HINDUSTAN UNIVERSITY

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE

(Estd. u/s 3 of the UGC Act, 1956)

Padur, Kancheepuram District - 603 103.

DEPARTMENT OF CIVIL ENGINEERING

CURRICULUM
&
SYLLABUS 2013-14

B. Tech.
CIVIL ENGINEERING

ACADEMIC REGULATIONS
(B.Tech. Full /Part Time)

(Effective 2013-14)

1. Vision, Mission and Objectives

1.1 The Vision of the Institute is "To make every man a success and no man a failure".

In order to progress towards the vision, the Institute has identified itself with a mission to provide every individual with a conducive environment suitable to achieve his / her career goals, with a strong emphasis on personality development, and to offer quality education in all spheres of engineering, technology, applied sciences and management, without compromising on the quality and code of ethics.

1.2 Further, the Institute always strives

- To train our students with the latest and the best in the rapidly changing fields of Engineering, Technology, Management, Science & Humanities.

- To develop the students with a global outlook possessing, state of the art skills, capable of taking up challenging responsibilities in the respective fields.

- To mould our students as citizens with moral, ethical and social values so as to fulfill their obligations to the nation and the society.

- To promote research in the field of Science, Humanities, Engineering, Technology and allied branches.

1.3 Aims and Objectives of the Institute are focused on

- Providing world class education in engineering, technology, applied sciences and management.

- Keeping pace with the ever changing technological scenario to help the students to gain proper direction to emerge as competent professionals fully aware of their commitment to the society and nation.

- To inculcate a flair for research, development and entrepreneurship.

2. Admission

2.1 The admission policy and procedure shall be decided from time to time by the Board of Management (BOM) of the Institute, following guidelines issued by Ministry of Human Resource Development (MHRD), Government of India. The number of seats in each branch of the B.Tech programme will be decided by BOM as per the directives from MHRD, Government of India and taking into account the market demands. Some seats for Non Resident Indians and a few seats for foreign nationals shall be made available.

2.2 (i) Full-Time :

At the time of applying for admission, the candidates should have passed / appeared and be awaiting results of the final examination of the 10+2 system or its equivalent with Mathematics, Physics and Chemistry as subjects of study.

(ii) Part -Time:

At the time of applying for admission, the candidates should have a Diploma in Engineering/Technology in the relevant branch of specialization awarded by the State Board of Technical Education, Tamil Nadu or any other authority accepted by the Board of Management of the University as equivalent thereto and a minimum of one year practical experience.

2.3 The selected candidates will be admitted to the B.Tech. programme after he/she fulfills all the admission requirements set by the Institute and after the payment of the prescribed fees.

2.4 In all matters relating to admission to the B.E. / B.Tech. programme, the decision of the Institute and its interpretation given by the Chancellor of the Institute shall be final.

2.5 If at any time after admission, it is found that a candidate has not fulfilled any of the requirements stipulated by the Institute, the Institute may revoke the admission of the candidate with information to the Academic Council.

3. Structure of the programme

3.1 The programme of instruction will have the following structure:

i) A general (common) core programme comprising basic sciences, engineering sciences, humanities, technical arts and mathematics.

ii) An engineering core programme introducing the student to the foundations of engineering in the respective branch.

iii) An elective programme enabling the student to opt and undergo a set of courses of interest to him/ her.

iv) Professional practice including project, seminar and industrial training.

v) General elective courses, such as, Environmental Studies, Physical Education, Professional ethics, and National Service Scheme.

The distribution of total credits required for the degree programme into the above five categories will nominally be 20%, 50%, 15%, 5%, and 10% respectively.

3.2 (i) Full-Time:

The duration of the programme will be a minimum of 8 semesters. Every branch of the B.E. / B.Tech. programme will have a curriculum and syllabi for the courses approved by the Academic Council.

ii) Part - Time:

The duration of the programme will be a minimum of 7 semesters. Every branch of the B.Tech. programme will have a curriculum and syllabi for the courses approved by the Academic Council

3.3 The academic programmes of the Institute follow the credit system. The general pattern is:

• One credit for each lecture hour per week per semester;

• One credit for each tutorial hour per week per semester;

• Two credits for each laboratory practical/ drawing of three hours per week per semester.

• One credit for 4 weeks of industrial training and

- One credit for 4 hours of project per week per semester

3.4 (i) Full-Time:

For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. The curriculum of the different programs shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits of 190-200.

(ii)   Part-Time:

For the award of degree, a student has to earn certain minimum total number of credits specified in the curriculum of the relevant branch of study. The curriculum of the different programs shall be so designed that the minimum prescribed credits required for the award of the degree shall be within the limits of 110-120.

3.5   The medium of instruction, examination and the language of the project reports will be English.

4.   Faculty Advisor

4.1   To help the students in planning their courses of study and for getting general advice on the academic programme, the concerned Department will assign a certain number of students to a Faculty member who will be called their Faculty Advisor.

5.   Class Committee

5.1   A Class Committee consisting of the following will be constituted by the Head of the Department for each class:

(i)   A Chairman, who is not teaching the class.

(ii)   All subject teachers of the class.

(iii) Two students nominated by the department in consultation with the class.

The Class Committee will meet as often as necessary, but not less than three times during a semester.

The functions of the Class Committee will include:

(i)   Addressing problems experienced by students in the classroom and the laboratories.

(ii)   Analyzing the performance of the students of the class after each test and finding ways and means of addressing problems, if any.

(iii) During the meetings, the student members shall express the opinions and suggestions of the class students to improve the teaching / learning process.

6.   Grading

6.1   A grading system as below will be adhered to.

Range of Marks	Letter Grade	Grade points
95 -100	S	10
85 - 94	A	09
75 - 84	B	08
65 -74	C	07
55 - 64	D	06
50 - 54	E	05
< 50	U	00
	I (Incomplete)	–

6.2 GPA and CGPA

GPA is the ratio of the sum of the product of the number of credits C_i of course "i" and the grade points P_i earned for that course taken over all courses "i" registered by the student to the sum of C_i for all "i". That is,

$$GPA = \frac{\sum\limits_i C_i P_i}{\sum\limits_i C_i}$$

CGPA will be calculated in a similar manner, at any semester, considering all the courses enrolled from the first semester onwards.

6.3 For the students with letter grade I in certain subjects, the same will not be included in the computation of GPA and CGPA until after those grades are converted to the regular grades.

6.4 Raw marks will be moderated by a moderation board appointed by the Vice-Chancellor of the University. The final marks will be graded using an absolute grading system. The Constitution and composition of the moderation board will be dealt with separately.

7. Registration and Enrolment

7.1 Except for the first semester, registration and enrollment will be done in the beginning of the semester as per the schedule announced by the University.

7.2 A student will be eligible for enrollment only if he/she satisfies regulation 10 (maximum duration of the programme) and will be permitted to enroll if (i) he/she has cleared all dues in the Institute, Hostel and Library up to the end of the previous semester and (ii) he/she is not debarred from enrollment by a disciplinary action of the University.

7.3 Students are required to submit registration form duly filled in.

8. Registration requirement

8.1 (i) Full -Time:

A full time student shall not register for less than 16 credits or more than 30 credits in any given semester.

(ii) Part -Time:

A part time student shall not register for less than 10 credits or more than 20 credits in any given semester

8.2 If a student finds his/her load heavy in any semester, or for any other valid reason, he/she may withdraw from the courses within three weeks of the commencement of the semester with the written approval of his/her Faculty Advisor and HOD. However the student should ensure that the total number of credits registered for in any semester should enable him/her to earn the minimum number of credits per semester for the completed semesters.

9. Continuation of the programme

9.1 For those students who have not earned the minimum required credit prescribed for that particular semester examination, a warning letter to the concerned student and also to his/her parents regarding the shortage of his/her credit will be sent by the HOD after the announcement of the results of the university examinations.

10. Maximum duration of the programme

10.1 (i) Full - Time

The normal duration of the programme is eight semesters. However a student may complete the programme at a slower pace by taking more time, but in any case not more than 14 semesters excluding the semesters withdrawn on medical grounds or other valid reasons.

(ii) Part - Time

The normal duration of the programme is seven semesters. However a student may complete the programme at a slower pace by taking more time, but in any case not more than 12 semesters excluding the semesters withdrawn on medical grounds or other valid reasons

11. Temporary discontinuation

11.1 A student may be permitted by the Director (Academic) to discontinue temporarily from the programme for a semester or a longer period for reasons of ill health or other valid reasons. Normally a student will be permitted to discontinue from the programme only for a maximum duration of two semesters.

12. Discipline

12.1 Every student is required to observe discipline and decorum both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.

12.2 Any act of indiscipline of a student reported to the Director (Academic) will be referred to a Discipline Committee so constituted. The Committee will enquire into the charges and decide on a suitable punishment if the charges are substantiated. The committee will also authorize the Director (Academic) to recommend to the Vice-Chancellor the implementation of the decision. The student concerned may appeal to the Vice-Chancellor whose decision will be final. The Director (Academic) will report the action taken at the next meeting of the Council.

12.3 Ragging and harassment of women are strictly prohibited in the University campus and hostels.

13. Attendance

13.1 A student whose attendance is less than 75% in a semester is not eligible to appear for the end-semester examination for that semester. The details of all students who have less than 75% attendance in a course will be announced by the teacher in the class. These details will be sent to the concerned HODs and Director (Academic).

13.2 Those who have less than 75% attendance will be considered for condonation of shortage of attendance. However, a condonation of 10% in attendance will be given on medical reasons. Application for condonation recommended by the Faculty Advisor, concerned faculty member and the HOD is to be submitted to the Director (Academic) who, depending on the merits of the case, may permit the student to appear for the end semester examination. A student will be eligible for this concession at most in two semesters during the entire degree programme. Application for medical leave, supported by medical certificate with endorsement

by a Registered Medical Officer, should reach the HOD within seven days after returning from leave or, on or before the last instructional day of the semester, whichever is earlier.

13.3 As an incentive to those students who are involved in extra curricular activities such as representing the University in Sports and Games, Cultural Festivals, and Technical Festivals, NCC/ NSS events, a relaxation of up to 10% attendance will be given subject to the condition that these students take prior approval from the officer - in-charge. All such applications should be recommended by the concerned HOD and forwarded to Director (Academic) within seven instructional days after the programme / activity.

14. Assessment Procedure

14.1 The Academic Council will decide from time to time the system of tests and examinations in each subject in each semester.

14.2 For each theory course, the assessment will be done on a continuous basis as follows:

Test / Exam	Weightage	Duration of Test / Exam
First Periodical Test *	10%	2 Periods
Second Periodical Test *	10%	2 Periods
Model Exam	20%	3 hours
Seminar/Assignments/Quiz	10%	-
Attendance	10%	
End - semester examination	50%	3 Hours

 *Best out of the two tests will be considered.

14.3 For practical courses, the assessment will be done by the subject teachers as below:

(i) Weekly assignment/Observation note book / lab records - weightage 60%.

(ii) End semester examination of 3 hours duration including viva - weightage 40%.

14.4 For courses on Physical Education, NSS, etc the assessment will be as satisfactory/not satisfactory only.

15. Make up Examination/Model Exam

15.1 Students who miss the end-semester examinations / model examination for valid reasons are eligible for make-up examination /model examination. Those who miss the end-semester examination / model examination should apply to the Head of the Department concerned within five days after he / she missed examination, giving reasons for absence.

15.2 Permission to appear for make-up examination / model examination will be given under exceptional circumstances such as admission to a hospital due to illness. Students should produce a medical certificate issued by a Registered Medical Practitioner certifying that he/she was admitted to hospital during the period of examination / model exam and the same should be duly endorsed by parent / guardian and also by a medical officer of the University within 5 days.

16. Project evaluation

16.1 For Project work, the assessment will be done on a continuous basis as follows:

Review / Examination	Weightage
First Review	10%
Second Review	20%
Third Review	20%
End-semester Examination	50%

For end-semester examination, the student will submit a Project Report in a format specified by the Director (Academic). The first three reviews will be conducted by a Committee constituted by the Head of the Department. The end-semester examination will be conducted by a Committee constituted by the Registrar / Controller of examination. This will include an external expert.

17. Declaration of results

17.1 A candidate who secures not less than 50% of total marks prescribed for a course with a minimum of 50% of the marks prescribed for the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

(ii) To be Eligible to appear for the end semester examinations for a particular course, a candidate will have to secure a minimum of 40% marks in the sessional for that course.

(iii) Candidates are required to obtain all credits assigned to the first two semesters of the programme within the first four semesters of the programme. Candidates failing to satisfy this requirement will not be allowed to proceed to the fifth semester until the condition is satisfied. Further, candidates will not be allowed to proceed to seventh semester if they have not cleared all the courses assigned during third & fourth semesters.

