -800 – 2007, *"Codes of Practice for General Construction in Steel"*, BIS, 2007
2. IS – 875 – Part III, *"Codes of Practice for Design Loads"* (other than Earthquake, for Buildings and Structures), 1987.
3. Steel Tables.

These codes and steel tables are permitted in the examinations.

TRANSPORTATION ENGINEERING LAB

Course Code: 13CE1125

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Determine engineering properties of aggregates.

CO 2 Evaluate bitumen properties.

CO 3 Design a bituminous concrete mix.

CO 4 Design the overlay thickness using different methods

CO 5 Interpret traffic studies using traffic volume data, spot speed and parking volume data

LIST OF EXPERIMENTS:

ROAD AGGREGATES:

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

BITUMINOUS MATERIALS:

7. Viscosity Test.
8. Ductility Test.
9. Softening Point Test.
10. Flash and fire point tests.
11. Marshall mix design
12. Benkelman beam (Optional)

TRAFFIC ENGINEERING

13. Traffic volume studies
14. Spot speed studies
15. Parking study

TECHNICAL COMMUNICATION AND SOFT SKILLS LAB

Course Code : 13HE1103

L	T	P	C
0	0	3	2

Introduction:

The introduction of the Advanced English Communication skills Lab is considered essential at B.Tech. level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context. The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:

- Gathering ideas and information: organizing ideas relevantly and coherently
- Engaging in debates
- Participating in group discussions
- Facing interviews
- Writing project proposals / technical reports
- Making oral presentations
- Writing formal letters and essays
- Transferring information from non-verbal to verbal texts and vice versa
- Taking part in social and professional communication

Course Outcomes:

CO 1 Use language fluently, accurately and appropriately in debates and group discussions

CO 2 Use their skills of listening comprehension to communicate effectively in cross-cultural contexts.

CO 3 Distinguish and use new vocabulary.

CO 4 Write resumes, project reports and reviews.

CO 5 Demonstrate interview skills and soft skills learnt.

LIST OF TASKS :

1. Listening comprehension – Achieving ability to comprehend material delivered at relatively fast speed; comprehending spoken material in Standard Indian English, British English, and American English; intelligent listening in situations such as interview in which one is a candidate.
2. Vocabulary building, Creativity, using Advertisements, Case Studies etc.
3. Personality Development: Decision-Making, Problem Solving, Goal Setting, Time Management & Positive Thinking
4. Cross-Cultural Communication : Role-Play/ Non-Verbal Communication.
5. Meetings- making meeting effective, chairing a meeting, decision-making, seeking opinions , interrupting and handling interruptions, clarifications, closure- Agenda, Minute writing
6. Group Discussion – dynamics of group discussion, Lateral thinking, Brainstorming and Negotiation skills
7. Resume writing – CV – structural differences, structure and presentation, planning, defining the career objective
8. Interview Skills – formal & informal interviews,concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing
9. Writing Skills - Business Communication, Essays for competitive examinations.
10. Technical Report Writing/ Project Proposals – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.- Feasibility, Progress and Project Reports.

REFERENCES:

1. Simon Sweeny, *"English for Business Communication"*, CUP, First South Asian Edition, 2010.
2. M. Ashraf Rizvi, *"Effective Technical Communication"*, Tata McGraw-Hill Publishing Company Ltd. 2005.
3. Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, *"English Language Communication: A Reader cum Lab Manual"*, Anuradha Publications, Chennai, 2006.
4. Dr. Shalini Verma, *"Body Language- Your Success Mantra"*, S. Chand, 2006.
5. Andrea J. Rutherford, *"Basic Communication Skills for Technology"*, 2nd Edition, Pearson Education, 2007.
6. Sunita Mishra & C. Muralikrishna, *"Communication Skills for Engineers"*, Pearson Education, 2011.
7. Jolene Gear & Robert Gear, *"Cambridge Preparation for the TOEFL Test"*, 4th Edition, CUP, 2006.
8. Meenakshi Raman & Sangeeta Sharma, *"Technical Communication"*, Oxford University Press, 2012.
9. Nick Ceremilla & Elizabeth Lee- Cambridge *"English for the Media"* CUP, 2010.
10. R.C. Sharma, Krishna Mohan, *"Business Correspondence and Report writing"*, 4th Edition, Tata Mcgraw-Hill Publishing Co. Ltd., 2010.
11. DELTA's key to the Next Generation TOEFL Test: *"Advanced Skill Practice,"* New Age International (P) Ltd., Publishers, New Delhi. 2010.
12. Books on TOEFL/GRE/GMAT/CAT by Barron's/ CUP, 2013.
13. IELTS series with CDs by Cambridge University Press, 2011.

BASIC COMPUTATIONS LAB

Course Code: 13ES11BC

L	T	P	C
0	0	3	2

Course Outcomes :

At the end of the course the student shall be able to
(using MATLAB programming Language)

CO 1 Perform matrix operations.

CO 2 Plot two dimensional, three dimensional graphs and draw inferences.

CO 3 Perform linear and non-linear regression analysis for the given data.

CO 4 Determine steady state, unsteady state solutions of Ordinary differential equations.

CO 5 Compute two and three dimensional integrals and solve unconstrained optimization problems.

LIST OF EXERCISES:

1. Basic MATLAB commands like representing arrays, matrices, reading elements of a matrix, row and columns of matrices, random numbers.
2. Floor, ceil, and fix commands.
3. Eigen values and Eigen vectors of a matrix.
4. Plotting tools for 2 dimensional and 3 dimensional plots, putting legends, texts, using subplot tool for multiple plots.
5. Linear Regression, interpolation and polynomial regression.
6. Non linear regression.
7. Solving non linear algebraic equations.
8. ODE IVP problems using Runge - Kutta method.

9. ODE BVP problems using shooting method.
10. Using quadrature to evaluate integrals (1, 2 and 3 dimensional cases).
11. Symbolic manipulation to evaluate Laplace and Fourier transforms.
12. Finding the minimum of an unconstrained function.

SYLLABI FOR VI SEMESTER

WATER RESOURCES ENGINEERING-II

Course Code: 13CE1126

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Distinguish various types of head works and their components and analyse the impervious floor on permeable foundations

CO 2 Apply the design principles in canal regulation and cross drainage structures.

CO 3 Calculate the capacity of reservoir using mass curve and determine the required hydro power for a given yield of the river.

CO 4 Determine the forces acting on a gravity dam and carryout stability analysis.

CO 5 Estimate the seepage through earthen dams and design the Ogee spillway profile

UNIT-I (12 Lectures)

DIVERSION HEAD WORKS:

Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure and impervious floors using Bligh's and Khosla's theory, exit gradient, functions of upstream and downstream sheet piles.

UNIT-II (14 Lectures)

CANAL REGULATION AND DRAINAGE WORKS:

Types of falls and their location, design principles of Sarda type fall, straight glacis fall, Canal regulation works - principles of design of

distributary head regulator, Canal outlets - types of canal modules, proportionality, sensitivity and flexibility, Cross drainage works - types, selection of site, design principles of aqueduct, syphon aqueduct.

UNIT-III (12 Lectures)

RESERVOIRS:

Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve for constant demand only.

WATER POWER ENGINEERING :

Introduction to Hydropower- Advantages and disadvantages, estimation of hydro- power, Flow duration curve, Power duration curve, Load curve, Load factor, Capacity factor, Utilization Factor, Diversity factor, Load duration curve, Firm power, Secondary power, Types of hydel schemes.

UNIT-IV (12 Lectures)

GRAVITY DAMS:

Types of dams, merits and demerits, selection of type of dam, selection of site for dam, 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 low gravity dam, stability analysis, drainage galleries.

UNIT-V (14 Lectures)

EARTH DAMS:

Types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.

SPILLWAYS:

Types of spillways, design principles of Ogee spillway, types of spillway gates, Methods of energy dissipation below spillway-Description only.

TEXT BOOKS:

1. S.K Garg, *"Irrigation engineering and hydraulic structures"*, 24th Edition, Khanna publishers, 2012.
2. K.R.Arora, *"Irrigation, Water Power and Water Resources Engineering"*, 3rd Edition, Standard Publishers Distributors, 2010.
3. R.K. Sharma and T.K. Sharma, *"Irrigation Engineering"*, S. Chand Publishers, 2007.
4. B.C.Punmia, B.B.L. Pande, Ashok K.R. Jain, Arun K.R. Jain, *"Irrigation & Water Power Engineering"*, 16th Edition, Laxmi Publications (P) Ltd., New Delhi, 2009.

REFERENCES:

1. G.L.Asawa, *"Irrigation and Water Resources Engineering"*, New Age International Publishers, 2005.
2. Varshney R.S., *"Concrete dams"*, 2nd Edition, Oxford and IBH Pub.Co.in, New Delhi, 1982.
3. Varshney R.S., S. C. Gupta & R.L. Gupta, *"Theory and Design of Hydraulic structures"*, 2nd Edition, Nemchand and Brothers, 1992.
4. Satyanarayana Murthy C, *"Water Resources Engineering"*, 1st Edition, New Age International Pvt. Ltd. Publishers, 1997.
5. Relevant IS codes.

ENVIRONMENTAL ENGINEERING-I

Course Code: 13CE1127

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Assess the quality and quantity of water requirements for a city /town and identify different components of a water supply project.

CO 2 Design different treatment units and distribution systems for water treatment supply

CO 3 Analyse the characteristics, collection, conveyance and disposal of wastewater

CO 4 Design of sewers and discuss the appurtenances

CO 5 Design secondary and biological treatment units

UNIT-I (12 Lectures)

WATER DEMANDS- STANDARDS -SOURCES:

Aspects of Environmental Engineering – Protected water supply – Need – Water demands – factors affecting - fluctuations – design period – population forecast – water quality – drinking water standards- Quality and Quantity and other considerations – surface and sub-surface sources – yield calculations – intake works – storage reservoir capacity – systems of water supply – requirements – detection of leakages – selection of pump – economical diameter of pumping main water quality – D.W.S. – testing and significance.