17.2 After the valuation of the answer scripts, the tabulated results are to be scrutinized by the Result Passing Boards of UG programmes constituted by the Vice-Chancellor. The recommendations of the Result Passing Boards will be placed before the Standing Sub Committee of the Academic Council constituted by the Chancellor for scrutiny. The minutes of the Standing Sub Committee along with the results are to be placed before the Vice-Chancellor for approval. After getting the approval of the Vice-Chancellor, the results will be published by the Controller of Examination/ Registrar.

17.3 If a candidate fails to secure a pass in a course due to not satisfying the minimum requirement in the end-semester examination, he/she shall register and re-appear for the end-semester examination during the following semester. However, the sessional marks secured by the candidate will be retained for all such attempts.

17.4 If a candidate fails to secure a pass in a course due to insufficient sessional marks though meeting the minimum requirements of the end-semester examination, and wishes to improve on his/her sessional marks, he/she will have to register for the particular course and attend the course with permission of the HOD concerned and Director(Academic) with a copy marked to the Registrar. The sessional and external marks obtained by the candidate in this case will replace the earlier result.

17.5 A candidate can apply for the revaluation of his/her end-semester examination answer paper in a theory course within 2 weeks from the declaration of the results, on payment of a prescribed fee through proper application to the Registrar/ Controller of Examinations through the Head of the Department. The Registrar/ Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

17.6 After ten semesters, the sessional marks of the candidate will not be considered for a pass in a course. A candidate who secures 50% in the end semester examination shall be declared to have passed the course and earned the specified credits for the course.

18.   Grade Card

18.1 After results are declared, grade sheet will be issued to each student which will contain the following details:

(i)   Program and branch for which the student has enrolled.

(ii)   Semester of registration.

(iii)   List of courses registered during the semester and the grade scored.

(iv)   Semester Grade Point Average (GPA)

(v)   Cumulative Grade Point Average (CGPA).

19.   Class/Division

19.1   Classification is based on CGPA and is as follows:

CGPA $\geq$ 8.0: **First Class with distinction**

6.5 $\leq$ CGPA < 8.0 : **First Class**

5.0 $\leq$ CGPA < 6.5 : **Second Class.**

19.2 (i) Further, the award of 'First class with distinction' is subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses in his/her first appearance within the minimum duration of the programme.

(ii)   The award of 'First Class' is further subject to the candidate becoming eligible for the award of the degree having passed the examination in all the courses **within 10 semesters.**

(iii)   The period of authorized discontinuation of the programme (vide clause 11.1) will not be counted for the purpose of the above classification.

20.   Transfer of credits

20.1. Within the broad framework of these regulations, the Academic Council, based on the recommendation of the transfer of credits committee so consulted by the Chancellor may permit students to earn part of the credit requirement in other approved institutions of repute and status in the country or abroad.

20.2 The Academic Council may also approve admission of lateral entry (who hold a diploma in Engineering/ technology) candidates with advance credit based on the recommendation of the transfer of credits committee on a case to case basis.

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

21.1. A student will be declared to be eligible for the award of the B.Tech. Degree if he/she has

i) registered and successfully acquired the credits for the core courses;

ii) successfully acquired the credits in the different categories as specified in the curriculum corresponding to the discipline (branch) of his/her study within the stipulated time;

iii) has no dues to all sections of the Institute including Hostels, and

iv) has no disciplinary action pending against him/her.

The award of the degree must be recommended by the Academic Council and approved by the Board of Management of the University.

22. Change of Branch

22.1 If the number of students in any branch of B.Tech. class as on the last instructional day of the First Semester is less than the sanctioned strength, then the vacancies in the said branches can be filled by transferring students from other branches. All such transfers will be allowed on the basis of merit of the students. The decision of the Chancellor shall be final while considering such requests.

22.2 All students who have successfully completed the first semester of the course will be eligible for consideration for change of branch subject to the availability of vacancies.

23. Power to modify

23.1. Notwithstanding all that has been stated above, the Academic Council shall modify any of the above regulations from time to time subject to approval by the Board of Management.

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DEPARTMENT OF CIVIL ENGINEERING

Semester I
(Common to all Branches)

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1.	EL 2101	Technical English	3	0	0	3	3
2.	MA 2101	Engineering Mathematics-I	3	1	0	4	4
3.	PH 2001/ CY 2001	Engineering Physics / Engineering Chemistry *	3	0	0	3	3
4.	ME 2101	Engineering Graphics	1	0	3	3	4
5.	CS 2101	Computer Programming	3	0	0	3	3
Practical							
6.	CS 2131	Computer Programming Laboratory	0	0	3	2	3
7.	GE 2131	Engineering Practices Laboratory-I	0	0	3	2	3
8.	EL 2131	Communication Skills Laboratory I	0	0	3	2	3
9.	PH 2031/ CY 2031	Physics Laboratory / Chemistry Laboratory *	1	0	3	3	4
		Total				25	30

Note: * Depending upon the number of batches, it will be alternated between semesters 1 & 2

SEMESTER II

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1	MA 2201	Engineering mathematics-II #	3	1	0	4	4
2	CY 2001/ PH 2001	Engineering Chemistry / Engineering Physics * #	3	0	0	3	3
3.	CE 2201	Mechanics of Solids	3	1	0	4	4
4.	ME 2202	Engineering Mechanics	3	1	0	4	4
5.	CE 2202	Construction Materials	3	0	0	3	3
Practical							
6.	CY 2031/ PH 2031	Chemistry Laboratory/ Physics Laboratory* #	1	0	3	3	4
7.	GE 2231	Engineering Practices Laboratory-II #	0	0	3	2	3
8.	EL 2231	Communication Skills Laboratory II #	2	0	2	3	4
9.	CE 2231	Construction Materials Laboratory	0	0	3	2	3
		Total				**28**	**32**

Note: * Depending upon the number of batches, it will be alternated between semesters 1 &2

 # Common to all Branches

SEMESTER III

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1.	CE 2301	Strength of Materials	3	1	0	4	4
2.	CE 2302	Structural Analysis - I	3	1	0	4	4
3.	CE 2303	Mechanics of Fluids	3	1	0	4	4
4.	CE 2304	Surveying	3	1	0	4	4
5.	CE 2305	Environmental Engineering	3	0	0	3	3
Practical							
6.	CE 2331	Computer Aided Building Drawing	0	0	3	2	3
7.	CE 2332	Computer Aided Structural Analysis Laboratory	0	0	3	2	3
8.	CE 2333	Survey Laboratory	0	0	3	2	3
		Total				**27**	**31**

SEMESTER IV

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1.	MA 2401	Numerical Methods*	3	1	0	4	4
2	CE 2401	Design of Steel Structures - I	3	1	0	4	4
3	CE 2402	Design of Concrete Structures - I	3	1	0	4	4
4	CE 2403	Mechanics of Soils	3	1	0	4	4
5	CE 2404	Construction Techniques Equipments and Practices	3	0	0	3	3
Practical							
6.	CE 2431	Environmental Engineering Laboratory	0	0	3	2	3
7.	CE 2432	Geo Technical Laboratory	0	0	3	2	3
8.	CE 2433	Project Work	0	0	6	2	6
		Total				**25**	**31**

*Common to Civil, Aeronautical, Mechanical Engineering

SEMESTER V

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1.	CE 2501	Structural Analysis - II	3	1	0	4	4
2.	CE 2502	Design of Steel Structures - II	3	1	0	4	4
3.	CE 2503	Design of Concrete Structures - II	3	1	0	4	4
4.	CE 2504	Irrigation Engineering	3	0	0	3	3
5.	CE 2505	Hydraulic Engineering	3	1	0	4	4
6	_	Elective - I 3	0	0	3	3	
Practical							
7.	EL 2431	Communication Skills & Personality Development	2	0	2	3	4
8.	CE 2531	Strength of Materials Laboratory	0	0	3	2	3
		Total				27	29

SEMESTER VI

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1.	MG 2001	Principles of Management *	3	0	0	3	3
2.	CE 2601	Foundation Engineering	3	1	0	4	4
3.	CE 2602	Tranportation Engineering - I	3	0	0	3	3
4.	CE 2603	Estimation and Quantity Surveying	3	1	0	4	4
5.	CE 2604	Environmental Science and Engineering	3	0	0	3	3
6.	-	Elective - II	3	0	0	3	3
Practical							
7.	CE 2631	Fluid Mechanics & Machinery Laboratory	0	0	3	2	3
8.	CE 2632	Irrigation & Environmental Engineering Drawing	0	0	3	2	4
		Total				**24**	**27**

*Common to Civil, Automobile, Mechanical Engineering

SEMESTER VII

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1.	MG 2002	Total Quality Management*	3	0	0	3	3
2.	CE 2701	Basics of Dynamics and Aseismic Design of Structures	3	1	0	4	4
3.	CE 2702	Transportation Engineering - II	3	0	0	3	3
4.	CE 2703	Construction Management	3	0	0	3	3
5.	-	Elective - III	3	0	0	3	3
6.	-	Elective - IV	3	0	0	3	3
Practical							
7.	CE 2731	Computer Aided Design and Drafting	0	0	3	2	3
8.	CE 2732	Construction Software Laboratory	0	0	3	2	3
		Total				**23**	**25**

* Common to Civil, Automobile, Aeronautical, Electronics & Instrumentation, Mechanical Engineering

SEMESTER VIII

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
THEORY							
1.	GE 2001	Professional Ethics and Human Values*	3	0	0	3	3
2.	-	Elective - V	3	0	0	3	3
3.	-	Elective - VI	3	0	0	3	3
Practical							
4.	CE 2831	Project & Viva-voce	0	0	24	6	24
		Total				**15**	**33**

* Common to Civil, Aeronautical, Mechanical Engineering

ELECTIVE SUBJECTS - SEMESTER V

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
1	CE 2551	Electronic Surveying	3	0	0	3	3
2	CE 2552	Applied Hydrology	3	0	0	3	3
3	CE 2553	Remote Sensing Techniques and Applications	3	0	0	3	3
4	CE 2554	Engineering Geology	3	0	0	3	3
5	CE 2555	Building Services	3	0	0	3	3

ELECTIVE SUBJECTS - SEMESTER VI

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
1	CE 2651	Housing Planning and Management	3	0	0	3	3
2	CE 2652	Management of Irrigation Systems	3	0	0	3	3
3	CE 2653	Environmental Impact Assessment	3	0	0	3	3
4	CE 2654	Industrial Waste Management	3	0	0	3	3
5	CE 2655	Air Pollution Management	3	0	0	3	3
6	CE 2656	Municipal Solid Waste Management	3	0	0	3	3
7	CE 2657	Modern construction materials	3	0	0	3	3

ELECTIVE SUBJECTS - SEMESTER VII

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
1	CE 2751	Traffic Engineering Management	3	0	0	3	3
2	CE 2752	Prestressed Concrete	3	0	0	3	3
3	CE 2753	Finite Element Analysis	3	0	0	3	3
4	CE 2754	Water Resources Engineering	3	0	0	3	3
5	CE 2755	Pavement Design and Engineering	3	0	0	3	3
6	CE 2756	Ground Improvement Techniques	3	0	0	3	3
7	CE 2757	Design of Steel Skeletal structures	3	0	0	3	3
8	CE 2758	Concrete Technology	3	0	0	3	3

ELECTIVE SUBJECTS - SEMESTER VIII

Sl. No.	Course Code	Course Title	L	T	P	C	TCH
1	CE 2851	Bridge Structures	3	0	0	3	3
2	CE 2852	Storage Structures	3	0	0	3	3
3	CE 2853	Tall Structures	3	0	0	3	3
4	CE 2854	Wind Engineering	3	0	0	3	3
5	CE 2855	Industrial Structures	3	0	0	3	3
6	CE 2856	Prefabricated Structures	3	0	0	3	3
7	CE 2857	Design of Steel Concrete Composite Structures	3	0	0	3	3
8	CE 2858	Repair and Rehabilitation of Structures	3	0	0	3	3

TOTAL NUMBER OF CREDITS = 193

EL 2101   TECHNICAL ENGLISH

L T P C
3 0 0 3

GOAL

The goal of the programme is to provide a theoretical input towards nurturing accomplished learners who can function effectively in the English language skills; to cultivate in them the ability to indulge in rational thinking, independent decision-making and lifelong learning; to help them become responsible members or leaders of the society in and around their work/living space; to communicate successfully at the individual or group level on multi-disciplinary activities in particular with the community, and in general with the world at large.

OBJECTIVES

The course should enable the students to :

- Widen the capacity of the learners to listen to English language at the basic level and understand its meaning.

- Enable learners to communicate in an intelligible English accent and pronunciation.

- Assist the learners in reading and grasping a passage in English.