UNIT-II (12 Lectures)

TREATMENT OF WATER AND DISTRIBUTION :

Water treatment, conventional treatment flow diagram – Sedimentation types – principles – design factors – coagulation –

design of clariflocculator – filtration – slow and rapid gravity filters – multimedia and pressure filters – design principles-Disinfection – chlorination – miscellaneous treatment methods – distribution systems – layouts – design- and analysis, Hardy Cross and equivalent pipe method - pipe joints – valves – other appurtenances.

UNIT-III (12 Lectures)

WASTE WATER MANAGEMENT:

Introduction: waste water treatment system – definitions of terms – waste water management systems – collection and conveyance of sewage – sewage flow rates – storm water – characteristics of sewage – cycles of decay – BOD- COD – ultimate disposal of sewage.

UNIT-IV (12 Lectures)

DESIGN OF SEWERS AND PRIMARY TREATMENT:

Layouts – design of sewers – sewers appurtenances – sewage pumping – conventional sewage treatment – primary treatment screens – grit chamber – sedimentation tanks – design principles. Septic tanks and Imhoff tanks rural latrines – House plumbing – appurtenances.

UNIT-V (12 Lectures)

SECONDARY BIOLOGICAL TREATMENT:

Secondary treatment – Biological treatment – trickling filters – Activated Sludge Process – low cost waste treatment methods – Design of oxidation ponds – Aerobic and anaerobic lagoons. Sludge Digestion – Design principles – Disposal.

TEXT BOOKS:

1. G.S. Birdi, *"Water supply and sanitary Engineering"*, Dhanpat Rai & Sons Publishers. 8th Edition, 2010.
2. B.C.Punmia, *"Water Supply Engineering", Vol. 1, "Waste water Engineering Vol. II"*, 2nd Edition, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi, 2008.
3. K.N. Duggal, *"Elements of Environmental Engineering"*, 7th Edition, S. Chand Publishers, 2010.

REFERENCES:

1. Hammer and Hammer *"Water and wastewater Technology"*, 4th edition, Prentice hall of India, 2003.
2. Fair, Geyer and Okun, *"Water and Waste Water Engineering"*, 3rd Edition, Wiley, 2010.
3. Metcalf and Eddy, *"Waste Water Engineering"*, 3rd edition, Tata Mc Graw Hill, 2008.
4. Howard S. Peavy, Donand P. Rowe, George Technobanoglous, *"Environmental Engineering"*, 1st Edition Mc Graw –Hill Publications, Civil Engineering Series, 1985.

TRANSPORTATION ENGINEERING – II

Course Code: 13CE1128

L	T	P	C
4	0	0	3

Course Outcome:

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

CO 1 Design flexible and rigid pavements

CO 2 Explain types of roads, pavements and their failures

CO 3 Compute the cost and benefits of a highway project.

CO 4 Identify the components of permanent way, theories related to creep of rails and discuss points & crossings

CO 5 Describe the components of Airport, Docks & Harbours and their layouts, compute runway length and its orientation

UNIT-I (12 Lectures)

PAVEMENT DESIGN –I:

Pavement Design – CBR method of flexible pavement design – IRC method of flexible pavement design, AASHO method of flexible pavement design.

PAVEMENT DESIGN–II:

IRC method of rigid pavement design – Importance of joints in rigid pavements – Types of joints – Use of tie bars and dowel bars.

UNIT-II (12 Lectures)

HIGHWAY CONSTRUCTION, MAINTENANCE AND DRAINAGE:

Highway construction – Construction of earth roads – Gravel roads – WBM roads – Bituminous roads – Cement concrete roads – Reinforced concrete pavements – Construction of joints in cement concrete pavements. Highway Maintenance – Failures of flexible and rigid pavements and their maintenance- Strengthening of existing pavements. Highway drainage – importance of highway drainage – Surface, sub surface drainage.

UNIT-III (12 Lectures)

HIGHWAY ECONOMICS & FINANCE:

Highway user benefits – Highway cost – Economic analysis – Highway finance.

UNIT-IV (12 Lectures)

RAILWAY ENGINEERING-I :

Permanent way components – Cross Section of Permanent Way – Functions of various Components like Rails, Sleepers and Ballast – Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density.

RAILWAY ENGINEERING- II:

Rail joints, welding of rails. Turnouts – Left hand turnout – Track – junctions – Points and crossings – Tracks drainage – Railway stations and yards – Signaling.

UNIT-V (14 Lectures)

AIRPORT ENGINEERING:

Factors affecting selection of site for Airport and Layout Design – Computation of Runway length – Correction for Runway Length – Orientation of Runway – Wind Rose Diagram – Runway Lighting system – Taxiways, Apron, Control tower terminal building.

DOCKS & HARBOURS:

Types – layout and planning principles – Break waters – Docks – Wharves and Quays – Transit sheds – Ware houses – Navigational Aids.

TEXT BOOKS:

1. S.K.Khanna & C.E.G.Justo, *"Highway Engineering"*, 7th Edition, Nemchand & Bros., 2000.
2. S.P.chadula, *"Railway Engineering–A text book of Transportation Engineering"*, S.Chand & Co. Ltd. 2001.
3. L.R.Kadiyali and Lal, *"Principles & Practices of Highway Engineering"*, 4th Edition, Khanna Publications, 2004.

4. S.K.Khanna and M.G.Arora, *"Airport Planning and Design"*, 6th Edition, Nemchand & Bros., 1999.
5. Rangwala S.C & K.S. *"Railway Engineering"*, 14th Edition, Charotar Publications, 2005.
6. Saxena S.C and Arora S.P, *"Railway Engineering"*, 6th Edition, Dhanapat Rai Publications, 2004.
7. Seetharaman, *"Dock & Harbour Engineering"*, 1st Edition, Umesh Publications, 2008.

REFERENCES:

1. S.P.Bindra , *"Highway Engineering"*, Dhanpat Rai & Sons.
2. Dr.L.R.Kadyali, *"Traffic Engineering & Transportation Planning"*, 6th Edition, Khanna Publications, 1997.
3. Virendhra Kumar & Statish Chandhra, *"Air Transportation Planning & Design"*, Gal Gotia Publishers, 1999.
4. Robert M. Horonjeff, *"Planning and Design of Airports"*, Mc Graw Hill Publications, 2008.
5. J. S. Mundrey, *"Railway Track Engineering"*, 4th Edition, Mc Graw Hill Publications, 2010.
6. Indian Road Congress, Ministry of Road Transport and Highways, and Special Publications

GEOTECHNICAL ENGINEERING–II

Course Code: 13CE1129

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Interpret soil properties by conducting various field and lab tests

CO 2 Estimate lateral earth pressures on retaining walls and check the stability and determine the stability of slopes

CO 3 Assess the bearing capacity of soils using different methods for shallow foundations.

CO 4 Compute the load carrying capacity of piles using different methods and settlement analysis

CO 5 Explain the importance of well foundations and outline the basics of rock mechanics

UNIT-I (10 Lectures)

SOIL EXPLORATION:

Need – Methods of Soil exploration – Boring and Sampling Methods – Field tests – Penetration Tests – Plate Load Test – Pressure Meter Test – Planning of exploration program and Preparation of Soil investigation report.

UNIT-II (14 Lectures)

EARTH SLOPE STABILITY & EARTH PRESSURE THEORIES:

Infinite and finite earth slopes – Types of failures – Factor of safety of slopes – Stability analysis by method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions. Rankine's theory of Earth pressure – Earth pressures in layered soils – Coulomb's Earth pressure theory, Stability of retaining wall under seismic condition.

UNIT-III (12 Lectures)

SHALLOW FOUNDATIONS:

Types – Choice of foundation –Depth of foundation – Safe Bearing Capacity – Terzaghi, Meyerhof, Skempton and IS Methods, Safe bearing pressure based on N- value –Plate Load Test – Settlement Analysis – Immediate and Consolidation Settlement, Empirical estimation of SBC and settlement.

UNIT-IV (14 Lectures)

DEEP FOUNDATIONS:

Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile capacity based on empirical relations- Under-reamed piles-Uplift capacity of under - reamed piles-Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

UNIT-V (10 Lectures)

ADVANCED TOPICS:

TYPES OF WELLS:

Components of well foundation; Shapes of wells; Construction and Sinking of wells; tilts and shifts

Basics of rock mechanics – Classification and index properties of rocks, Rock strength and Failure criteria, Initial stresses in rocks and their measurement.

TEXT BOOKS:

1. B.M. Das, *"Principles of Foundation Engineering"*, 7th Edition, Cengage Learning, 2011.
2. Swami Saran, *"Analysis and Design of Substructures"*, 5th Edition, Oxford and IBH Publishing company Pvt Ltd (1998).
3. Som,N.N., and Das, S.C., *"Theory and Practice of foundation design"*, 3rd Edition, PHI, 2006.

REFERENCES:

1. Varghese. P.C., *"Foundation Engineering"*, 1st Edition, Prentice Hall of India, 2005.
2. J.E. Bowles, *"Foundation Analysis and Design"*, 5th Edition, McGraw-Hill Publishing Company, 1995.
3. Kurien, N.P., *"Theory and Practice of Foundation Design"*, 3rd Edition, Narosa Publishers, 2012.
4. D.P. Coduto, *"Foundation Designs – Principles and Practices"*, 1st Edition, Prentice Hall of India, 2009.
5. Lakshmi Reddi, Hilary Inyang, *"Geo Environmental Engineering: Principles and Applications"*, 1st Edition, CRC Press, 2000.
6. Goodman, R.E., *"Introduction to Rock Mechanics"*, 2nd Edition, John Wiley and Sons, 1989
7. Relevant IS codes, Special Publications and handbooks.
8. NPTEL Video lectures.

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
(ELECTIVE-I)

Course Code: 13CE1130

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Write the equations of motion for damped and undamped vibrations for SDOF systems

CO 2 Analyse the MDOF systems and calculate the frequency & mode shapes

CO 3 Associate with engineering seismology including causes and effects of earthquakes.

CO 4 Analyze, design and detail a multi-storeyed structure using Seismic Coefficient and Response Spectrum methods

CO 5 Explain the concept of aseismic planning, design and detail of Shear walls using I.S: 13920.

UNIT-I **(10 Lectures)**

INTRODUCTION TO STRUCTURAL DYNAMICS :

Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Un damped and damped free vibration – Damped – Force vibrations – Response to harmonic excitation – Concept of response spectrum.