- Learn the art of writing simple English with correct spelling, grammar and punctuation.

- Cultivate the ability of the learners to think and indulge in divergent and lateral thoughts.

OUTCOME

The students should be able to:

- The learners will have the self-confidence to improve upon their informative listening skills by an enhanced acquisition of the English language.

- The learners will be able to speak English at the formal and informal levels and use it for daily conversation, presentation, group discussion and debate.

- The learners will be able to read, comprehend and answer questions based on literary, scientific and technological texts.

- The learners will be able to write instructions, recommendations, checklists, process-description, letter-writing and report writing.

- The learners will have the confidence to develop thinking skills and participate in brainstorming, mind-mapping, audiovisual activities, creative thinking and also answer tests in the job-selection processes.

UNIT I   LISTENING SKILL   12

Listening to short and extended dialogues, telephone conversations, discussions, soliloquies - Listening to prose & poetry reading -- Listening to sounds, silent letters, stressed syllables in English

-- Listening to video clips, documentaries, feature films, presentations, interviews -- Listening for the gist of the text, for identifying a topic, general meaning and specific information -- Listening for multiple-choice questions, for positive & negative comments, for interpretation -- Listening for advanced interpretation.

UNIT II   SPEAKING SKILL   12

Introducing oneself or expressing personal opinion -- Simple oral or casual interaction - Dialogue -- Conversation - Giving and receiving feedback using Johari window - Debates -- Brief presentations -- Differences between disagreeing and being disagreeable -- Participating in group discussions, role plays and interviews -- Generating talks based on visual or written prompts -- Addressing a small group or a large formal gathering - Comparing, contrasting, justifying, agreeing and disagreeing on advanced topics - Speaking about present and past experiences and future plans - Debates, discussions and role plays on advanced topics - Job interviews - Preparing HR questions with possible answers -- Brief presentations - Arguing out a topic without verbal fights -- Power point presentation.

UNIT III   READING SKILL   12

Reading for skimming and scanning -- Reading for the gist of a text, for specific information, for information transfer and interpretation -- Reading and interpreting anecdotes, short stories, poems, prose passages for intellectual and emotional comments - Reading a Fishbone diagram for strengths and weaknesses, for pros and cons - Reading comprehension exercises for multiple-choice questions, for contextual meaning -- Reading newspapers, magazine articles for critical comments.

UNIT IV   WRITING SKILL   12

Writing emails, messages, notices, agendas, leaflets, brochures, instructions, recommendations, functional checklists, minutes of a meeting -- Writing paragraphs, comparing, contrasting, presentations with an Introduction, Body and Conclusion -- Arranging appointments, asking for permission, apologizing and offering compensation - Writing formal business letters -- Letter inviting, accepting, declining the invitation -- Letter to the editor -- Requesting permission for industrial visits or implant training, enclosing an introduction to the educational institution -- Letter applying for a job, enclosing a CV or Resume -- Writing short reports -- Industrial accident reports -- Writing short proposals.

UNIT V   THINKING SKILL   12

Developing the acquisition and imparting the knowledge of English using thinking skills -- Eliciting thinking blocks for critical interpretation -- Decoding diagrammatic and pictorial representations into English orthographic version in the form of words, phrases, expressions, idioms, sayings and proverbs.

TOTAL: 60

REFERENCES

1.   Norman Whitby. Business Benchmark: Pre-Intermediate to Intermediate - BEC Preliminary. New Delhi: Cambridge University Press, 2008 (Latest South Asian edition).

2.   Devaki Reddy & Shreesh Chaudhary. Technical English. New Delhi: Macmillan, 2009.

3.   Rutherford, Andrea J. Basic Communication Skills for Technology. 2nd edition. New Delhi: Pearson Education, 2010.

MA 2101 ENGINEERING MATHEMATICS - I

L T P C
3 1 0 4

GOAL

To create the awareness and comprehensive knowledge in engineering mathematics.

OBJECTIVES

The course should enable the students to :

- Find the inverse of the matrix by using Cayley Hamilton Theorem and Diagonalisation of matrix using transformation.

- Understand the Evolutes and Envelope of the curve.

- Learn the solutions of second order linear differential equations of standard types and Legendre's linear differential equation.

- Learn partial differentiations involving two and three variables and expansions of functions using Taylor series.

- Learn the expansions of trigonometric, hyperbolic functions and their relations.

OUTCOME

The students should be able to:

- Identify Eigen value problems from practical areas and obtain its solutions and using transformation diagonalising the matrix which would render Eigen values.

- Find out effectively the geometrical aspects of curvature and appreciates mathematical skills in constructing evolutes and envelopes in mechanics and engineering drawing.

- Recognize and to model mathematically and solving, the differential equations arising in science and engineering.

- Understand and model the practical problems and solve it using maxima and minima as elegant applications of partial differentiation.

- Acquire skills in using trigonometric and hyperbolic and inverse hyperbolic functions.

UNIT I   MATRICES   12

Review: Basic concepts of matrices-addition, subtraction, multiplication of matrices - adjoint -inverse - solving cubic equations.

Characteristic equation - Properties of Eigen values - Eigen values and Eigen vectors - Cayley Hamilton theorem (without proof) - Verification and inverse using Cayley Hamilton theorem. Diagonalisation of matrices - Orthogonal matrices - Quadratic form   - Reduction of symmetric matrices to a Canonical form using orthogonal transformation - Nature of quadratic form.

UNIT II   DIFFERENTIAL CALCULUS   12

Review: Basic concepts of differentiation - function of function, product and quotient rules.

Methods of differentiation of functions - Cartesian form - Parametric form - Curvature - Radius of curvature - Centre of curvature - Circle of curvature. Evolutes of parabola, circle, ellipse, hyperbola and cycloid - Envelope.

UNIT III   ORDINARY DIFFERENTIAL EQUATIONS   12

Review: Definition, formation and solutions of differential equations.

Second order differential equations with constant coefficients - Particular integrals - , eaxCosbx, eaxSinbx. Euler's homogeneous linear differential equations - Legendre's linear differential equation - Variation of parameters.

UNIT IV   PARTIAL DIFFERENTIATION   12

Partial differentiation - differentiation involving two and three variables - Total differentiation -Simple problems. Jacobian - verification of properties of Jacobians - Simple problems. Taylor's series - Maxima and minima of functions of two and three variables.

UNIT V   TRIGONOMETRY   12

Review: Basic results in trigonometry and complex numbers - De Moivre's theorem.

Expansions of sinn , cosn , tann where n is a positive integer. Expansions of in terms of sines and cosines of multiples of   where m and n are positive integers. Hyperbolic and inverse hyperbolic functions - Logarithms of complex numbers - Separation of complex functions into real and imaginary parts - Simple problems.

Note: Questions need not be asked from review part.

TOTAL: 60

TEXT BOOKS

1.   Erwin Kreyzig, A Text book of Engineering Mathematics, John Wiley, 1999.

2.   Grewal B.S, Higher Engineering Mathematics, Thirty Eighth Editions, Khanna Publisher, Delhi, 2004.

3.   Chandrasekaran A, A Text book of Engineering Mathematics I, Dhanam Publications, Chennai, 2010.

REFERENCES

1.   Venkataraman M.K, Engineering Mathematics, Volume I, The National Publishing Company, Chennai, 1985.

2.   Kandaswamy P, Thilagavathy K and Gunavath K, Engineering Mathematics, Volume I & II, S.Chand and Company, New Delhi, 2005.

3.   Bali N.P, Narayana Iyengar. N.Ch., Engineering Mathematics, Laxmi Publications Pvt. Ltd, New Delhi, 2003.

4.   Veerarajan T, Engineering Mathematics (for first year), Fourth Edition,Tata McGraw - Hill Publishing Company Limited, New Delhi, 2005.

PH2001 ENGINEERING PHYSICS

L T P C
3 0 0 3

GOAL

To impart fundamental knowledge in various fields of Physics and its applications.

OBJECTIVES

The course should enable the students to :

- Develop strong fundamentals of properties and behavior of the materials

- Enhance theoretical and modern technological aspects in acoustics and ultrasonics.

- Enable the students to correlate the theoretical principles with application oriented study of optics.

- Provide a strong foundation in the understanding of solids and materials testing.

- Enrich the knowledge of students in modern engineering materials.

OUTCOMES

The students should be able to:

- Be able to understand the properties and behaviour of materials.

- Have a fundamental knowledge of acoustics which would facilitate in acoustical design of buildings and on ultrasonics and be able to employ it as an engineering tool.

- Understand the concept, working and application of lasers and fiber optics.

- Know the fundamentals of crystal physics and non destructive testing methods.

- Have an understanding of the production, characteristics and application of the new engineering materials. This would aid them in the material selection stage.

UNIT I   PROPERTIES OF MATTER   9

Elasticity - types of moduli of elasticity - Stress-Strain diagram - Young's modulus of elasticity - Rigidity modulus - Bulk modulus - Factors affecting elasticity - twisting couple on a wire - Torsional pendulum - determination of rigidity modulus of a wire - depression of a cantilever - Young's modulus by cantilever - uniform and non-uniform bending - viscosity - Ostwald's viscometer - comparison of viscosities.

UNIT II   ACOUSTICS AND ULTRASONICS   9

Classification of sound - characteristics of musical sound - intensity - loudness - Weber Fechner law - Decibel - Reverberation - Reverberation time, derivation of Sabine's formula for reverberation time(Jaeger's method) - absorption coefficient and its determination - factors affecting acoustics of building (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies. Ultrasonics - production - Magnetostriction and Piezoelectric methods - properties

- applications of ultrasonics with particular reference to detection of flaws in metal (Non - Destructive testing NDT) - SONAR.

UNIT III   LASER AND FIBRE OPTICS   9

Principle of lasers - Stimulated absorption - Spontaneous emission, stimulated emission - population inversion - pumping action - active medium - laser characteristics - Nd-Yag laser - CO2 laser - Semiconductor laser - applications - optical fiber - principle and propagation of light in optical fibers - Numerical aperture and acceptance angle - types of optical fibers - single and multimode, step index and graded index fibers - applications - fiber optic communication system.

UNIT IV   CRYSTAL PHYSICS AND NON- DESTRUCTIVE TESTING   9

Crystal Physics: Lattice - Unit cell - Bravais lattice - Lattice planes - Miller indices - 'd' spacing in cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - coordination number - Packing factor for SC, BCC, FCC and HCP structures.

Non Destructive Testing: Liquid penetrate method - Ultrasonic flaw detection - ultrasonic flaw detector (block diagram) - X-ray Radiography - Merits and Demerits of each method.

UNIT V   MODERN ENGINEERING MATERIALS AND SUPERCONDUCTING MATERIALS   9

Modern Engineering Materials: Metallic glasses: Preparation properties and applications. Shape memory alloys (SMA): Characteristics, applications, advantages and disadvantages of SMA. Nano Materials: Synthesis -Properties and applications.

Superconducting Materials: Superconducting phenomena - Properties of superconductors - Meissner effect - Type I and Type II superconductors - High Tc superconductors (qualitative) - uses of superconductors.

TOTAL : 45

TEXT BOOKS:

1.   Gaur R.K. and Gupta S.L., "Engineering Physics ", 8th edition, Dhanpat rai publications (P) Ltd., New Delhi 2010.

2.   P.Mani, "Engineering Physics ", Vol-I, Dhanam Publications, Chennai 2011.

3.   Rajendran V. an Marikani A., "Applied Physics for engineers" , 3rd edition, Tata Mc Graw -Hill publishing company Ltd., New Delhi,2003.

REFERENCES:

1.   Uma Mukherji, "Engineering Physics ", Narosa publishing house, New Delhi, 2003.

2.   Arumugam M., "Engineering Physics ", Anuradha agencies, 2007.

3.   Palanisamy P.K., "Engineering Physics ", SciTech Publications, Chennai 2007.

4.   Arthur Beiser, "Concepts of Modern Physics", Tata Mc Graw -Hill Publications, 2007.

5.   P.Charles, Poople and Frank J. Owens, "Introduction to Nanotechnology", Wiley India, 2007

CY 2001 - ENGINEERING CHEMISTRY

L T P C
3 0 0 3

GOAL

To impart basic principles of chemistry for engineers.

OBJECTIVES

The course should enable the students to :

- To make the students conversant with the basics of

  a) Water Technology and

  b) Polymer science.

- To provide knowledge on the requirements and properties of a few important engineering materials.

- To educate the students on the fundamentals of corrosion and its control.

- To give a sound knowledge on the basics of a few significant terminologies and concepts in thermodynamics.

- To create an awareness among the present generation about the various conventional energy sources.

OUTCOME

The students should be able to:

- The students will gain basic knowledge in water analysis and suitable water treatment method.

- The study of polymer chemistry will give an idea on the type of polymers to be used in engineering applications.

- Exposure of the students to the common engineering materials will create awareness among the students to search for new materials.

- Knowledge on the effects of corrosion and protection methods will help the young minds to choose proper metal / alloys and also to create a design that has good corrosion control.

- Students with good exposure on the important aspects of basic thermodynamics will be able to understand the advanced level thermodynamics in engineering applications.

- A good background on the various aspects of energy sources will create awareness on the need to utilize the fuel sources effectively and also for exploring new alternate energy resources.

UNIT I   WATER TECHNOLOGY AND POLYMER CHEMISTRY   9

Hardness (Definition, Types, Units) - problems - Estimation of Hardness (EDTA Method) - Water softening - Carbonate conditioning and Calgon conditioning - Demineralization (Ion-Exchange Method) - Water Quality Parameters - Municipal Water Treatment- Desalination - Reverse Osmosis.

Classification of Polymers - PVC, Bakelite - preparation, properties and applications - Effect of Polymer Structure on Properties - Compounding of Plastics- Polymer Blends and Polymer Alloys - Definition, Examples.

UNIT II   ENGINEERING MATERIALS   9

Properties of Alloys - Heat Treatment of Steel - Polymer Composites - types and applications.- Lubricants - Classification, properties and applications - Mechanism of Lubrication - MoS2 And Graphite - Adhesives - classification and properties - Epoxy resin (Preparation, properties and applications) - Refractories - Classification, Properties and General Manufacture - Abrasives - Classification , Properties and Uses - Carbon nano tubes - preparation, properties and applications.

UNIT III   ELECTROCHEMISTRY AND CORROSION   9

Conductometric Titration - HCl vs NaOH and mixture of acids vs NaOH - Electrochemical Series and its applications - Nernst Equation - problems - Polarization, Decomposition Potential, Over-voltage (definitions only) - Galvanic series - Corrosion (Definition, Examples, effects) - Mechanism of Dry Corrosion and Wet Corrosion - Differential aeration Corrosion , examples - Factors Influencing Corrosion - Metal and Environment - Corrosion Control - Design -Cathodic Protection methods - Protective Coatings - Galvanising - Anodising - Electroplating (Cu and Ni) and Electroless plating (Cu and Ni) - Constituents of Paints and varnish.

UNIT IV   CHEMICAL THERMODYNAMICS   9

Thermodynamic terminology- First Law of Thermodynamics-Internal energy- enthalpy - heat capacity - work done in isothermal expansion of an ideal gas -problems - second law of thermodynamics - entropy change - phase transformations and entropy change - problems - Work Function & Free Energy Function- Maxwell's Relations-Gibbs Helmholtz equation- van't Hoff Isotherm- van't Hoff Isochore - Problems.

UNIT V   FUELS AND ENERGY SOURCES   9

Fuels - classification - Calorific Value - Dulong's Formula - Problems - Determination of Calorific Value by Bomb Calorimeter - Coal - Proximate Analysis - problems - Octane Number - Cetane Number - Diesel Index (Definitions only) - Bio Gas - Producer Gas -Water Gas - Preparation, Properties and Uses - Batteries - Primary Cells - Leclanche Cell -Secondary Cell - Nickel Cadmium Battery - Fuel Cells - Hydrogen -Oxygen Fuel Cell - Solar Battery - Lead Acid Storage Cell - Nuclear Energy - Light water nuclear power plant.

TOTAL: 45

TEXT BOOKS :

1.   S. S. Dara, Text Book of Engineering Chemistry, S. Chand & Company Ltd., New Delhi, 2003

2.   Murthy, Agarwal & Naidu, Text Book of Engineering Chemistry, BSP, 2003.

3.   S.Sumathi, Engineering Chemistry, Dhanam Publications, 2008.

4.   S.Sumathi and P.S.Raghavan, Engineering Chemistry II, Dhanam Publications, 2008.

REFERENCES :

1.   B. K. Sharma, Engineering chemistry, Krishna Prakasam Media (P) Ltd., 2003

2.   A 1. Vogel, A text book of Qualitative Inorganic Analysis, ELBS, London, 2004

3.   A. Gowarikar, Text Book of Polymer Science, 2002

4.   Kuriacose & Rajaram, Vols. 1 & 2, Chemistry in Engineering and Technology, 2004

5.   Puri, Sharma and Pathania, Principles of Physical Chemistry, Vishal Publishing Co. Jalandar, 2004.

ME 2101 ENGINEERING GRAPHICS

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L  T  P  C
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GOAL

To develop graphical skills for communicating concepts, ideas and designs of engineering products and to give exposure to national standards relating to technical drawings.

OBJECTIVES

The course should enable the students to:

•   Introduce drawing standards and use of drawing instruments.

•   Introduce first angle projection.

•   Practice of engineering hand sketching and introduce to computer aided drafting

•   Familiarize the students with different type of projections.

•   Introduce the process of design from sketching to parametric 3D CAD and 2D orthographic drawings to BIS

OUTCOME

The students should be able to:

•   Develop Parametric design and the conventions of formal engineering drawing

•   Produce and interpret 2D & 3D drawings

•   Communicate a design idea/concept graphically

•   Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.

•   Get a Detailed study of an engineering artifact

Note: Only first angle projection is to be followed

BASICS OF ENGINEERING GRAPHICS   **2**

Importance of graphics Use of drawing instruments - BIS conventions and specifications - drawing sheet sizes, layout and folding - lettering - Dimensioning - Geometrical constructions - Scales. Construction of curves like ellipse, parabola, cycloids and involutes.

UNIT I   PROJECTION OF POINTS, LINES AND SURFACES   **15**

General principles of presentation of technical drawings as per BIS - Introduction to Orthographic projection - Naming views as per BIS - First angle projection. Projection of points. Projection of straight lines located in first quadrant (using rotating line method only). Projection of plane surfaces like polygonal lamina and circular lamina. Drawing views when the surface of the lamina is inclined to one reference plane.

UNIT II   PROJECTION OF SOLIDS   **10**

Projections of simple solids like prism, pyramid, cylinder and cone - Drawing views when the axis of the solid is inclined to one reference plane.

UNIT III   DEVELOPMENT OF SURFACES   **10**

Introduction to sectioning of solids. Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

UNIT IV   ORTHOGRAPHIC PROJECTIONS   **10**

Orthographic projections - Conversion of orthographic views from given pictorial views of objects, including dimensioning. Free hand sketching of Orthographic views from Pictorial views.

UNIT V   PICTORIAL PROJECTIONS   **10**

Isometric projection - Isometric scale - Isometric views of simple solids like prisms, pyramids, cylinders and cones. Introduction to perspective Projections.

COMPUTER AIDED DRAFTING (Demonstration Only)   **3**

Introduction to computer aided drafting and dimensioning using appropriate software. 2D drawing commands Zoom, Picture editing commands, Dimensioning, Isometric drawing, Iso-Planes and 3D drafting. Plotting of drawing. Practice includes drawing the projection of lines and solids. Prepare isometric view of simple solids like prisms, pyramids, cylinders and cones.

          TOTAL: 60

TEXT BOOKS:

1.   Jeyapoovan T, "Engineering Drawing and Graphics Using AutoCAD", Vikas Publishing House Pvt. Ltd., New Delhi, 2010.

2.   Warren J. Luzadder and Jon. M.Duff, "Fundamentals of Engineering Drawing", Prentice Hall of India Pvt. Ltd., Eleventh Edition, 2003.

REFERENCES:

1. Bhatt N.D and Panchal V.M, "Engineering Drawing: Plane and Solid Geometry", Charotar Publishing House, Anand-3001, 2007.

2. Thomas E. French, Charles J.Vierck and Robert J.Foster, " Engineering Drawing and Graphic Technology, McGraw- Hill Book company 13th Edition.1987.

3. Venugopal K., "Engineering Graphics", New Age International (P) Limited, New Delhi, 2008.

CS 2101 COMPUTER PROGRAMMING

L T P C
3 0 0 3

GOAL

To introduce computers and programming and to produce an awareness of the power of computational techniques that are currently used by engineers and scientists and to develop programming skills to a level such that problems of reasonable complexity can be tackled successfully.

OBJECTIVES

The course should enable the students to:

*   Learn the major components of a Computer system.

*   Learn the problem solving techniques.

*   Develop skills in programming using C language.

OUTCOMES

The students should be able to:

*   Understand the interaction between different components of Computer system and number system.

*   Devise computational strategies for developing applications.

*   Develop applications (Simple to Complex) using C programming language.

UNIT I   COMPUTER FUNDAMENTALS   9

Introduction - Evolution of Computers - Generations of Computer - Classification of Computers - Application of Computers - Components of a Computer System - Hardware - Software -   Starting a Computer (Booting) - Number Systems.

UNIT II   COMPUTER PROGRMMING AND LANGUAGES   9

Introduction - Problem-Solving Techniques: Algorithms, Flowchart, Pseudocode - Program Control Structures - Programming Paradigms - Programming languages - Generations of Programming Languages - Language Translators - Features of a Good ProgrammingLanguages.

UNIT III   PROGRAMMING WITH C   **9**

Introduction to C - The C Declaration - Operators and Expressions - Input and Output in C - Decision Statements - Loop Control Statements.

UNIT IV   FUNCTIONS, ARRAYS AND STRINGS   **9**

Functions - Storage Class - Arrays - Working with strings and standard functions.

UNIT V   POINTERS, STRUCTURES AND UNION   **9**

Pointers - Dynamic Memory allocation - Structure and Union - Files.

<div align="right">TOTAL: 45</div>

TEXT BOOK:

1. ITL Education Solution Limited, Ashok Kamthane, "Computer Programming", Pearson Education Inc 2007 (Unit: I to V).

REFERNCES:

1. Byron S. Gottfried, "Programming with C", Second Edition, Tata McGraw Hill 2006.

2. Yashvant Kanetkar, "Let us C", Eighth edition, BPP publication 2007.

3. Stephen G.Kochan, "Programming in C - A Complete introduction to the C programming language" , Pearson Education, 2008.

4. T.JeyaPoovan, "Computer Programming Theory and Practice", Vikas Pub, New Delhi.

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CS 2131 COMPUTER PROGRAMMING LABORATORY

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<div align="right">

L T P C
0 0 3 2

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GOAL

To provide an awareness to develop the programming skills using computer languages.

OBJECTIVES

The course should enable the students to:

1. Gain knowledge about Microsoft office, Spread Sheet.

2. Learn a programming concept in C.

OUTCOME

The students should be able to:

1. Use MS Word to create document, table, text formatting and Mail merge options.

2. Use Excel for small calculations using formula editor, creating different types of charts and including pictures etc,

3. Write and execute the C programs for small applications.

LIST OF EXPERIMENTS:

a) Word Processing   **12**

1.   Document creation, Text manipulation with Scientific notations.

2.   Table creation, Table formatting and Conversion.

3.   Mail merge and Letter preparation.

4.   Drawing - flow Chart

b) Spread Sheet   **9**

5.   Chart - Line, XY, Bar and Pie.

6.   Formula - formula editor.

7.   Spread sheet - inclusion of object, Picture and graphics, protecting the document

c) Programming in C   **24**

8.   To write a C program to prepare the electricity bill.

9.   Functions:

     (a) Call by value   (b) Call by reference.

10.   To write a C program to print the Fibonacci series for the given number.

11.   To write a C program to find the factorial of number using recursion.

12.   To write a C program to implement the basic arithmetic operations using Switch Case statement.

13.   To write a C program to check whether the given number is an Armstrong number.

14.   To write a C program to check whether the given string is a Palindrome.

15.   To write a C program to create students details using Structures.

16.   To write a C program to demonstrate the Command Line Arguments.

17.   To write a C program to implement the Random Access in Files.

18.   To write C programs to solve some of the Engineering applications

     TOTAL 45

HARDWARE/SOFTWARE REQUIRED FOR BATCH OF 30 STUDENTS

HARDWARE

LAN system with 33 nodes (OR) Standalone PCs - 33 Nos

Printers - 3 Nos

SOFTWARE

OS - Windows / UNIX

Application package - MS office

Software - C language

GE 2131 - ENGINEERING PRACTICES LABORATORY I
(common to all branches)

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GOAL

To provide the students with hands on experience on various basic engineering practices in Civil and Mechanical Engineering.

OBJECTIVES

The course should enable the students to

*   Relate theory and practice of basic Civil and Mechanical Engineering

*   Learn concepts of welding and machining practice

*   Learn concepts of plumbing and carpentry practice

OUTCOMES

The students should be able to

*   Indentify and use of tools, Types of joints used in welding, carpentry and plumbing operations.

*   Have hands on experience on basic fabrication techniques such as carpentry and plumbing practices.