UNIT-II **(12 Lectures)**

MULTI-DEGREES OF FREEDOM (MDOF) SYSTEMS (LIMITED TO 2 DOF):

Formulation of equations of motion – Free vibration – Determination

of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT-III (12 Lectures)

EARTHQUAKE ENGINEERING :

Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelerograms.

UNIT-IV (14 Lectures)

CODAL DESIGN PROVISIONS :

Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy –Assumptions – Analysis by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion – Analysis of a multistoried building using Seismic Coefficient method.

CODAL DETAILING PROVISIONS:

Review of the latest Indian codes IS: 4326 and IS: 13920 Provisions for ductile detailing of R.C buildings – Beam, column and joints.

UNIT-V (14 Lectures)

ASEISMIC PLANNING :

Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

SHEAR WALLS:

Types – Design of Shear walls as per IS: 13920 – Detailing of reinforcements.

TEXT BOOKS:

1. Mario Paz, *"Structural Dynamics - Theory and Computations"*, 6th Edition, Pearson Education, 2005.
2. Pankaj Agarwal & Manish Shrikhande, *"Earthquake Resistant Design of Structures"*, 5th Edition, Prentice Hall of India, New Delhi, 2009.
3. Jai Krishna A.R, Chandrasekharan A.R, Brijesh Chandra, *"Elements of Earthquake Engineering"*, 2nd Edition, South Asian Publishers, New Delhi, 2001.

REFERENCES:

1. Chopra A.K., *"Dynamics of Structures"*, 5th Edition, Pearson Education, Indian Branch, Delhi, 2007.
2. Clough & Penzien, *"Dynamics of Structures"*, 4th Edition, McGraw Hill, International Edition, 2008.
3. S.K.Duggal, *"Earth Quake Resistant Design of Structures"*, Oxford university Press, 1st Edition, 2012.
4. IS Codes: IS: 1893, IS: 4326 and IS:13920, Bureau of Indian Standards, New Delhi.

INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT
(ELECTIVE-I)

Course Code: 13CE1131

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Assess the characteristics of industrial effluents and their effects on environment including their tolerance limits.

CO 2 Describe the basic principles of industrial waste water treatment by physical methods.

CO 3 Discuss the sources, characteristics and treatment of food industrial wastes.

CO 4 Identify the sources, characteristics and treatment of major industrial waste of Thermal Power Plants, Oil Refineries, Steel mills and Cement industries

CO 5 Identify the sources, characteristics and treatment of chemical industrial wastes

UNIT-I **(12) Lectures)**

INTRODUCTION:

General Characteristics of Industrial effluents, effects on Environment – ISI tolerance limits for discharging industrial effluents into surface water, into public sewers and on to land for irrigation.

UNIT-II **(14 Lectures)**

TREATMENT OF INDUSTRIAL WASTE WATER :

Necessity of treatment –Segregation – Process changes – Salvaging – By Product Recovery –Ion Exchange, Electro dialysis, Solvent Extraction, Floatation – Removal of Nitrogen and Phosphorus – Boiler water treatment methods and cooling water treatment methods.

UNIT-III (10 Lectures)

FOOD INDUSTRIES:

Sources, characteristics and treatment of Sugar, Dairy, Distilleries.

UNIT-IV (12 Lectures)

MAJOR INDUSTRIAL EFFLUENTS:

Sources, characteristics and treatment of power plants, oil refineries, cement and steel.

UNIT-V (12 Lectures))

CHEMICAL INDUSTRIES:

sources and characteristics and treatment of Paper and pulp, tanneries, textiles, fertilizers and pharmaceuticals

TEXT BOOK:

Rao, M.N. & Dutta, A.K. "Waste Water Treatment", 3rd Edition, IBH Publishers, 1982.

REFERENCES:

1. Numersorn. N.L., *"Liquid Waste from industry – theories, Practice and Treatment"*.
2. Benefield L.D. and Randall C.D, "*Biological Process Designs for Wastewater Advanced Waste Treatment Methods "Removal suspended soils – Dissolved solid Treatment"*, Prentice Hall Pub. Co., 1980.
3. Metcalf and Eddy. *"Waste water Engineering – Collection, Treatment, Disposal and Reuse"*, Mc Graw Hill Pub. Co., 1995.
4. Bhide, A.D. & Sunderesan, B.B. *"Solid Waste Management"*, INSDOC, NEERI, Nagpur 1994.

TRAFFIC ENGINEERING
(ELECTIVE-I)

Course Code:13CE1132

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Discuss traffic characteristics and analyse the traffic data

CO 2 Describe the factors affecting highway capacity and LOS

CO 3 Analyse parking data for designing parking facilities

CO 4 Design effective traffic signal system and discuss the effects of traffic on environment

CO 5 Explain traffic signs and road markings for highway safety

UNIT-I **(12 Lectures)**

TRAFFIC CHARACTERISTICS:

Basic characteristics of Traffic- Volume, Speed and Density- Relationship among Traffic parameters.

TRAFFIC MEASUREMENT:

Traffic Volume Studies-Objectives- Types of Volume Studies –Concept of PCU- Data Collection and Presentation – Speed Studies – Types of Speeds- Objectives of Speed Studies- Methods of Conducting speed studies- Data collection and Presentation- Statistical Methods for Analysis of Speed Data.

UNIT-II **(12 Lectures)**

HIGHWAY CAPACITY:

Definition of Capacity – Importance of capacity – Factors affecting Capacity- Concept of Level of Service- Different Levels of Service- Concept of Service Volume- Peak Hour Factor.

UNIT-III (10 Lectures)

PARKING STUDIES:

Types of parking facilities – On street and Off Street Parking Facilities- Parking Studies- Parking Inventory Study – Parking Survey by Patrolling Method- Analysis of Parking Data and parking characteristics-Multi Story Car Parking Facility-Design standards.

UNIT-IV (14 Lectures)

TRAFFIC CONTROL & REGULATION:

Traffic Problems in Urban areas- Importance of Traffic Control and regulation- Traffic Regulatory Measures- Channelisation- Traffic Signals- Saturation Flow – Signal Design by Webster Method – Signal Phasing and Timing Diagrams.

TRAFFIC & ENVIRONMENT :

Detrimental effect of traffic on environment – Air Pollution – Pollutants due to Traffic – Measures to reduce Air Pollution due to Traffic- Noise Pollution – Measures to reduce Noise Pollution.

UNIT-V (14 Lectures)

TRAFFIC SIGNS AND ROAD MARKINGS:

Types of Traffic Signs- Cautionary, Regulatory and Informative Signs- Specifications- Pavement markings- Types of Markings – Lane markings and Object markings- Standards and Specifications for Road Markings.

HIGHWAY SAFETY:

Problem of Highway Safety – Types of Road accidents- Causes – Engineering Measures to reduce Accidents- Enforcement Measures – Educational Measures- Road Safety Audit- Principles of Road Safety Audit.

TEXT BOOKS:

1. Kadiyali L.K, *"Traffic Engineering and Transportation Planning"*, 3rd Edition, Khanna Publishers", 2004.
2. Mannering and Kilareski, *"Highway Engineering and Traffic Analysis"*, 3rd Edition, John Wiley Publications, 2007.

REFERENCES:

1. Khisty C. J., *"Transportation Engineering – An Introduction"*, 3rd Edition, Prentice Hall, 2010.
2. Partha Chakroborthy,Animesh Das, *"Principles of Transportation Engineering"*, 2nd Edition, Prentice Hall of India, 2005.
3. Papacostas C.S., *"Fundamentals of Transportation Engineering"*, 2nd Edition, Prentice Hall (India), 2005.

PORTS AND HARBOURS
(ELECTIVE- I)

Course code: 13CE1133

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Explain the significance of port and harbours as a mode of transport

CO 2 Demonstrate the fundamental principles of wave hydrodynamics and port cargo handling.

CO 3 Demonstrate the basic design of port layout

CO 4 Design, plan and integrate port and harbour infrastructure.

CO 5 Explain the construction, maintenance and renovation aspects of ports and inland waterways

UNIT-I **(12 Lectures)**

INTRODUCTION:

Ports and harbours as the interface between the water and land infrastructure – an infrastructure layer between two transport media.

UNIT-II **(12 Lectures)**

THE FUNDAMENTALS:

Wave conditions inside harbour, water circulation; breakwaters, jetties & quay walls; mooring, berthing and ship motion inside the port; cargo handling – bulk material storage & handling.

UNIT-III **(12 Lectures)**

DESIGN ISSUES:

Sea port layout with regards to (1) Wave action (2) Siltation (3) Navigability berthing facilities.

UNIT-IV (12 Lectures)

DESIGN OF PORT INFRASTRUCTURES:

Design of port infrastructures with regards to (1) Cargo handling (2) Cargo storage (3) Integrated transport of goods, Planning multipurpose port terminals.

UNIT-V (14 Lectures)

CONSTRUCTION ASPECTS:

Planning and construction of expansion and renovation of existing Inland Port Infrastructure.

Inland Waterways and ports: Maintenance of waterways, Construction of environmentally engineered banks, Dredging, Processing and storing of polluted dredged materials, development of river information services.

TEXT BOOK:

Ozha & Ozha, *"Dock and Harbour Engineering"*, 1st Edition, Charotar Books, Anand., 1990.

REFERENCES:

1. S.Seetharaman, *"Construction Engineering and Management"*, 4th Edition, Umesh Publications, New Delhi, 1999
2. Richand L. Silister, *"Coastal Engineering" Volume I & II,* Elsevier Publishers, 2000.
3. Pera Brunn, *"Port Engineering"*, 1st Edition, Gulf Publishing Company, 2001.

AIR POLLUTION AND CONTROL
(ELECTIVE-II)

Course Code: 13CE1134

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Distinguish the different sources of air pollution, effects and emission standards

CO 2 Determine the plume dispersion under different meteorological conditions using different models.

CO 3 Describe the properties of particulate pollutants and to control them at source using different methods.

CO 4 Discuss the design process for removal of gaseous pollutants.

CO 5 Categorise industries with respect to site selection, zoning, legislation and emission standards.