*.   Have hands on experience on basic fabrication techniques of different types of welding and basic machining practices.

LIST OF EXPERIMENTS   24

1. Mechanical Engineering

1. Welding

Arc welding - butt joints, lap joints and T joints.

2. Basic Machining

Facing, Turning, Threading and Drilling practice.

3. Machine assembly practice

Study of centrifugal pump

4. Study on

a. Smithy operations- Production of hexagonal headed bolt.

b. Foundry operations - mould preparation for gear and step cone pulley.

2. Civil Engineering

1.   Basic pipe connection using valves, couplings, unions, reducers, elbows in household fitting.

2.   Practice in mixed pipe connections: Metal, plastic and flexible pipes used in household appliances.

3. Wood work: Sawing, Planning and making common joints.

4. Study of joints in door panels, wooden furniture.

List of equipments and components (For a batch of 30 students)

CIVIL 21

1. Assorted components for plumbing consisting of metalic pipes,plastic pipes,flexible pipes, couplings, unions, elbows, plugs and other fittings.15 Sets

2. Carpentry vice 15 Nos.

3. Standard woodworking tools 15 Sets.

4. Models of insdustrial trusses, door joints, furniture joints 5 each.

5. Power tools:

   (a) Rotary Hammers 2 Nos

   (b) Demolition Hammers 2 Nos

   (c) Circulars Saw 2 Nos

   (d) Planer 2 Nos

   (e) Hand Drilling Machine 2 Nos

   (f) Jigsaw 2 Nos

MECHANICAL

1. Arc welding transformer with cables and holders 5 Nos

2. Welding booth with exhaust facility, 5 Nos

3. Welding accessiories like welding sheild,chipping hammer,wire brush,etc.,5 Sets

4. Oxyzen and acetylene gas cylinders, blow pipe and other welding outfit.2 Nos

5. Center lathe 2 Nos

6. Hearth furnanace, anvil and smithy tools 2 Sets

7. Molding table, foundry tools 2 Sets

8. Power Tool : Angle Grinder 2 Nos

9. Study-Purpose items: centrifugal pump, air-conditioner One each.

TOTAL : 45

TEXT BOOK:

1. T. Jeyapoovan, M.Saravanapandian and S. Pranitha, "Engineering Practices Lab Manual", 3rd Edition 2006, Vikas Publishing house (P) Ltd., New Delhi.

EL 2131 COMMUNICATION SKILLS LABORATORY I

L T P C
0 0 3 2

GOAL

The goal of the programme is to provide a practical input towards nurturing accomplished learners who can function effectively in the English language skills.

OBJECTIVES

The course should enable the students to :

•   Extend the ability of the learners to be able to listen to English and comprehend its message.

•   Enable the learners to have a functional knowledge of spoken English.

•   Assist the learners to read and grasp the meaning of technical and non-technical passages in English.

•   Help the learners develop the art of writing without mistakes.

•   Expand the thinking capability of the learners so that they would learn how to view things from a different angle.

OUTCOME

The students should be able to:

•   The learners will be able to listen to and evaluate English without difficulty and comprehend its message.

•   The learners would have developed a functional knowledge of spoken English so as to use it in the institution and at job interviews.

•   The learners will be able to read and comprehend the meaning of technical and non-technical passages in English.

•   The learners will have developed the art of writing so as to put down their thoughts and feelings in words.

•   At the end of the course, the learners will be able to think independently and contribute creative ideas.

UNIT I   LISTENING SKILL   9

Listening to conversations and interviews of famous personalities in various fields -- Listening practice related to the TV-- Talk shows - News - Educative programmes -- Watching films for critical comments - Listening for specific information - Listening for summarizing information - Listening to monologues for taking notes - Listening to answer multiple-choice questions.

UNIT II   SPEAKING SKILL   9

Self-introduction -- Group discussion - Persuading and negotiating strategies - Practice in dialogues -- Presentations based on short stories / poems -- Speaking on personal thoughts and feelings --

academic topics - News reading - Acting as a compere -- Speaking about case studies on problems and solutions - Extempore speeches.

UNIT III   READING SKILL   9

Reading anecdotes to predict the content - Reading for interpretation -- Suggested reading -- Short stories and poems -- Critical reading - Reading for information transfer - Reading newspaper and magazine articles for critical commentary - Reading brochures, advertisements, pamphlets for improved presentation.

UNIT IV   WRITING SKILL   9

At the beginning of the semester, the students will be informed of a mini dissertation of 2000 words they need to submit individually on any non-technical topic of their choice. The parts of the dissertation will be the assignments carried out during the semester and submitted towards the end of the semester on a date specified by the department. This can be judged as part of the internal assessment.

UNIT V   THINKING SKILL   9

Practice in preparing thinking blocks to decode diagrammatical representations into English words, expressions, idioms and proverbs - Inculcating interest in English using thinking blocks. Making pictures and improvising diagrams to form English words, phrases and proverbs -- Picture reading.

TOTAL : 45

REFERENCES:

1.   Raman, Meenakshi, and Sangeetha Sharma. Technical Communication: English Skills for Engineers. 2nd edition. New Delhi: Oxford University Press, 2010.

2.   Riordian, Daniel. Technical Communication. New Delhi. Cengage Learning, 2009

WEBSITES:

1.   British: Learn English - British Council (Listen & Watch) - http://learnenglish. british council.org

2.   American: Randall's ESL Cyber Listening Lab - http://www.esl-lab.com/.

3.   Intercultural: English Listening Lesson Library Online http://www.elllo.org

Equipments required

1.   Career Lab:1 room

2.   2 Computers as a Server for Labs (with High Configuration)

3.   LCD Projectors - 4 Nos

4.   Headphones with Mic (i-ball) - 100 Nos

5.   Speakers with Amplifiers, Wireless Mic and Collar Mic - 2 Sets

6.   Teacher table, Teacher Chair - 1 + 1

7.   Plastic Chairs - 75 Nos

PH 2031 PHYSICS LABORATORY

L T P C
1 0 3 3

OBJECTIVE

To expose the students for practical training through experiments to understand and appreciate the concepts learnt in Physics

OUTCOME

Performing the experiments related to the subject will help the students to apply the practical knowledge in industrial applications and for developing or modifying methods

S.No.	List of Experiments	Batch 2 (30)			Batch 1 (30)		
		Week	Periods allotted		Week	Periods allotted	
			L	P		L	P
1	Torsional Pendulum - Determination of rigidity modulus of the material of a wire.	1	1	3	2	1	3
2	Non Uniform Bending - Determination of Young's Modulus.	3	1	3	4	1	3
3	Viscosity -Determination of co-efficient of Viscosity of a liquid by Poiseuille's flow.	5	1	3	6	1	3
4	Lee's Disc - Determination of thermal conductivity of a bad conductor.	7	1	3	8	1	3
5	Air Wedge - Determination of thickness of a thin wire.	9	1	3	10	1	3
6	Spectrometer - Refractive index of a prism.	11	1	3	12	1	3
7	Semiconductor laser - Determination of wavelength of Laser using Grating.	13	1	3	14	1	3
	TOTAL	7	2	1	7	2	1
						56 Periods	

LIST OF EQUIPMENTS REQUIRED FOR A BATCH OF 30 STUDENTS

1	Torsional Pendulum	(500 gm, wt, 60 cm wire Al-Ni Alloy)	5 nos.
2	Travelling Microscope	(X10)	15 nos.
3	Capillary tube	(length 10cm, dia 0.05mm)	5 nos.
4	Magnifying lens	(X 10)	15 nos.
5	Lee's disc apparatus	(std form)	5 nos.
6	Stop watch	(+/- 1 s)	5 nos.
7	Meter scale	1m length	5 nos.
8	Spectrometer	(main scale 360 deg, ver 30")	5 nos.
9	Grating	(2500 LPI)	5 nos.
10	Laser	(632.8 nm)	5 nos.
11	Semi transparent glass plate Al coating, 65 nm thickness,	50% visibility	5 nos.
12	Equilateral prism	(n = 1.54)	5 nos.
13	Thermometer	+/- 1 deg	8 nos.
14	Screw gauge	(+/- 0.001cm)	12 nos.
15	Vernier caliper	(+/- 0.01 cm)	8 nos.
16	Steam Boiler	1 L	5 nos.
17	Scale	50 cms	5 nos.
18	Cylindrical mass	100 gms	10 sets
19	Slotted wt	300 gms	5 sets
20	Heater	1.5 KW	5 nos.
21	Transformer sodium vapour lamp1 KW	10 nos.	
22	Sodium vapour lamp	700 W	5 nos
23	Burette	50 mL	5 nos
24	Beaker	250 mL	5 nos
25	Spirit level		10 nos

REFERENCES

1.   P.Mani, Engineering PhysicsPracticals, Dhanam Publications, 2011.

CY 2031 CHEMISTRY LABORATORY

L T P C
1 0 3 3

OBJECTIVE

To expose the students for practical training through experiments to understand and appreciate the concepts learnt in Chemistry.

OUTCOME

Performing the experiments related to the subject will help the students to apply the practical knowledge in industrial applications and for developing or modifying methods

S.No.	List of Experiments (Any Five)	Batch 2 (30) Week	Batch 2 (30) Periods allotted L	Batch 2 (30) Periods allotted P	Batch 1 (30) Week	Batch 1 (30) Periods allotted L	Batch 1 (30) Periods allotted P
1	Estimation of Commercial soda by acid-base titration	1	1	3	2	1	3
2	Determination of Percentage of nickel in an alloy	3		3	4		3
3	Determination of Temporary, permanent and total hardness of water by EDTA method	5	1	3	6	1	3
4	Determination of Chloride content in a water sample	7		3	8		3
5	Potentiometric Estimation of iron	9	1	3	10	1	3
6	Conductometric Titration of a strong acid with a strong base	11	1	3	12	1	3
7	Conductometric Titration of mixture of acids.	13	1	3	14	1	3
8	Determination of Degree of polymerization of a polymer by Viscometry	15	1	3	16	1	3
	TOTAL		**6**	**24**		**6**	**24**
							60 Periods

List of Glassware and Equipments required for a batch of 30 students

1	Burette	(50 mL)	30 nos.
2	Pipette	(20 mL)	30 nos.
3	Conical Flask	(250 mL)	30 nos.
4	Distilled water bottle	(1 L)	30 nos.
5	Standard flask	(100 mL)	30 nos.
6	Funnel	(small)	30 nos.
7	Glass rod	20 cm length	30 nos.
8	Reagent Bottle	(250 mL)	30 nos.
9	Reagent Bottle	(60 mL)	30 nos.
10	Beaker	(100 mL)	30 nos.
11	Oswald Viscometer	Glass	30 nos.
12	Measuring Cylinder	(25 mL)	30 nos.
13	Digital Conductivity Meter	PICO make	8 nos.
14	Conductivity cell	(K=1)	12 nos.
15	Digital Potentiometer	PICO make	8 nos.
16	Calomel Electrode	Glass	12 nos.
17	Platinum Electrode	Polypropylene	12 nos.
18	Burette Stands	Wooden	30 nos.
19	Pipette stands	Wooden	30 nos.
20	Retard stands	Metal	30 nos.
21	Porcelain Tiles	White	30 nos.
22	Clamps with Boss heads	Metal	30 nos.

REFERENCES

1.   J.Mendham, R.C. Denney, J.D. Barnes and N.J.K. Thomas, Vogel's Textbook of Quantative Chemical Analysis, 6th Edition, Pearson Education, 2004.

2.   C. W. Garland, J. W. Nibler, D. P. Shoemaker, ;"Experiments in Physical Chemistry, 8th ed.," McGraw-Hill, New York, 2009.