UNIT-I **(12 Lectures)**

AIR POLLUTION:

Air Pollution – Definition of Air pollution-sources and classification of air pollutants-effects of air pollution-global effects-air Quality Emission standards-Sampling of pollutants in ambient air-Stack sampling

UNIT-II **(12 Lectures)**

METEOROLOGY AND AIR POLLUTION:

Factors influencing air pollution-Wind rose-Mixing depths-Lapse rates and dispersion- atmospheric stability- Plume rise and dispersion-prediction of air quality-box model-Gaussian model-Dispersion coefficient-Application of tall chimney for pollutant dispersion.

UNIT-III (12 Lectures)

CONTROL OF PARTICULATE POLLUTANTS:

Properties of particulate pollution-particle size distribution-control mechanism-Dust removal equipment-Design and operation of settling chambers, cyclones, wet dust scrubbers, fabric filters and ESP

UNIT-IV (12 Lectures)

CONTROL OF GASEOUS POLLUTANTS:

Process and equipment for the removal of gaseous pollutants by chemical methods – Design and operation of absorption and adsorption equipment-Combustion and condensation equipment.

UNIT-V (12 Lectures)

CONTROL OF AIR POLLUTION:

Zoning and site selection-Other management controls, AP legislation-Automobile pollution and control-Emission standards

TEXT BOOKS:

1. M.N.Rao and H.V.N.Rao, *"Air Pollution"*, Tata McGraw Hill Company.
2. Wark and Warner, *"Air pollution"*, Harper & Row, New York.
3. Prof. K.V.S.G. Muralikrishna, *"Air pollution"*, Kaushal Publications – Kakinada.

REFERENCE:

R.K. Trivedy and P.K. Goel, *"An introduction to Air Pollution"* B.S. Publications.

GROUND IMPROVEMENT TECHNIQUES
(ELECTIVE – II)

Course Code : 13CE1135

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Describe dewatering techniques according to field conditions.

CO 2 Identify different grout materials and apply various grouting methods

CO 3 Explain various in situ densification methods for granular and cohesive soils.

CO 4 Demonstrate basic knowledge about design principles of reinforced soil walls.

CO 5 Describe applications of geo-synthetics and methods of soil stabilization.

UNIT-I **(12 Lectures)**

DEWATERING:

Methods of de-watering- Sumps and Interceptor Ditches- Single, Multi stage well points - Vacuum well points- Horizontal wells- Foundation drains-Blanket drains- Criteria for selection of fill material around drains –Electro-osmosis.

UNIT-II **(10 Lectures)**

GROUTING:

Objectives of grouting- Grouts and their properties- Grouting methods- Ascending, Descending and Stage Grouting- Hydraulic fracturing in soils and rocks- Post grout test.

UNIT-III **(14 Lectures)**

IN SITU DENSIFICATION METHODS IN GRANULAR SOILS & COHESIVE SOILS :

Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth, preloading or dewatering, Vertical drains – Sand Drains, Sand wick drains, synthetic drains – Stone and Lime columns – Thermal methods.

UNIT-IV (10 Lectures)

REINFORCED SOIL:

Principles – Components of reinforced soil – Factors governing design of reinforced soil walls – Design principles of reinforced soil walls.

UNIT-V (12 Lectures)

GEO SYNTHETICS & METHODS OF STABILIZATION:

Geo textiles- Types, Functions and Applications – Geo grids and Geo membranes – Functions and Applications. Cement Stabilization, Mechanism, Factors affecting and Properties, Use of Additives, Design of soil cement mixtures, Construction techniques. Lime and Bituminous Stabilization - Type of Admixtures, Mechanism, Factors affecting, design of mixtures, construction.

TEXT BOOKS:

1. Hausmann M.R., *"Engineering Principles of Ground Modification"*, 3rd Edition, McGraw-Hill International Edition, 2002.
2. Purushotham Raj, *"Ground Improvement Techniques"*, 4th Edition, Laxmi Publications, New Delhi, 2006.

REFERENCES:

1. Moseley M.P., *"Ground Improvement"*, 2nd Edition, Blackie Academic and Professional, Boca Taton, Florida, USA, 2007.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A., *"Ground Control and Improvement"*, 5th Edition, John Wiley and Sons, New York, USA 2000.
3. Robert M. Koerner, *"Designing with Geo-synthetics"*, 2nd Edition, Prentice Hall New Jersey, USA, 2000.

ADVANCED STRUCTURAL ANALYSIS
(ELECTIVE - II)

Course Code : 13CE1136

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Analyse portal frames with inclined legs and gable frames using slope deflection method.

CO 2 Analyse 2 and 3-hinged arches using ILD concept.

CO 3 Solve frames and trusses using flexibility method

CO 4 Solve frames and trusses by stiffness method

CO 5 Discuss the concept of plastic analysis and its application to fixed and continuous beams

UNIT-I **(12 Lectures)**

SLOPE DEFLECTION METHOD:

Application to the analysis of portal frames with inclined legs, gable frames

UNIT-II **(12 Lectures)**

ARCHES:

Analysis of two hinged and three hinged arches using influence line concept.

UNIT-III **(12 Lectures)**

FLEXIBILITY METHOD:

Introduction to the structural analysis by flexibility concept using Matrix approach and application to frames and trusses. (Maximum indeterminacy of 3)

UNIT-IV (12 Lectures)

STIFFNESS METHOD:

Introduction to the structural analysis by stiffness concept using Matrix approach and application to frames and trusses. (Maximum degrees of freedom of 3)

UNIT-V (16 Lectures)

PLASTIC ANALYSIS:

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge formation – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS:

1. Pandit and Gupta, *"Matrix Methods of Structural Analysis"*, 2nd Edition, Tata McGraw Hill, 2000.
2. Vazirani and Ratwani, *"Analysis of structures"*, Vol. I & II, 4th Edition, Khanna publications, 2009.

REFERENCES:

1. Prakash Rao D.S., "Structural Analysis", 3rd edition, Sagar books, 2008.
2. Bhavi Katti S.S, *"Structural Analysis"*, Vol. I & II, 4th Edition, Vikas Publications, 2010.

ADVANCED DESIGN OF STEEL STRUCTURES
(ELECTIVE- II)

Course code: 13CE1137

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Analyse and design a beam-column

CO 2 Explain the need of plate girder and its design as per IS code

CO 3 Calculate the loads on gantry girder and its design

CO 4 Design a simple truss for wind loads and design of gable frame

CO 5 Explain the concepts of pre-engineered buildings and their design

UNIT-I **(12 Lectures)**

DESIGN OF BEAMS-COLUMNS:

Introduction – General behavior of beams-columns – Codal provision for local capacity check and overall buckling check – Design of beams-columns.

UNIT–II **(14 Lectures)**

DESIGN OF PLATE GIRDER:

Introduction to plate girder – Elements of plate girder– IS 800-2007 codal provisions, preliminary design considerations - Concept of tension field action, design of end panels. Design of plate girder using IS 800-2007- Design of vertical stiffeners – Design of longitudinal stiffeners – Design of torsional stiffeners – Introduction to steel plate shear wall.

UNIT-III **(12 Lectures)**

DESIGN OF GANTRY GIRDER:

Introduction - Loading consideration & maximum load effect –

Selection of Gantry girder – Design of gantry girders for primary loads only.

UNIT-IV (12 Lectures)

DESIGN OF INDUSTRIAL STRUCTURES:

Introduction – Analysis and design of knee braced roof truss members – Design of gable portal frame – Analysis and design of Gantry girder columns.

UNIT-V (12 Lectures)

PRE-ENGINEERED BUILDINGS:

Introduction – Connection details – Design of typical portal frame of Industrial shed using IS: 800-2007

TEXT BOOKS :

1. N. Subramanyam, *"Design of Steel Structures"*, 1st Edition, Oxford University Press, 2008. Units: I to IV
2 M.R. Sheyekar *"Limit state design in Structural Steel"*, 1st Edition, PHI Publications, 2010. Unit-V.
3. SK Duggal "Limit state design of steel structures", 1st Edition, TMH publication2011

REFERENCE:

Edmin H. Gaylord, J. Charles. N. Gaylord & James E. Stallmeyer, *"Design of steel structures"*, 3rd Edition, Mc Graw – Hill International 1992.

COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB

Course Code : 13CE1138

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Analyse 2D and 3D frames using software

CO 2 Calculate the fundamental frequency and mode shapes for a given structure using software.

CO 3 Analyze and design the trusses and pipe net works using software.

CO 4 Calculate the area and volume of a given block level survey using software.

CO 5 Write a C program to calculate the safe bearing capacity of soil.

LIST OF EXERCISES:

1. Analysis of beams.
2. Analysis of 2D frames for gravity loads.
3. Analysis of 2D frames for lateral loads.
4. Analysis of 3D frames for gravity loads.
5. Analysis of 3D frames for lateral loads
6. Analysis of 3D frames for combined gravity and lateral loads.
7. Analysis of trusses.
8. Determine the fundamental frequency and mode shapes for a given structure.

9. Calculation of area and volume for a given block level survey data and to plot the contours.
10. To design the pipe network for a sewer line.
11. Calculation of earth pressures on retaining wall and assessment of slope stability of a finite slope.
12. Determination of safe bearing capacity of soil using C Programming..

GEOTECHNICAL ENGINEERING LAB

Course Code: 13CE1139

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Identify index properties of soils for classification purposes

CO 2 Estimate the soil permeability

CO 3 Determine the settlement characteristics of soils

CO 4 Determine the compaction characteristics of soils

CO 5 Estimate the strength parameters of soils

LIST OF EXPERIMENTS:

1. Atterberg's Limits.
2. Field density-core cutter and Sand Replacement Method
3. Specific Gravity Test
4. Sieve Analysis
5. Sedimentation Analysis
6. Permeability of soil, constant and variable head Test
7. Compaction Test
8. CBR Test
9. Consolidation Test
10. Unconfined compression Test
11. Direct Shear Test.
12. Vane Shear Test

REFERENCE:

IS 2720 all parts, and other relevant IS codes, special publications and handbooks

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

(Common to all Branches)

Course Code: 13NM1103

L	T	P	C
2	0	0	0

Course Outcomes:

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

CO 1 Examine the legal principles relating to IPR

CO 2 Identify the various policies and procedures related to trademarks.

CO 3 Summarise the principles and subject matter of the copyright law.

CO 4 Outline the various policies and procedures related to patents.

CO 5 Apply transactional law for creating wealth and managing risk.

UNIT-I **(7 Lectures)**

Introduction to intellectual property Act and Law-the evolutionary past-the IPR tool kit- legal tasks in intellectual property law-ethical obligations in Para legal tasks in intellectual property law

UNIT-II **(8 Lectures)**

Introduction to trade mark – Trade mark registration process-Post registration procedures-Trade mark maintenance – transfer of rights-inter party's proceeding – Infringement-Dilution ownership of trade mark-likelihood of confusion – trademark claims- trademark litigations

UNIT-III **(6 Lectures)**

Introduction to copy rights- principles of copyright – subjects matter of copy right- rights afforded by copyright law- copyright ownership-transfer and duration – right to prepare derivative works- right of

distribution- right to perform the work publicity- copyright formalities and registrations

UNIT-IV (7 Lectures)

Introduction to patent law- Rights and limitations- Rights under patent law- patent requirements- ownership – transfer- patent application process- patent infringement- patent litigation

UNIT-V (6 Lectures)

Introduction to transactional law- creating wealth and managing risk – employment relationship in the Internet and technologic cal sector-contact for internet and technological sector

TEXT BOOKS:

1 Kompal Bansal and Praishit Bansal, "Fundamentals of IPR for Engineers", 1st Edition, BS Publications, 2012.

2 Prabhuddha Ganguli, *"Intellectual Property Rights"*, 1st Edition, TMH, 2012.

REFERENCES:

1 R Radha Krishnan & S Balasubramanian, *"Intellectual Property Rights"*, 1st Edition, Excel Books, 2012.

2 M Ashok Kumar & mohd Iqbal Ali, *"Intellectual Property Rights"*, 2nd Edition, Serial publications, 2011.

NOTES

SYLLABI FOR VII SEMESTER

ENVIRONMENTAL ENGINEERING-II

Course Code: 13CE1140

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Discuss evil effects of Air and Noise pollutants and suggest the control measures.

CO 2 Categorise different treatment methods for water and waste water.

CO 3 Differentiate municipal solid waste into various categories, their treatment and disposal.

CO 4 Classify and disposal of hazardous waste.

CO 5 Appraise legal knowledge related to disposal of solid, liquid and gaseous wastes and fundamental knowledge of various Environmental Acts

UNIT-I (12 Lectures)

AIR POLLUTION & NOISE POLLUTION:

Sources of Air pollution – Air pollutants – classification – effects on man-vegetation – materials – global effects - Control of air pollution – Gaussian model – Removal of particulate pollutants – Removal gaseous pollutants. Noise pollution – Impacts – measurement and control.

UNIT-II (12 Lectures)

SPECIAL WATER TREATMENT METHODS:

a) Special treatment methods – Reverse Osmosis – Ion Exchange – Ultra filtration – De-fluoridation – Gas transfer – Thermal Phenomena.

b) Theories of Industrial Waste Treatment – Volume Reduction –

Strength Reduction – Neutralization – Equalization – Proportioning – Nitrification and Denitrification – Removal of Phosphates.

UNIT-III (12 Lectures)

SOLID WASTE MANAGEMENT:

Municipal solid wastes – Solid wastes characteristics – generation – collection – segregation and transportation – treatment and disposal.

UNIT-IV (12 Lectures)

HAZARDOUS WASTE TREATMENT METHODS:

Sources and effects – classification - characterization – treatment - secured land fill and safe disposal, Nuclear Wastes - Bio-Medical Wastes, and Chemical Wastes.

UNIT-V (12 Lectures)

LEGAL ASPECTS OF POLLUTION CONTROL :

Legal aspects of Environmental Management – Effluent standards – Air Emission Standards – Water Act – Air Act – Environmental Protection Act – Legal Provisions.

TEXT BOOKS:

1. Henry. G. J. and Heinke G.W., *"Environmental Science and Engineering"*, 2nd Edition, Pearson Education, 1996.
2. Dhameja. K. Suresh, *"Environmental Engineering and Management"*, 2nd edition, S.K. Kataria & Sons, 2005.
3. Howard S. Peavy, Donald R. Rowe, George Tchobanoglous, 1st Edition, McGraw-Hill, 1985.

REFERENCES:

1. Walter J. Weber, *"Physico, Chemical process for waste quality control"*, 9th Edition, Wiley- Interscience, 1972.
2. Rao M.N & Rao H.N., *"Air Pollution and Control"*, 1st Edition, Tata McGraw-Hill, 2006.

PRESTRESSED CONCRETE

Course Code : 13CE1141

L	T	P	C
4	0	0	3

Course Outcome:

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

CO 1 Distinguish various pre-stressing methods.

CO 2 Differentiate losses in pre-stressing.

CO 3 Design pre-stressed concrete members for flexure and shear.

CO 4 Analyse End Blocks for a pre-stressing system

CO 5 Determine deflection in pre-stressed concrete beams

UNIT-I (14 Lectures)

INTRODUCTION:

Historic development – General principles of Pre-stressing - Pre-tensioning and Post tensioning – Advantages and Limitations of Pre-stressed concrete – Materials – High Strength Concrete and High Tensile Steel and their characteristics.

PRESTRESSING METHODS :

IS Code provisions, Methods and Systems of Pre-stressing; Pre-tensioning and Post tensioning methods – Analysis of Post tensioning – Different systems of Pre-stressing like Hoyer system, Magnel Blaton system, Freyssinet's system and Gifford Udall System.

UNIT-II (14 Lectures)

LOSSES OF PRESTRESS:

Loss of Pre-stress in Pre-tensioned and Post-tensioned members due to various causes like Elastic shortage of concrete, Shrinkage of concrete, Creep of concrete, Relaxation of steel, Slip in anchorage bending of member and frictional losses.

ANALYSIS OF SECTIONS FOR FLEXURE:

Analysis of sections for flexure; Elastic analysis of concrete beams

pre-stressed with straight, Concentric, Eccentric, Bent and Parabolic Tendons.

UNIT-III (12 Lectures)

DESIGN OF SECTIONS FOR FLEXURE AND SHEAR :

Allowable stress, Design criteria as per IS Code – Elastic design of simple rectangular and I-section for flexure, shear, and Principal Stresses – Design for shear in beams – Kern – Lines, Cable profile.

UNIT-IV (10 Lectures)

ANALYSIS OF END BLOCKS:

Analysis of end Blocks by Guyon's method and Mugnel method, Anchorage zone stress – Approximate method of design – Anchorage zone reinforcement – Transfer of pre- stress pre-tensioned members.

UNIT-V (10 Lectures)

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:

Importance of control of deflections – Factors influencing deflections – Short term deflections of uncracked members prediction of long term deflections.

TEXT BOOKS:

1. Krishna Raju N, *"Prestressed Concrete"*, 4th Edition, Tata McGraw Hill Publications, 2007.
2. Rajagopalan. N, *"Prestressed Concrete"*, 2nd Edition, Narosa publications, 2006.

REFERENCES:

1. Ramamrutham S., *"Prestressed Concrete"*, 4th Edition, Dhanpatrai Publications, 2006.
2. Lin T.Y. & Ned H. Burns, *"Design of Prestressed concrete structures"*, 3rd Edition, John Wiley & Sons, 2004.

CONSTRUCTION MANAGEMENT

Course Code : 13CE1142

L	T	P	C
4	0	0	3

Course Outcome:

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

CO 1 Classify different construction contracts, tenders and deposits

CO 2 Explain construction organisation, construction planning and scheduling for projects

CO 3 Design networks using PERT and CPM

CO 4 Compose resource planning and optimization

CO 5 Categorise different construction disputes and their legislation

UNIT-I (12 Lectures)

CONTRACT MANAGEMENT :

Introduction and types of contract – Contract documents – possible contractual obligations – meaning of specification – tender notice – types – tender documents – earnest money deposit (EMD) and security deposits (SD) – scrutiny and acceptance of a tender – contract agreement – contractual changes and termination of contract – subcontract – rights and duties of sub contractor.

UNIT-II (16 Lectures)

PLANNING, SCHEDULING AND RESOURCE MANAGEMENT FOR CIVIL ENGINEERING PROJECT:

Objectives of planning – its advantage to client and engineer – limitations –stages of planning by owner & contractor. Scheduling – definition – its preparation – uses and advantages – classification – methods of scheduling – bar chart – job layout – Gantt chart – work breakdown chart (WBC)

Resource Management : Definition – need for resource management – optimum utilization of resources- finance, materials, machinery, human resources – resources planning – resource levelling and its objectives" – time – cost trade off – crashing – need for crashing an activity – methods & tips for crashing – time vs. cost optimization curve – cost slope – its significance in crashing.

UNIT-III (10 Lectures)

PROJECT MANAGEMENT THROUGH NETWORKS:

Activity – Event – Dummies – basic assumptions in creating a network – rules for drawing networks – Fulkerson's rule for numbering the events, PERT – time estimates – earliest expected time – latest allowable occurrence time – slack, standard deviation, variance.

QUALITY MANAGEMENT AND SAFETY:

Importance of quality – elements of quality – quality assurance techniques (inspection, testing, and sampling) importance of safety – causes of accidents – role of various parties (designer / employer / worker) in safety management – benefits – approaches to move safety in construction.

UNIT-IV (8 Lectures)

PRECEDENCE NETWORKS:

Creating network logic, Relationship Types – Finish to Start, Start to start, finish to finish, start to finish, critical path method – ES, EF, LS, LF, Floats – significance of critical path.

UNIT-V (12 Lectures)

CONSTRUCTION DISPUTES AND THEIR SETTLEMENT:

Introduction – development in disputes – categories of disputes – modes of settlements –arbitration

CONSTRUCTION LABOUR AND LEGISLATION:

Need for legislation – Payment of wages Act – Factories Act – Contract labour (Regulation and abolition Act – Employees Provident Fund (EPF) Act.

TEXTBOOKS:

1. Sengupta.B, & H.Guha, *"Construction Management and Planning"*, Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2004.
2. Seetharaman. S, *"Construction Engineering & Management"*, Umesh Publications, NaiSarak, New Delhi, 2006.
3. Sanga Reddy. S, *"Construction Management"*, Kumaran Publications, Coimbatore, 2004.