3.   S. Sumathi, Engineering Chemistry Practicals, Dhanam Publications, 2011.

MA 2201 ENGINEERING MATHEMATICS II

```
L  T  P  C
3  1  0  4
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GOAL

To create the awareness and comprehensive knowledge in engineering mathematics.

OBJECTIVES

The course should enable the students to:

- Understand the evaluation of the double and triple integrals in Cartesian and polar forms.

- Know the basics of Vector calculus.

- Know Cauchy - Riemann equations, Milne - Thomson method and Conformal mapping

- Grasp the concept of Cauchy's integral formula, Cauchy's residue theorem and contour integration.

- Know Laplace transform and inverse Laplace transform and their properties.

OUTCOME

The students should be able to:

- Find area as double integrals and volume as triple integrals in engineering applications.

- Evaluate the gradient, divergence, curl, line, surface and volume integrals along with the verification of classical theorems involving them.

- Applies analytic functions and their interesting properties in science and engineering.

- Evaluate the basics of complex integration and the concept of contour integration which is important for evaluation of certain integrals encountered in practice.

- Have a sound knowledge of Laplace transform and its properties and their applications in solving initial and boundary value problems.

UNIT I   MULTIPLE INTEGRALS   12

Review: Basic concepts of integration - Standard results - Substitution methods - Integration by parts - Simple problems.

Double integrals: Cartesian and polar co-ordinates - Change of variables - simple problems - Area as a double integral. Triple integrals: Cartesian co ordinates - Volume as a triple integral - simple problems.

UNIT II   VECTOR CALCULUS   12

Review: Definition - vector, scalar - basic concepts of vector algebra - dot and cross products-properties.

Gradient, Divergence and Curl - Unit normal vector, Directional derivative - angle between surfaces-

Irrotational and solenoidal vector fields. Verification and evaluation of Green's theorem - Gauss divergence theorem and Stoke's theorem. Simple applications to regions such as square, rectangle, triangle, cuboids and rectangular parallelopipeds.

UNIT III   ANALYTIC FUNCTIONS   12

Review: Basic results in complex numbers - Cartesian and polar forms - Demoivre's theorem.

Functions of a complex variable - Analytic function - Necessary and sufficient conditions (without proof) - Cauchy - Riemann equations - Properties of analytic function - Harmonic function - Harmonic conjugate - Construction of Analytic functions by Milne - Thomson method. Conformal mapping: w = z + a, az, 1/z and bilinear transformation.

UNIT IV   COMPLEX INTEGRATION   12

Statement and application of Cauchy's integral theorem and Integral formula - Evaluation of integrals using the above theorems - Taylor and Laurent series expansions -Singularities - Classification. Residues - Cauchy's residue theorem (without proof) - Contour integration over unit circle and semicircular contours (excluding poles on boundaries).

UNIT V   LAPLACE TRANSFORM   12

Laplace transform - Conditions of existence - Transform of elementary functions - properties - Transforms of derivatives and integrals - Derivatives and integrals of transforms - Initial and final value theorems - Transforms of unit step function and impulse function - Transform of periodic functions. Inverse Laplace transform - Convolution theorem - Solution of linear ODE of second order with constant coefficients.

TOTAL: 60

Note: Questions need not be asked from review part.

TEXT BOOKS:

1.   Venkatraman M.K, Mathematics, Volume - II, National Publishing Company, Chennai, 1985.

2.   Grewal B.S, Higher Engineering Mathematics, Thirty Eighth Editions, Khanna Publisher, Delhi, 2004.

3.   Chandrasekaran A, Engineering Mathematics, Volume - II, Dhanam Publication, 2008.

REFERENCES:

1.   Kandasamy P, Engineering Mathematics Volume II, S. Chand & Co., New Delhi, 1987.

2.   Grewal B.S, "Engineering Maths - II", Sultan Chand, New Delhi, 1993.

3.   Bali N.P, Manish Goyal, Text book of Engineering Mathematics, 3rd Edition, Lakshmi Publications, 2003.

CE 2201 MECHANICS OF SOLIDS

L T P C
3 1 0 4

PREREQUISITES: MA 2101

GOAL

To introduce the concepts of force, stress, equilibrium, deformation, strain, compatibility, and stress-strain behaviour of materials to the students.

OBJECTIVES

The course should enable the students to :

•   Understand the Stress -Strain behaviour of materials.

•   Understand the concepts in the analysis of plane trusses and thin cylinders/shells.

•.   Get knowledge on shear force and bending moment.

•   Get knowledge on the deflection and shear stress distribution in the beams.

•   Understand the concepts of torsion in shafts.

OUTCOME

The students will be able to:

•   Develop knowledge on the different types of stresses acting on rigid bodies. .

•   Calculate the reactions and internal forces in simple trusses.

•   Draw the Shear force and bending moment diagrams for determinate beams for different loading conditions which is needed for the analysis of structures.

•.   Find out the deflection of determinate beams and shear stress distribution for different types of sections

•   Find out the deflection of springs and torsion in solid and hollow shafts.

UNIT I   STRESS STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS   9

Rigid bodies and deformable solids - stability, strength, stiffness - tension, compression and shear stresses - strain, elasticity, Hooke's law, limit of proportionately, modulus of elasticity, stress-strain curve, lateral strain - temperature stresses - deformation of simple and compound bars - shear modulus, bulk modulus, relationship between elastic constants - biaxial state of stress - stress at a point - stress on inclined plane - principal stresses and principal planes - Mohr's circle of stresses.

UNIT II   ANALYSIS OF PLANE TRUSS, THIN CYLINDERS / SHELLS   9

Stability and equilibrium of plane frames - types of trusses - analysis of forces in truss members method of joints- thin cylinders and shells

UNIT III   TRANSVERSE LOADING ON BEAMS   **9**

Beams - types of supports - simple and fixed, types of load - concentrated, uniformly distributed, varying distributed load, combination of above loading - relationship between bending moment and shear force - bending moment, shear force diagram for simply supported, cantilever and over hanging beams - Theory of simple bending - analysis of stresses - load carrying capacity of beams.

UNIT IV   DEFLECTION OF BEAMS AND SHEAR STRESSES   **9**

Deflection of beams - double integration method - Macaulay's method -variation of shear stress - shear stress distribution in rectangular, I sections, solid circular sections, hollow circular sections, angle and channel sections- shear centre.

UNIT V   TORSION AND SPRINGS   **9**

Stresses and deformation in circular (solid and hollow shafts) - stepped shafts - shafts fixed at both ends- stresses in helical springs - deflection of springs.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS:

1.   R K Bansal,Sanjay Bansal" Strength of Materials" ,Laxmi Publications, 2009

2.   V. N.Vazirani, M.M. Ratwani, Analysis of Structures, Volume -1,Khanna Publishers, New Delhi

REFERENCES:

1.   Kazimi S.M.A, Solid Mechanics, Tata McGraw-Hill Publishing Co, New Delhi, 2003.

2.   William Nash, Theory and Problems of Strength of Materials, Schaum's Outline Series, McGraw-Hill International Edition.

3.   Srinath L.N, Advanced Mechanics of Solids,Tata McGraw-Hill Publishing Co., New Delhi, 2003.

4.   Egor G. Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi, 2003.

<div align="center">**ME 2202 ENGINEERING MECHANICS**</div>

<div align="right">
L T P C
3 1 0 4
</div>

PREREQUISITE : MA 2101,PH 2101

GOAL

To impart the students with the knowledge about the Statics and dynamics of rigid bodies.

OBJECTIVES

The course should enable the students to :

• Study the units and dimensions, laws of mechanics and resolution of forces and equilibrium of particles in space.

• Understand the various types of supports and their reactions.

• Throw light on friction and frictional force due to belt- friction, wedge friction etc.

•. Study the methods of determining the centre of gravity and moment of inertia of plane area.

•. Understand the basics of velocity, acceleration, displacement and the relation between them.

OUTCOME

The students should be able to:

• Apply the proper units and dimensions appropriately and resolve forces and solve various problems.

•. Analyse the reactions offered by the various supports.

• Describe the different types of frictional force and its practical applications..

• Workout the centre of gravity and moment of inertia of various plane areas.

• Solve problems in dynamics using the various principles like Newtons 2 nd law, Work- energy, Impulse momentum, equations of motions etc.,

UNIT I   BASICS & STATICS OF PARTICLES   9

Introduction - Units and Dimensions - Laws of Mechanics - Lame's theorem, Parallelogram and triangular Law of forces - Vectors - Vectorial representation of forces and moments - Vector operations : addition, subtraction, dot product, cross product - Coplanar Forces - Resolution and Compaction of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces - Principle of transmissibility - Single equivalent forces.

UNIT II   EQUILIBRIUM OF RIGID BODIES   9

Free body diagram - Types of supports and their reactions - Requirements of stable equilibrium - Static determinacy - Moments and Couples - Moment of a force about a point and about an axis - Vectorial representation of moments and couples - Scalar components of a moment - Varignon's

theorem - Equilibrium of Rigid bodies in two dimensions - Equilibrium of Rigid bodies in three dimensions - Examples.

UNIT III   FRICTION   9

Frictional force - Laws of Coulomb friction - Simple contact friction - Belt friction - Transmission of power through belts - Wedge Friction - Screw Jack - Rolling Resistance.

UNIT IV   PROPERTIES OF SURFACES AND SOLIDS   9

Determination of Areas and Volumes - Determination of First moment of area , Centroid of sections, Second and product moments of plane area - Rectangle, circle, triangle, T section, I section, Angle section, Hollow section- Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia -Product moment of inertia.

UNIT V   DYNAMICS OF PARTICLES   9

Displacements, Velocity and acceleration, their relationship - Relative motion - Curvilinear motion - Newton's law - Work Energy Equation of particles - Impulse and Momentum - Impact of elastic bodies.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS:

1.   Palanichamy, M.S., Nagan, S., Engineering Mechanics - Statics & Dynamics, Tata McGraw-Hill, 2001.

2.   Rajasekaran, S, Sankarasubramanian, G., Fundamentals of Engineering Mechanics, Vikas Publishing House Pvt., Ltd., 2003.

3.   N.Kottiswaran, "Engineering Mechanics,Statics& Dynamics, Sri Balaji Publications,2005

REFERENCES :

1.   Hibbeller, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2000.

2.   Ashok Gupta, Interactive Engineering Mechanics - Statics - A Virtual Tutor (CDROM), Pearson Education Asia Pvt., Ltd., 2002.

3.   Irving H. Shames, Engineering Mechanics - Statics and Dynamics, IV Edition - Pearson Education Asia Pvt., Ltd., 2003.

4.   Beer, F.P and Johnson Jr. E.R, "Vector Mechanics for Engineers", Vol.1 Statics and vol. 2 Dynamics, McGraw-Hill International Edition, 1997.

CE 2202 CONSTRUCTION MATERIALS

L T P C
3 0 0 3

PREREQUISITE: Nil

GOAL

To introduce the student to various materials that are commonly used in civil engineering construction and their properties.

OBJECTIVES

The course should enable the students to :

*   Be acquainted with the knowledge of manufacture and testing of various conventional materials like stone, bricks and concrete blocks.

*   Be familiar with the manufacturing process and testing of cement, lime, mortar and aggregates.

*   Throw light on testing of concrete and mix proportioning.

*   Be familiar with the properties and applications of construction materials like timber, bitumen, metals and paints.

*   Gain knowledge of modern materials like glass, ceramics, composites and geosynthetics.

OUTCOME

The students should be able to   :

*   Make proper choice of material, testing method and aware of various codes available for construction materials.

*   Develop knowledge of constituents, manufacturing process and testing of cement and lime.

*   Describe concrete properties and do concrete mix design.

*   Aware of various market forms of metal, paint, timber and identify suitable material for different civil engineering applications

*   Gain knowledge of modern materials and its applications.

UNIT I   STONES   9

Stone as building material - Criteria for selection - Tests on stones - Deterioration and Preservation of stone work

UNIT II   BRICKS   9

 Bricks - Classification - Manufacture of clay bricks - Tests on bricks - Compressive Strength - Water Absorption - Efflorescence - Bricks for special use - Refractory bricks - Cement and Concrete hollow blocks - Light weight concrete blocks.

UNIT III   LIME - CEMENT   9

Lime - Preparation of lime mortar - Cement, Ingredients - Manufacturing process - Types and Grades - Properties of cement and Cement mortar - Hydration - Compressive strength - Tensile strength - Soundness and consistency - Setting time.

UNIT IV   AGGREGATES - MORTAR - CONCRETE   9

Aggregates - Natural stone aggregates - Industrial by products - Crushing strength - Impact strength - Flakiness - Abrasion Resistance - Grading - Sand - Bulking

Concrete - Ingredients - Manufacture - Batching plants - Ready Mix Concrete -Hollow concrete blocks.

UNIT V   TIMBER AND OTHER MATERIALS   9

Timber - Industrial timber - Plywood - Veneer - Thermocole -Bitumen -Market forms Panels of laminates

TOTAL: 45

TEXT BOOKS:

1.   R.K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000.

2.   M.S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd., 2003

REFERENCE:

1.   P. C Varghese, Building Materials, Prentice Hall of India ca-print-prentice_hall,2005

GE 2231 - ENGINEERING PRACTICES LABORATORY II

                                                                     L T P C
                                                                     0 0 3 2

LIST OF EXPERIMENTS

S.No	LIST OF EXPERIMENTS	HOURS
	Electrical Engineering:	
1.	Wiring for a tube light.	6
2.	Wiring for a lamp and fan.	6
3.	Staircase wiring	3
4.	Study of (i) Iron box and (ii) Fan with Regulator	6
	Electronics Engineering	
5.	Study of Electronic components and Equipments	3
6.	Characteristics of PN junction diode & measurement of Ripple factor of half wave and full wave rectifier.	9

| 7. | Applications of OP-AMP - Inverter, Adder and Subtractor. | 9 |
| 8. | Study and verification of Logic Gates | 3 |

PRACTICAL 45

Components Required:

Electrical Engineering

Choke	2 nos
Starter	2 nos
Tubelight stand	2 nos
36W tubelight	2 nos
Fan	2nos
40W lamp	5nos
Single way switch	10 nos
Two way switch	5 nos
Iron box	2nos
Fan with regulator opened	1no (demo purpose)

Wires

Electronics Engineering

IC Trainer Kit, Resistors, Capacitors, CRO, Function Generator,BreadBoard,Regulated Power Supply, Zener Diode, PN Junction Diode, Potentiometer, Digital Multimeter,Ammeter, Voltmeter, Wattmeter, IC 7408,IC 7432,IC 7486, IC 7400, IC 7404, IC 7402

TEXT BOOK

1. T. Jeyapoovan, M.Saravanapandian and S. Pranitha, Engineering Practices Lab Manual, 3rd Edition 2006, Vikas Publishing house (P) Ltd., New Delhi.

EL2231 COMMUNICATION SKILLS LABORATORY II

L T P C
2 0 2 2

GOAL

The goal of the programme is to provide an advanced practical input towards moulding student-achievers who can use the English language with ease.

OBJECTIVES

The course should enable the students to:

- Extend the power of the learners to listen to English at an advanced level and comment on it.

- Guide the learners to speak English at the formal and informal levels.

- Enable learners to read and grasp   the in-depth meaning of technical and   non-technical passages in English.

- Help the learners develop the art of writing at the formal and informal levels.

- Expand the thinking capability of the learners so that they would learn how to be original in their thoughts.

OUTCOME

The students should be able to:

- Listen to and understand English at an advanced level and interpret its meaning.

- Develop English language skill at the formal and informal levels and thus gained the confidence to use it without fear.

- Read and grasp the in-depth meaning of technical and non-technical passages in English.

- Develop the art of formal and informal writing.

- Think independently and creatively and also verbalize their thoughts fearlessly.

UNIT I   LISTENING SKILL   12

Topics: Listening to telephonic conversations -- Listening to native British speakers -- Listening to native American speakers -- Listening to intercultural communication -- Listening to answer questions as one-liners and paragraphs -- Listening practice to identify ideas, situations and people -- Listening to group discussions -- Listening to films of short duration.

UNIT II   SPEAKING SKILL   12

Topics: Interview skills - People skills - Job interview - Body language and communication -- How to develop fluency -- Public speaking -- Speaking exercises involving the use of stress and intonation - Speaking on academic topics - Brain storming & discussion - Speaking about case studies on problems and solutions - Extempore speeches - Debating for and against an issue - Mini presentations - Generating talks and discussions based on audiovisual aids.

UNIT III   READING SKILL   12

Topics: Reading exercises for grammatical accuracy and correction of errors -- Reading comprehension exercises with critical and analytical questions based on context - Evaluation of contexts - Reading of memos, letters, notices and minutes for reading editing and proof reading -- Extensive reading of parts of relevant novels after giving the gist of the same.

UNIT IV   WRITING SKILL   12

Topics: At the beginning of the semester, the students will be informed of a mini dissertation of 2000 words they need to submit individually on any non-technical topic of their choice. The parts of the dissertation will be the assignments carried out during the semester and submitted towards the end of the semester on a date specified by the department. This can be judged as part of the internal assessment.

UNIT V   THINKING SKILL   12

Topics: Practice in preparing thinking blocks to decode pictorial representations into English words, expressions, idioms and proverbs - Eliciting the knowledge of English using thinking blocks -- Picture rereading -- Finding meaning in the meaningless - Interpreting landscapes, simple modern art and verbal and non-verbal communication.

TOTAL : 60

REFERENCES

1.   Ibbotson, Mark. Cambridge English for Engineering. New Delhi: Cambridge University Press, 2009.

2.   Smith-Worthington Jefferson. Technical Writing for Success. New Delhi. Cengage Learning, 2007.

Websites for learning English

1.   British: Learn English - British Council (Business English) - "http://learnenglish.   british council.org/"

•   BBC Learning English (General and Business English) - "http://www.bbc.co.uk/worldservice/ learningenglish/"

•   Intercultural: English Listening Lesson Library Online "http://www.elllo.org/"

CE 2231 CONSTRUCTION MATERIALS LABORATORY

0 0 3 2

PREREQUISITES: CE 2203

GOAL

To introduce the students to various properties of the materials that is commonly used in civil engineering construction.

OBJECTIVES

The course should enable the students to :

•   Conduct tests on various construction materials.

OUTCOME

The students should be able to:

•   Gain knowledge about the mechanical properties of construction materials such as brick, cement, aggregate, concrete and bitumen.

UNIT I   TESTS ON BRICK   9

Compressive Strength - Water Absorption - Efflorescence.

UNIT II   TESTS ON CEMENT   9

Specific gravity - Soundness - Consistency and Setting Times - Vicat - Le Chatelier's

UNIT III   TESTS ON AGGREGATES   9

Crushing Strength - Impact Resistance - Flakiness Index.

UNIT IV   TESTS ON CONCRETE   9

Slump cone -Compaction Factor - Cube and Cylinder strength

UNIT V   TESTS ON WOOD   9

Compressive Strength of wood-Perpendicular and Parallel to the grain

TOTAL : 45

LIST OF EQUIPMENTS

1.   Universal TestingMachine - 400 KN capacity

2.   Compression Testing Machine

3.   Concrete mixer

4.   Compaction Factor Apparatus

5.   Slump cone apparatus

6.   Aggregate Impact testing machine

7.   Flexural Testing Machine

8.   Le Chatelier's apparatus

9.   Vibrating Table

10.   Sieve shaker with accessories

11.   Vibrating Table

12.   Sieve shaker with accessories

13.   Flow table

14.   Mortar cube moulds (75mm x75mm x75mm)

15.   Concrete cube moulds (150 mmx150mm x150mm)

16.   Concrete cylinder moulds (150 mmx300mm)

17.   Concrete Prism moulds

18.   Pycnometer

19.   Sieve Set

20.   Trovels and mason pad

21.   Weighing Machine

22.   Weighing Balance

23.   Furniture and tools

TEXT BOOKS :

1.   M.S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd., 2003

2.   PC Varghese, Building Materials, Prentice Hall of India ca-print- prentice_hall,2005

REFERENCE :

1.   R.K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000.

CE 2301 STRENGTH OF MATERIALS

L T P C
3 1 0 4

PREREQUISITES : CE 2201,CE 2202

GOAL

To develop a simple inventory to measure fundamental strength of materials (SOM) concepts such as stress, strain and buckling.

OBJECTIVES

The course should enable the students to :

*   Know the concept of strain energy.

*   Understand the concepts of indeterminate beams such as fixed beam, continuous beam, propped cantilever.

*   Understand the concept of short column and long column.

*   Understand the concept of state of stress in 3D and various failure theories.

*   Understand the   concepts of bending of beams.

OUTCOME

The students should be able to:

*   Apply energy theorems and compute deflections in beams and trusses

*   Calculate the shear force and bending moment for indeterminate beams.

*   Calculate the critical load acting on the columns for various end conditions.

*   Calculate the principal stresses and principal strains using different theories of failures.

*   Analyse the beams with symmetrical, unsymmetrical sections and curved beams.

UNIT I   ENERGY PRINCIPLES   9

Strain energy and strain energy density - strain energy in traction, shear in flexure and torsion - Castigliano's theorems - principle of virtual work - application of energy theorems for computing deflections in beams and trusses - Maxwell's reciprocal theorems

UNIT II   INDETERMINATE BEAMS   9

Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) - theorem of three moments - analysis of continuous beams - shear force and bending moment diagrams for continuous beams.

UNIT III   COLUMNS   **9**

Eccentrically loaded short columns - middle third rule - core section - columns of unsymmetrical sections - (angle channel sections) - Euler's theory of long columns - critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns - thick cylinders - compound cylinders.

UNIT IV   STATE OF STRESS IN THREE DIMENSIONS   **9**

Spherical and deviatory components of stress tensor - determination of principal stresses and principal planes - volumetric strain - dilatation and distortion - theories of failure - principal stress - principal strain - shear stress - strain energy and distortion energy theories - application in analysis of stress, load carrying capacity and design of members -residual stresses

UNIT V   ADVANCED TOPICS IN BENDING OF BEAMS   **9**

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections - curved beams - Winkler Bach formula - stress concentration

TUTORIAL: 15

L = 45, T = 15, TOTAL: 60

TEXT BOOKS:

1.   Dr.R.K.Bansal, "A Text Book of Strength of materials", Laxmi Publications, Fourth Edition , 2010

2.   V.N. Vazirani, M.M.Ratwani, "Analysis of Structures", Vol-1, Khanna Publishers, New Delhi, (Paper back 2007).

REFERENCES:

1.   Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003.

2.   William Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, McGraw Hill International Edition.

3.   R.S. Khurmi, "Strength of Materials", S. Chand & Company Ltd, New Delhi, 2003

4.   Egor P Popov, "Engineering Mechanics of Solids", Prentice Hall of India, New Delhi, 2003.

CE 2302 STRUCTURAL ANALYSIS - I

L T P C
3 1 0 4

PREREQUISITES: CE 2201,CE 2301

GOAL

To introduce the students to basic theory and concepts of Structural analysis and the classical methods as they require in the analysis of buildings.

OBJECTIVES

The course should enable the students to :

- Understand the principles of analysis of determinate structures

- Study the concept of influence lines for the analysis of beams and trusses.

- Throw light on the different types of arches.

- Impart knowledge in the analysis of the continuous beams and frames using the classical method of analysis.

- . Understand the concept of analysis of multi storey buildings.

OUTCOME

The students should be able to :

- Analyse the trusses and frames using unit load method.

- Analyse the structure for moving loads and to get the shear force and bending moment for any complex type of moving loads.

- Analyse of Hinged and fixed arches used in the construction industry.

- . Analyse beams and frames using one slope Deflection Method.

- Analyse the Multistorey buildings using the Moment Distribution method, which is an iterative method often used in the analysis of indeterminate structures.

UNIT I   DEFLECTION OF DETERMINATE STRUCTURES   9

Principles of virtual work for deflections - Deflections of pin-jointed plane frames and rigid plane frames - Williot diagram - Mohr's correction

UNIT II   MOVING LOADS AND INFLUENCE LINES (DETERMINATE & INDETERMINATE STRUCTURES)   9

Influence lines for reactions in statically determinate structures - influence lines for members forces in pin-jointed frames - Influence lines for shear force and bending moment in beam sections.

Muller Breslau's principle - Influence lines for continuous beams and single storey rigid frames.

UNIT III   ARCHES   **9**

Arches as structural forms - Examples of arch structures - Types of arches - Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches - Settlement and temperature effects.

UNIT IV   SLOPE DEFLECTION METHOD   **9**

Continuous beams and rigid frames (with and without sway) - Simplification for hinged end - Support displacements.

UNIT V   MOMENT DISTRIBUTION METHOD   **9**

Distribution and carry over of moments - Stiffness and carry over factors - Analysis of continuous beams - Plane rigid frames with and without sway.

TUTORIAL: 15

L = 45, T = 15, TOTAL: 60

TEXT BOOKS:

1.   Vaidyanadhan, R and Perumal, "Comprehensive Structural Analysis - Vol. 1 & Vol. 2", P, Laxmi Publications, New Delhi, 2008

2.   B.C.Punmia, Ashok Kumar Jain, Arun K. Jain, " Theory of Structures", Laxmi Publications Pvt. Ltd, 2003.

3.   S.S. Bhavikatti,Structural Analysis, Vol I & II, Vikas Publishing House Pvt. Ltd, 2011.

REFERENCES:

1.   C.K. Wang, Tata McGraw-Hil,l Analysis of Indeterminate Structures

2.   Devdas Menon, Morgan & Claypool, Structural Analysis -, 2007

3.   L.S. Negi & R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, Sixth Edition, 2003.

CE 2303 MECHANICS OF FLUIDS

L T P C
3 1 0 4

PREREQUISITE : MA 2101

GOAL

To introduce the students to basic concepts of the properties of fluid and properties of flow. The concept of model analysis is also introduced.

OBJECTIVES

The course should enable the students to :

- Understand the properties of fluid.

- Understand the properties of flow.

- Understand the principles of Bernoulli's Theorem.