REFERENCES:

1. Rangwala.S.C, *"Construction of Structures and Management of Works"*, 3rd Edition, Charotar Publishing House, 2000.
2. Mincks and Johnston, *"Construction Jobsite Management"*, 4th Edition, Narosa Publications, Delmar, 1998.
3. Dorsey, Robert, *"Case Studies in Building Design and Construction"*, 3rd Edition, Prentice-Hall, 1999.

REINFORCED CONCRETE STRUCTURES-II

Course Code: 13CE1143

L	T	P	C
4	1	0	3

Course Outcomes:

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

CO 1 Design different types of stair cases.

CO 2 Select appropriate foundation system.

CO 3 Apply the design principles of retaining walls.

CO 4 Differentiate types of rectangular water tanks and analyse as per IS code methods

CO 5 Select types of circular water tanks and analyse as per IS code methods

UNIT-I (10 Lectures)

STAIRCASES: Introduction, types - design of Dog-legged staircase- design of open well staircase with quarter span landing- design of stairs with central stringer beam.

UNIT-II (14 Lectures)

COMBINED FOOTINGS:

Introduction – Design of combined rectangular footings –combined trapezoidal footings – MAT foundation – Reinforcement detailing and bar bending schedule.

STRUCTURAL DESIGN OF PILE FOUNDATIONS :

Types of piles – Load carrying capacity of piles – Group action in piles – Structural design of RC piles – Design of pile cap for 2 or 3 piles - Reinforcement detailing and bar bending schedule.

UNIT-III (14 Lectures)

CANTILEVER RETAINING WALLS :

Introduction – Types of retaining walls –Active and passive earth pressure- Design principles of cantilever retaining walls with horizontal back fill – With horizontal back fill and traffic load – With sloping back fill.

COUNTERFORT RETAINING WALLS:

Design principles of Counterfort retaining walls with horizontal back fill –With horizontal back fill and traffic load – With sloping back fill- Reinforcement detailing and bar bending schedule.

UNIT-IV (12 Lectures)

RECTANGULAR WATER TANKS-I:

Introduction – General design requirements according to Indian standard code of practice – Design of on ground and underground water tanks- Reinforcement detailing and bar bending schedule.

RECTANGULAR WATER TANKS-II:

Introduction – General design requirements according to Indian standard code of practice –Design of over head water tanks- Reinforcement detailing and bar bending schedule.

UNIT-V (10 Lectures)

CIRCULAR WATER TANKS :

Introduction – General design requirements according to Indian standard code of practice – Joints in water tanks – Circular tank with flexible joint between floor and wall – Circular tank with rigid joint between floor and wall – Design of Over head tanks - IS code method for design of circular tanks- Reinforcement detailing and bar bending schedule need to be prepared.

TEXT BOOKS

1. Punmia B.C., Ashok kumar Jain & Aurn Kumar Jain, *"Reinforced concrete structures"*, volume – I, 5th Edition, Laxmi publications Pvt. Ltd., New Delhi, 2008.

2. Varghese P.C., *"Limit State Design of Reinforced Concrete Structures"*, 3rd Edition, Prentice hall of India, New Delhi, 2005.

REFERENCES

1. Varghese P.C., *"Advanced Reinforced Concrete Structures"*, 4th edition, Prentice hall of India, 2005.
2. Pillai S.V. and Menon D, *"Reinforced Concrete Design"*, 2nd edition, Tata Mc Graw Hill, 2006.
3. Krishna Raju N, *"Advanced Reinforced Concrete Design"*, 4th edition, University Press, 2007.
4. Codes: Relevant IS codes.

REMOTE SENSING AND GIS

Course Code: 13CE1144

L	T	P	C
4	0	0	3

Course Outcome :

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

CO 1 Distinguish between the principles of photogrammetry and remote sensing.

CO 2 Differentiate types of sensors and satellites.

CO 3 Demonstrate the concepts and fundamentals of geographic information system.

CO 4 Apply the knowledge of remote sensing in water resource applications.

CO 5 Apply the knowledge of remote sensing in transportation and environmental disciplines of civil engineering

UNIT-I (12 Lectures)

PHOTOGRAMMETRY & REMOTE SENSING :

Introduction – principle and types of aerial photographs, Stereoscopy, Scale of a vertical aerial photograph, map Vs aerial photographs, mosaic, ground control, parallax measurements for height. Basic concepts and foundation of remote sensing – Elements involved in remote sensing , electromagnetic spectrum, Physics of remote sensing, energy interactions with earth surface features of vegetation, water and soil, energy interactions with atmosphere.

UNIT-II (10 Lectures)

SATELLITES & SENSORS:

Satellite and sensor characteristics of LANDSAT series, SPOT, IRS, IKONOS & QUICKBIRD. Visual interpretation keys - converging evidence.

UNIT-III (14 Lectures)

GEOGRAPHIC INFORMATION SYSTEM:

Geographic information system: Introduction, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Types of data representation- Data collection data input and output. Mannual digitizing and scanning. GIS data file management; Layer based GIS, Feature based GIS mapping. Data storage – raster, vector and attribute data storage, Overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data. Integration of RS, GIS & GPS.

UNIT-IV (12 Lectures)

WATER RESOURCES APPLICATIONS- I:

Land use/Land cover, Rainfall – Runoff relations and runoff potential indices of watersheds, flood and drought impact assessment and monitoring. Watershed management for sustainable development and watershed characteristics – Reservoir sedimentation, Identification of suitable sites for ground water & identification of sites for artificial recharge structures, drainage morphometry, water depth estimation and bathymetry.

UNIT-V (12 Lectures)

ENVIRONMENTAL AND TRANSPORTATION ENGINEERING APPLICATIONS:

Air pollution – detection & identification of pollution sources of water – water quality mapping & monitoring, environmental impact assessment – highway alignment-urban planning and infrastructure development.

TEXT BOOKS

1. Lillesand and Kiefer, *"Remote Sensing and Image Interpretation"*, 5th Edition, published by John Wiley and Sons, 2008.
2. M.Anji Reddy, *"Remote Sensing and Geographical Information systems"*, 3rd Edition, B.S.Publications, 2006.

3. A.M. Chandra, S.K. Ghosh, *"Remote Sensing and Geographical Information System"*, Narosa Publishing house, 1st Edition, 2007.

REFERENCES

1. Micheal N Demers, *"Fundamental of GIS"*, 3rd Edition, John Wiley & Sons, 2008.
2. C.P.Lo Albert, K.W. Yonng, *"Concepts & Techniques of GIS"*, 2nd Edition, Prentice Hall (India) Publications, 2008.
3. David P Paine, *"Aerial Photography and Image Interpretation"*, 2nd Edition, published by Wiley, Higher Education, 2006.
4. Kang – Tsung chang, *"Introduction to GIS"*, 4th Edition, TMH Publications & Co., 2007.
5. Ian Heywood, Sarah Cornelius, Steve Carver, *"An Introduction to Geographical Information Systems"*, 1st Edition, Pearson Education Asia, 2000.
6. Bernhardsen, *"Geographic Information Systems- An Introduction"*, 3rd Edition, Published by John Wiley Sons, 2006.
7. LRA Narayana, *"Basics of Remote Sensing and its applications"*, Universities press, 1st Edition, 2001
8. Peter A Burrough and Rachael A, MC Donnell, *"Principles of Geographical Information Systems"*, 1st Edition, Oxford Publishers, 1998.

INTRODUCTION TO FINITE ELEMENT METHOD
(ELECTIVE – III)

Course code: 13CE1145

L	T	P	C
4	0	0	3

Course Outcome:

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

CO 1 Summarise the basic concepts of FEM.

CO 2 Generate the model and formulate the shape function and strain displacement matrix.

CO 3 Generate Element stiffness matrix for 1D and 2D elements using FEM.

CO 4 Analyse 2D trusses using Finite Element concept.

CO 5 Analyse 2D beams using Finite Element concept.

UNIT-I **(10 Lectures)**

INTRODUCTION TO FEM:

Introduction – Limitations of methods of structural analysis – Mathematical modeling of physical problem - Concept of FEM through perimeter of circle – History, merit and demerits and applications of FEM – FEM based softwares – Steps involved in FEM as applicable to structural mechanics problems.

UNIT-II **(12 Lectures)**

CHOICE OF DISPLACEMENT MODELS:

Introduction – Discretization – Choice of element shapes - Choice of displacement models – Requirements of ideal displacement model - Factors affecting nature and degree of polynomial for displacement models.

FORMULATION OF SHAPE FUNCTION AND STRAIN DISPLACEMENT MATRIX:

Introduction – Properties of Shape Functions - Methods of determination – Shape functions and strain displacement matrix for 1D bar, beam element and 2D CST element.

UNIT-III (14 Lectures)

ELEMENT STIFFNESS MATRIX :

Introduction - Element stiffness matrix based on minimization of total potential Energy and Virtual Work - Stiffness matrix for 2 noded truss element, 3 noded truss element, 2 noded Beam element, 3 noded CST –Assemblage of element stiffness matrices – consistent load vector for elements - Assembling load matrix- Static Condensation.

UNIT-IV (14 Lectures)

1D AND 2D TRUSS ANALYSIS USING FEM:

Introduction - Analysis of stepped bars and tapered bars- Analysis of 2D Truss - 2D Truss with initial Strain/Rise in Temperature.

UNIT-V (10 Lectures)

BEAM ANALYLSIS USING FEM:

Introduction - Analysis of simply supported beam – Analysis of propped cantilevers, Fixed beams, and Continuous beams for various loadings.

TEXT BOOKS:

1. Chandrupatla,T.R., Belegunde, A.D, "*Introduction to Finite Elements in Engineering*", 3rd Edition, PHI, 2010
2. Desai,Y.M., Eldho.TI, Shah,A.H, *"Finite Element Methods with Application in Engineering"*, 1st Edition, Pearson, 2011
3. S.S. Bhavikatti, *"Finite Element Analysis"*, 2nd Edition, New age international, 2010

REFERENCES:

1. Klaus-Jurgen Bathe, *"Finite Element Methods"*, 2nd Edition, Prentice Hall, 2010

2. Reddy, J.N., *"Introduction to Finite Element Method"*, 3rd Edition, Mc Graw Hill, 2002\

SYLLABI FOR VIII SEMESTER

TRANSPORTATION PLANNING AND DESIGN
(ELECTIVE - III)

Course Code : 13CE1146

L	T	P	C
4	0	0	3

Course Outcome:

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

CO 1 Outline travel demand models.

CO 2 Explain different data collection methods and sampling.

CO 3 Generate trip generation & distribution models.

CO 4 Generate trip assignment & modal split.

CO 5 Assess interaction between traffic-environment & economic evaluation of transportation plans.

UNIT-I **(12 Lectures)**

CONCEPT OF TRAVEL DEMAND :

Travel characteristics – Origin. Destination, Route mode, Purpose – Travel demand as a function of independent variables – Assumptions in demand estimation, relation between land use and travel – Four step process of Transportation planning.

TRANSPORTATION PLANNING PROCESS:

General concept of Trip – Trip Generation – Trip Distribution – Traffic assignment and mode split , Aggregate and disaggregate Models – Direct Demand Models, Sequential and Sequential Recursive models.

UNIT-II **(12 Lectures)**

DATA COLLECTION AND INVENTORIES :

Definition of study area – Zoning principles ; Types and sources of Data, Home Interview surveys ; Road side interview surveys; Goods

Taxi, IPT surveys; Sampling techniques ; Expansion factors and Accuracy check : Desire line diagram and use.

UNIT-III (12 Lectures)

TRIP GENERATION MODELS:

Factors governing Trip Generation and Attraction :

Multiple linear Regression Models – Category analysis.

TRIP DISTRIBUTION MODELS METHODS OF TRIP DISTRIBUTION :

Growth Factor Models – Uniform Growth Factor Method ; Average Growth Factor Method ; Fratar Method ; Furness Method ; limitation of Growth Factor Models ; Concept of Gravity Model.

UNIT-IV (12 Lectures)

TRAFFIC ASSIGNMENT AND MODE SPLIT : PURPOSE OF ASSIGNMENT AND GENERAL PRINCIPLES:

Assignment Techniques – All-or-nothing assignment : Multiple route assignment :

Capacity resistant method, Minimum path trees ; Diversion curves. Factors affecting mode split – Probit logit and Descriminant Analysis.

UNIT-V (12 Lectures)

TRANSPORTATION AND ENVIRONMENT:

Detrimental effect of Traffic on Environment: Noise Pollution :Air pollution : Vibrations : Visual Intrusion – Effects and remedial measures.

ECONOMIC EVALUATION OF TRANSPORTATION PLANS :

Costs and benefits of transportation projects ; vehicle operating cost ; time saving, accident costs ; methods of economic evaluation – benefit Cost ratio method – Net Present Value method ; Internal Rate of Return method.

TEXT BOOKS:

1. Kadiyali L.R., *"Traffic Engineering and Transportation Planning"*, 8th Edition, Khanna Publishers, Delhi, 2005.

2. Papa Costas C.S., *"Fundamentals of Transportation Engineering"*, 2nd Edition, Prentice Hall, 2006.

REFERENCES:

1. Bruton M.J., *"Introduction to Transportation Planning"*, Hutchinson of London, 4th Edition, 2009
2. Khisty C.J., *"Transportation Engineering- An Introduction"*, 3rd Edition, Prentice Hall, 2008.

SOIL DYNAMICS AND MACHINE FOUNDATIONS
(ELECTIVE – III)

Course Code : 13CE1147

L	T	P	C
4	0	0	3

Course Outcome:

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

CO 1 Discuss the basics of vibrations and their effects on the performance of machines

CO 2 Estimate the dynamic properties of soil using tests

CO 3 Analyse a machine foundation using the forces acting on it

CO 4 Assess the machine foundation requirements for reciprocating and impact machines using IS code

CO 5 Summarise the methods used for vibration isolation

UNIT-I **(12 Lectures)**

THEORY OF VIBRATIONS:

Basic definitions- Free and Forced vibrations with and without damping for Single degree freedom system- Resonance and its effect – Magnification – Logarithmic decrement – Transmissibility, Natural frequency of foundation soil system -Barkan's and IS methods – Pressure bulb concept – Pauw's Analogy.

UNIT-II **(12 Lectures)**

WAVE PROPAGATION AND DYNAMIC SOIL PROPERTIES:

Elastic waves in Rods – Waves in elastic Half space, Field and Laboratory methods of determination – Uphole, Down hole and Cross hole methods – Cyclic plate load test – Block vibration test – Determination of Damping factor.

UNIT-III (12 Lectures)

MACHINE FOUNDATIONS:

Types, Design criteria, Permissible amplitudes and Bearing pressure, Degrees of freedom - Analysis under different modes of vibration of block foundation

UNIT-IV (12 Lectures)

DESIGN OF FOUNDATIONS FOR RECIPROCATING AND IMPACT MACHINES:

Analysis of Two Degree freedom systems under free and forced vibrations -Principles of Design of Foundations for reciprocating and impact machines as per IS code.

UNIT-V (10 Lectures)

VIBRATION ISOLATION:

Types and methods – Isolating materials and their properties

TEXT BOOKS:

1. Barkan, *"Dynamics of Bases and Foundations"*, 2nd Edition McGraw Hill Publishing, 1970.
2. Shamsher Prakash, *"Soil Dynamics"*, 3rd Edition, John Wiley, 2000.

REFERENCES:

1. Richart, Hall and Woods, *"Vibration of Soils and Foundations"*, Prentice Hall, 1981.
2. Prasad.B.B., *"Advance Soil Dynamics and Earthquake Engineering"*, 1st Edition, Prentice Hall, 2011.
3. P.Srinivasulu and G.V.Vaidyanathan, *"Handbook of Machine Foundations"*, 2nd Edition, Tata McGraw Hill, 1999.

DESIGN OF PUBLIC BUILDINGS
(ELECTIVE – III)

Course Code : 13CE1148

L	T	P	C
4	0	0	3

Course Outcomes :

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

CO 1 Explain with simple examples primary and secondary schools with reference to climate and functional design.

CO 2 Draw simple library buildings required by colleges and small public libraries.

CO 3 Explain with examples primary health centers in villages and small towns.

CO 4 Design small banks and post offices.

CO 5 Associate with various principles of design of auditoriums and cinema halls

UNIT-I **(12 Lectures)**

EDUCATIONAL BUILDINGS:

Requirements, primary school, secondary school, degree colleges. Design with reference to climate and functional requirements.

UNIT-II **(12 Lectures)**

Design of Library buildings: College libraries, public libraries.

UNIT-III **(12 Lectures)**

Functional design of a primary health centre.

UNIT-IV **(12 Lectures)**

Functional design of a bank, post office

UNIT-V (12 Lectures)

Principles of design of auditorium and cinema halls including acoustics.

In all the above FIVE UNITS emphasis shall be on plan and section of the buildings. They shall include the sanitary, ventilation and climate requirements and also NBO & NBC regulations.

TEXT BOOKS :

1. N. Kumara Swamy and. A. Kameswara Rao, *"Building Planning and Drawing"*, 8th Edition, Charotar Publications, 2010.
2. Y.S. Sane, *"Building planning and design"*.

REFERENCE:

Shah, Kale, Patk, *"Building Drawing with an Integrated Approach to Built Environment"*, Tata Mc Graw Hill.

ENVIRONMENTAL ENGINEERING LAB

Course Code: 13CE1149

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Assess physical parameters of water as turbidity and colour.

CO 2 Determine the chemical characteristics as pH, TDS, Hardness, Cl, DO, etc.

CO 3 Assess pollution characteristics of waste water by analysing DO, BOD and COD

CO 4 Assess the total hardness of given water sample.

CO 5 Calculate the amount of coagulant required for optimum sedimentation

LIST OF EXPERIMENTS:

1. Determination of pH and turbidity
2. Determination and Estimation of total solids, organic solids, dissolved solids, inorganic solids, determination of electrical conductivity.
3. Determination of Alkalinity/Acidity.
4. Determination of Optimum coagulant dose
5. Determination of Chlorides.
6. Determination of Chlorine demand.
7. Determination of Dissolved Oxygen.
8. Determination of B.O.D
9. Determination of C.O.D
10. Determination of total Hardness.

11. Determination of Nitrogen.
12. Determination of Total Phosphates.

TEXT BOOK:

Standard Methods for Analysis of Water and Waste Water – APHA.

REFERENCES:

1. Relevant *"IS Codes and Water & Waste Water Analysis Manual of ICMR or NEERI"*.
2. Sawyer and Mc Carty, *"Chemistry for Environmental Engineering"*.

GEOMATICS LAB

Course Code: 13CE1150

L	T	P	C
0	0	3	2

Course Outcomes:

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

CO 1 Operate advanced surveying instruments like total station.

CO 2 Demonstrate survey with total station and calculation of given area and locate known coordinates on the ground using total station.

CO 3 Compute contour maps for required contour intervals.

CO 4 Reconstruct the images and prepare thematic maps by digitization.

CO 5 Develop a land use / land cover classification and interpolate with various attribute analysis.

LIST OF EXERCISES

1. Opening and importing of an image.
2. Rectification of images.
3. Subset by inquire box method.
4. Subset by AOI method.
5. Mosaic of images.
6. Supervised classification of a given image
7. Unsupervised classification of a given image
8. Digitization of map/toposheet / creation of thematic maps.
9. Developing digital elevation model and draping of an image.

GIS SOFTWARE :

Arc GIS /ERDAS /Map info /ILWIS/SURFER

TOTAL STATION:

10. Determination of area
11. Contouring by SURFER
12. Stake out
13. GPS

REINFORCED CONCRETE BRIDGES

Course Code: 13CE1151

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Discuss the IRC standard live loads and design the deck slab type bridges

CO 2 Analyse the box culverts for the given loading and detail the box culverts.

CO 3 Design and detail of T-Beam bridges.

CO 4 Design and check the stability of piers and abutments

CO 5 Discuss the bridge foundations and prepare the bar bending schedule.

UNIT-I (14 Lectures)

GENERAL CONSIDERATIONS FOR ROAD BRIDGES:

Introduction – Site selection – Soil exploration for site – Selection of bridge type – Economical span – Number of spans – Determination of HFL – General arrangement drawing.

STANDARD SPECIFICATIONS FOR ROAD BRIDGES :

Width of carriageway- Clearances- Loads to be considered- Dead load – I.R.C. standard live loads- Impact effect- Review of I.R.C. loadings- Application of live loads on deck slabs – Wind load – Longitudinal forces- Centrifugal forces- Horizontal forces due to water currents –Buoyancy effect- Earth pressure.

UNIT-II (12 Lectures)

CULVERTS:

Introduction, analysis and design of box culverts- slab culverts – pipe culverts- Reinforcement detailing and bar bending schedule need to be prepared.

UNIT-III (12 Lectures)

REINFORCED CONCRETE T-BEAM BRIDGES :

Introduction – Analysis and design of T – Beam girder bridges- Reinforcement detailing and bar bending schedule need to be prepared.

UNIT-IV (12 Lectures)

DESIGN OF SUBSTRUCTURE:

Analysis and Design of Abutments and pier- Reinforcement detailing and bar bending schedule need to be prepared.

BRIDGE BEARINGS: Bearings, forces on bearings, design of elastomeric bearings, basics for selection of bearings, expansion joints, construction joints.

UNIT-V (12 Lectures)

BRIDGE FOUNDATIONS:

Types of foundations, well foundation – open well foundation, components of well foundation – pile foundations – designs not included- Reinforcement detailing .

TEXT BOOKS:

1. Johnson victor D, *"Essentials of Bridge Engineering"*, 7th Edition, Oxford, IBH publishing Co., Ltd., 2006.
2. Ponnu Swamy, *"Bridge Engineering"*, 4th Edition, Mc Graw-Hill Publication, 2008.
3. Krishna Raju N., *"Design of Bridges"*, 4th Edition, Oxford and IBH Publishing Co., Ltd., 2008.

REFERENCES:

1. Vazirani, Ratvani & Aswani, *"Design of Concrete Bridges"*, 5th Edition, Khanna Publishers, 2006.
2. Jagadish T.R. & M.A. Jayaram, *"Design of Bridge Structures"*, 2nd Edition, 2009.
3. Swami Saran, *"Analysis and Design of sub-structures"*, 2nd Edition, Oxford IBH Publishing co ltd., 2006.

ENVIRONMENTAL IMPACT ASSESSMENT
(ELECTIVE – IV)

Course Code : 13CE1152

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Discuss about the likely impacts of the project on individual, society and environment.

CO 2 Analyse the various indicators to assess the state of health, economy and standard of life either prospering or deteriorating.

CO 3 Assess the impacts on water bodies and land use related to construction and execution of projects.

CO 4 Analyse the statement of 'A smoke tube belching out smoke is a symbol of prosperity' by considering pros and cons.

CO 5 Classify the different methodologies of EIA and conditions under which a particular method can be adopted

UNIT-I **(12 Lectures)**

INTRODUCTION :

Environment and its interaction with human activities-Environment Imbalances- Attributes, impacts, Indicators, and measurements-Concept of Environmental Impact assessment (EIA) Environmental Impact Statement, Objectives of EIA, Advantages and limitations of EIA.

UNIT-II **(12 Lectures)**

ENVIRONMENTAL INDICATORS:

Indicators for climate-Indicators for terrestrial subsystems-Indicators for aquatic subsystems-Selection of indicators-Socio-economic indicators-Basic information-Indicators for economy-Social indicators-

indicators for health and nutrition-Cultural indicators-Selection of indicators

UNIT-III (12 Lectures)

ENVIRONMENTAL ISSUES IN WATER RESOURCE DEVELOPMENT :

Land use-soil erosion and their short and long term effects- Disturbance and long term impacts-Changes in quantity and quality of flow-sedimentation Environmental Impact assessment of water resource development structures-Case studies -water quality impact assessment – attributes, water quality impact assessment of water resources projects-data requirements of water quality impact assessment for dams impacts of dams on environment-case studies

UNIT-IV (12 Lectures)

ENVIRONMENTAL ISSUES INDUSTRIAL DEVELOPMENT:

On site and off site impacts during various stages of industrial development , long term climatic changes, green house effect, industrial effluents and their impact cycle, Environment Impact of high ways, mining and energy development.

UNIT-V (12 Lectures)

METHODOLOGIES FOR CARRYING ENVIRONMENTAL IMPACT ASSESSMENT:

Overview of methodologies, Adhoc, Checklist, Matrix, Network, Overlays, Benefit cost analysis choosing a methodology, review criteria.

TEXT BOOKS:

1. CANTER L.W, *"Environmental Impact Assessment"*, Mcgraw Hill Pub.Co. New York, 1996.
2. Join, R.K. Urban L.V.Stracy, G.S. *"Environmental Impact Analysis"*, 2nd Edition, Vau Nostrand Reinhold Co, 2004.
3. Anjaneyulu, Vall Manickam, *"Environmental Impact Assessment Methodologies"*, 2nd Edition , B.S.Publications, 2007.

REFERENCES:

1. Ran, J.G. & Wooten, D.C., *"Environmental Impact Assessment"*, 2nd Edition, Mc Graw Hill Pub. Co. Ltd, 2008.
2. UNESCO, *"Methodologies, Guidelines for the Integrated Environmental Evaluation of Water Resources Development"*, UNESCO/UNEP, Paris, 1987.

ADVANCED FOUNDATION ENGINEERING
(ELECTIVE- IV)

Course Code : 13CE1153

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Discuss the depth and spacing requirements and design principles of spread foundations.

CO 2 Explain the mat foundations and design guidelines.

CO 3 Analyse and design pile foundations and Drilled Piers.

CO 4 Demonstrate basic knowledge about cantilever sheet piles, anchored bulk heads and earth pressure diagrams.

CO 5 Summarise the knowledge of stability conditions and bearing capacity of cofferdams.

UNIT-I **(12 Lectures)**

SHALLOW FOUNDATIONS:

Depth, Spacing of footings, Erosion problems, Water table effects, Foundations on Sands, Silts, Clays, landfills (qualitative treatment only). Introduction to design of Spread footings, Rectangular footings, and Eccentrically loaded spread footings, Basics of beams on elastic foundation and Ring foundations.

UNIT-II **(10 Lectures)**

MAT FOUNDATIONS:

Types, Bearing capacity, Settlements, Sub grade reaction, Design guidelines.

UNIT-III (14 Lectures)

DEEP FOUNDATIONS:

Stresses during pile driving, Tension piles, Negative skin friction, and under-reamed piles. Guidelines for design of pile caps, Batter piles, Laterally loaded piles- Ultimate capacity of laterally loaded piles. Drilled piers – Uses, load carrying capacity, Settlements.

UNIT-IV (12 Lectures)

SHEET PILE WALLS:

Cantilever sheet piles and Anchored bulkheads, Earth pressure diagram Determination of Depth of embedment in sands and clays – Timbering of trenches- Earth pressure diagrams – Forces in struts.

UNIT-V (10 Lectures)

COFFER DAMS:

Stability, Bearing capacity, Settlements (Qualitative treatment only).

TEXT BOOKS:

1. Das. B.M., *"Principles of Foundation Engineering"*, 4th Edition, Cengage Learning, Singapore, 1999.
2. Bowles. J.E., *"Foundation Analysis and Design"*, 4th Edition, McGraw- Hill International, 1988.

REFERENCES:

1. Venkataramaiah C., *"Geotechnical Engineering"*, 5th Edition, NewAge International Pvt.Ltd, Publishers, 2009.
2. Swami Saran, *"Analysis and Design of Substructures"*, 3rd Edition, Oxford & IBH Publishing Company Pvt.Ltd, 2009.
3. Gopal Ranjan &ASR Rao, *"Basics and Applied Soil Mechanics"*, 4th Edition, New Age International Pvt.Ltd, Publishers, 2002.

ADVANCED STRUCTURAL DESIGN
(ELECTIVE-IV)

Course Code: 13CE1154

L	T	P	C
4	0	0	3

Course Outcomes:

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

CO 1 Demonstrate the ability to design Flat slab system

CO 2 Analyse and design Grid floor system

CO 3 Design Bunkers and Silos

CO 4 Design RC Chimneys for wind and temperature loads

CO 5 Design and details of Plate Girder Bridge

UNIT-I **(12 Lectures)**

FLAT SLABS:

Introduction – Components of flat slab construction- Indian code Recommendations (IS : 456 -2000)- Direct design method – Equivalent frame method – Shear in flat slabs – Detailing of flat slabs- Reinforcement detailing and bar bending schedule need to be prepared.

UNIT-II **(14 Lectures)**

GRID FLOORS:

Introduction – Analysis and design of grid floors – analysis of rectangular grid floors by Timoshenkos plate theory- Reinforcement detailing and bar bending schedule need to be prepared.

UNIT-III **(10 Lectures)**

BUNKERS AND SILOS:

Introduction – difference between bunker & silo – concepts of loading and design.

UNIT-IV (12 Lectures)

CHIMNEYS:

Introduction to chimneys – Parts of chimney – Stress in RC shafts due to self weight and wind loads – Stress due to temperature difference – Design of RC chimneys.

UNIT-V (14 Lectures)

PLATE GIRDER BRIDGES:

Analysis and design of Plate girder bridges- Detailed drawings must be prepared.

TEXT BOOKS:

1. Varghese P.C., *"Advanced Reinforced Concrete Structures"*, 6th Edition, Prentice Hall of India Pvt. Ltd., 2005.
2. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain, *"Reinforced concrete structures"*, Vol- 2, 5th Edition, Laxmi publications Pvt. Ltd., New Delhi, 2007.
3. Duggal S.K., *"Limit State Design of Steel Structures"*, 1st Edition, TMH, 2011.

REFERENCES:

1. Pillai S.U, and Menon D., *"Reinforced Concrete Design"*, 2nd Edition, Tata Mc Graw hill Publishing Company, 2008.
2. Bhavikatti S.S., *"Advanced RCC Design"*, 4th Edition, New Age International Pvt. Ltd., 2008.
3. Relevant IS: codes.