- Be acquainted with the losses of flow in pipes.

- Be acquainted with the principles of model analysis.

OUTCOME

The students should be able to:

- Relate to the properties of fluid.

-. Describe how the different flows can be analysed and measured.

- Describe the principles and application of Bernoulli's theorem.

- Identify the losses in pipes.

-. Develop models based on dimensional and model analysis.

UNIT I   DEFINITIONS AND FLUID PROPERTIES   5

Definitions - Fluid and fluid mechanics - Dimensions and units - Fluid properties.

UNIT II   FLUID STATICS & KINEMATICS   10

 Hydrostatic equation - Forces on plane surfaces- Pressure measurement .Stream, streak and path lines - Classification of flows - Continuity equation.

UNIT III   FLUID DYNAMICS   10

Euler and Bernoulli's equations - Application of Bernoulli's equation - Discharge measurement - Laminar flows through pipes- Turbulent flow - Darcy-Weisbach formula - Moody diagram.

UNIT IV   FLOW THROUGH PIPES   10

Major and minor losses of flow in pipes - Pipes in series and in parallel.

UNIT V   SIMILITUDE AND MODEL STUDY   **10**

Dimensional Analysis - Rayleigh's method, Buckingham's Pi-theorem - Similitude and models.

TUTORIAL: 15

L = 45, T = 15, TOTAL: 60

TEXT BOOKS :

1.   Dr. R.K. Bansal "Fluid Mechanics and Hydraulic Machines", Laxmi Publication (P) Publishing House (P) Ltd., 2002.

2.   Rajput, R.K., "A text book of Hydraulic Machines", S. Chand Publications, 3rd Edition, 2006

3.   Garde, R.J. and Mirajgaoker, A.G., "Engineering Fluid Mechanics", Nem Chand Bros., Roorkee

3.   Fox, Robert, W. and Macdonald, Alan,T., "Introduction to Fluid Mechanics", John Wiley & Sons, 1995

REFERENCES :

1.   Streeter, Victor, L. and Wylie, Benjamin E., "Fluid Mechanics", McGraw-Hill Ltd., 1998.

2.   E. John Finnemore and Joseph B. Franzini, "Fluid Mechanics with Engineering Applications", McGraw-Hill International Edition.

3.   Pernard Messay, "Mechanics of Fluids" 7th Edition, Nelson Thornes Ltd. U. K. 1998.

CE 2304 SURVEYING

                                                                                L T P C
                                                                                3 1 0 4

PREREQUISITES: Nil

GOAL

To impart the students with the knowledge about the different types of surveying and leveling.

OBJECTIVES:

The course should enable the students to :

•   Understand the principles of surveying.

•   Know about compass surveying and plane table surveying.

•   Understand the concepts of leveling and its applications.

•   Understand the concepts of Theodolite surveying,

•   Get exposed to the different Engineering Surveys.

OUTCOME:

The students should be able to:

* Gain the knowledge about the Survey Instruments, their care and adjustments and the, principles of Chain Surveying.

* Describe the bearing systems and the instruments used in compass surveying and the methods of plane table surveying.

* Use the instruments in leveling, methods of leveling and contouring.

* Do the temporary and permanent adjustments of vernier transit, measurement of horizontal and vertical angles theodolite using theodolite traversing.

* Find the preliminary and final location surveys for engineering projects, route surveys for highways, railways and waterways and the different types of curves.

UNIT I   INTRODUCTION AND CHAIN SURVEYING   9

Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

UNIT II   COMPASS SURVEYING AND PLANE TABLE SURVEYING   9

Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors. Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.

UNIT III   LEVELLING AND APPLICATIONS   9

Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

UNIT IV   ENGINEERING SURVEYS   9

Reconnaissance, preliminary and Final location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - Curve ranging - Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distances - Mine Surveying - instruments - Tunnels - Correlation of under ground and surface surveys - Shafts

UNIT V   TACHEOMETRIC SURVEYING   9

Tachometric systems - Tangential, stadia and sub tense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS :

1. Dr.B.C.punmia,Ashok K Jain, Arun K Jain, Surveying Vol.I, Laxmi Publications, 2009

2. Surveying and leveling . S.C.Rangwala and P. S. Rangwala, Charotar Publishing House Pvt. Ltd, 2005

REFERENCES:

1. Clark D., Plane and Geodetic Surveying, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 1971.

2. James M.Anderson and Edward M.Mikhail, Introduction to Surveying, McGraw-Hill Book Company, 1985.

CE 2305 ENVIRONMENTAL ENGINEERING

L T P C
3 0 0 3

PREREQUISITE: Nil

GOAL

To make the students understand about the water borne diseases, important of water treatment including disinfection of water.

OBJECTIVES

The course should enable the students to :

• Learn the population forecasting methods, water demand, source identifications, transportation and treatment of surface water.

• Know about the different operations and processes involved in water treatment.

• Study about sewerage system for collection and transmission of sanitary sewage.

• Understand the design principles sewage and sludge treatment.

• Study about the safe disposal sewage.

OUTCOME

The students should be able to:

• Design the various water treatment units in the water supply system.

• Describe the water treatment processes such as flocculating, sediminatation, filtration, disinfection etc.,

• Design sewers for transmission of sanitary sewage and the pumping units.

• Design sedimentation tanks, aeratizon tank, trickling filter, septic tank etc.,.

• Apply the suitable technique for the disposal sewage.

UNIT I   WATER SUPPLY SYSTEMS - SOURCE & CONVEYANCE   6

Objectives - Population forecasting - Design period - Water demand characteristics - Sources of water - Source selection - Water quality parameters & significance - Standards - Intake structures - Conveyance - Hydraulics - Laying, jointing & testing of pipes - Pump selection - appurtenances

UNIT II   DESIGN PRINCIPLES OF WATER TREATMENT   10

Objectives - Selection of unit operations and processes - Principles of flocculation, sedimentation, filtration, disinfection - Design principles of flash mixer, flocculator, clarifiers, filters - Disinfection devices - Softening - Demineralisation - Aeration - Iron removal - Defluoridation - Operation and Maintenance aspects - Residue Management

DISTRIBUTION

Requirements - Components - Service reservoir design - Analysis of distribution network - Hardy Cross method - Equivalent Pipe method - computer application - Leak detection

UNIT III   SEWERAGE SYSTEM : COLLECTION & TRANSMISSION   10

Sources of wastewater - Quantity of sanitary sewage - Storm run off estimation - Wastewater characteristics and significance - Effluent disposal standover - Design of sewers - Computer applications - Laying, jointing and testing of sewers - Sewer appurtenances - Pump selection.

UNIT IV   SEWAGE TREATMENT & DESIGN PRINCIPLES   10

Objectives - Selection of unit operation and process - Design principles of primary and secondary treatment, screen chamber, grit chamber, primary sedimentation tanks, activated sludge process - Aeration tank & oxidation ditch - Trickling filter - Stabilisation ponds - Septic tanks with soak pits - Sludge: treatment and disposal - Biogas recovery - Sewage farming.

UNIT V   DISPOSAL OF SEWAGE   9

Disposal on land - Disposal into water bodies - Oxygen sag curve - Streeter Phelp's model - Wastewater reclamation techniques

TOTAL = 45

TEXT BOOKS

1.   Garg, S.K., "Environmental Engineering I & II", Khanna Publishers, New Delhi

2.   Modi, P.N., "Environmental Engineering I & II", Standard Book House, Delhi - 6

REFERENCES

1.   Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999.

2.   Manual on Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi, 1993.

3.   Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987.

4.   Metcalf and Eddy, M.C., "Wastewater Engineering - Treatment & Reuse", Tata McGraw-Hill Publications, New Delhi, 2003.

CE 2331 COMPUTER AIDED BUILDING DRAWING

L T P C
0 0 3 2

PREREQUISITES: ME 2101

GOAL

To introduce the students to draft the plan, elevation and sectional views of the buildings using Auto CADD

OBJECTIVES

The course should enable the students to :

•   Develop the students to draft building drawings using Auto CADD.

OUTCOME

The students should be able to:

•   Draft on computer building drawings Industrial buildings and framed structures (Plan, elevation and sectional views) in accordance with development and control rules satisfying orientation and functional requirements.

LIST OF EXPERIMENTS:

1.   Buildings with load bearing walls (Flat and pitched roof) -

       Including details of doors and windows.   12

2.   RCC framed structures   9

3.   Industrial buildings - North light roof structures - Trusses   12

4.   Perspective view of one and two storey buildings   12

                                                                    TOTAL : 45

TEXT BOOKS:

1.   Civil Engg. Drawing & House Planning - B.P. Verma, Khanna publishers, Delhi

2.   Building drawing & detailing - Dr. Balagopal & T.S. Prabhu, Spades Publishers, Calicut.

REFERENCES:

1.   Shah, Tata McGraw- Hill Building drawing

2.   Dr. N. Kumaraswamy, A. Kameswara Rao, Charotar Publishing- Building planning & Drawing

3.   Shah, Kale and Patki, Building Drawing, Tata McGraw-Hill.

Examination Guideline

30% of the end semester examination paper shall deal with planning, while the rest 70% shall be based on the drafting skill.

LIST OF EQUIPMENTS
(For a batch of 30 students)

SI. No.	Description of Equipments	Quantity
1.	Computer system of Pentium IV or equivalent	1 for each student
2.	Licensed version of any reputed Analysis, Design & Drafting software students	1 copy for a set of 3

CE 2332 COMPUTER AIDED STRUCTURAL ANALYSIS LABORATORY

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L  T  P  C
0  0  3  2
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PREREQUISITES: CE 2301, CE 2201

GOAL

•   To Impart knowledge in analyzing the structures using software

OBJECTIVES

The course should enable the students to :

•   Get exposed to the usage of software in the analysis of structures and also testing of structural components through virtual lab

OUTCOME

The students should be able to:

•   Analyze the structures using software

LIST OF EXPERIMENTS:

1.   Introduction to Structural Engineering virtual lab   9

2.   Analysis of Continuous beams and Portal Frames   12

3.   Analysis of Trusses   12

4.   Analysis of Multi Storied Buildings- Residential Buildings, Commercial Buildings   12

SOFTWARES REQUIRED

1.   STAAD PRO - Software

2.   ANSYS Civil

TOTAL : 45

LIST OF EQUIPMENTS

(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	Computer system of Pentium IV or equivalent	1 for each student
2.	Licensed version of STADD PRO, ANSYS CIVIL	1 copy for a set of 3 students

CE 2333 SURVEY LABORATORY

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PREREQUISITES: CE 2304

GOAL

To impart the students with the knowledge about the different types of surveying and leveling field techniques.

OBJECTIVES

The course should enable the students to :

• Conduct experiments on Surveying and Levelling.

OUTCOME

The students should be able to:

• Students will possess knowledge about chain surveying, compass surveying, plane table surveying, Levelling ,Theodolite survey, Tachometric survey and contouring.

LIST OF EXPERIMENTS

1.	Study of chains and its accessories	3
2.	Aligning, Ranging and Chaining	3
3.	Chain Traversing	3
4.	Compass Traversing	3
5.	Plane Table Surveying	3
6.	Study of levels and levelling staff	6
7.	Fly levelling	6
8.	Check levelling	6
9.	LS and CS	3

| 10. | Theodolite survey traverse | 3 |
| 11. | Tachometry - Tangential system - Stadia system - Subtense system | 6 |

TOTAL : 45

LIST OF EQUIPMENTS.

1. Chains (30 m)

2. Cross staff

3. Steel Tapes (30m)

4. Steel Arrows

5. Ranging rods

6. Total Station

7. Plain table

8. Dumpy level

9. Aluminum Leveling staff (4m)

10. Theodolites.

MA 2401 NUMERICAL METHODS

L T P C
3 1 0 4

GOAL

To create the awareness and comprehensive knowledge in numerical solutions.

OBJECTIVES

The course should enable the students to:

•	Learn the techniques of solving the algebraic and transcendental equations.

•	Learn to interpolate using Newton's forward and backward difference formulae for equal and unequal intervals

•	Understand the use of numerical differentiation and understands to find the approximate area using numerical integration.

•	Understand solving numerically the initial value problems for ordinary differential equations using single step and multi step method.

•	Learn the methods of solving second order partial differential equations numerically and use it to solve initial and boundary value problems for partial differential equations.

OUTCOME

The students should be able to:

•	Find out the roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations by direct and indirect methods.

•	Solve problems where huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.

•	Use the numerical differentiation and integration when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.

•	Solve engineering problems which are characterized in the form of nonlinear ordinary differential equations, since many physical laws are couched in terms of rate of change of one independent variable

•	Solve the initial and boundary value problems related heat flow, both one and two dimensional and vibration problems. Understands the numerical techniques of solving the partial differential equation in engineering applications.

UNIT I   SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS   12

Linear interpolation methods (method of false position) - Newton's method - Statement of Fixed Point Theorem - Fixed point iteration: x=g(x) method. Solution of linear algebraic system of equations - Direct methods - Gauss-Jordon method and Crout's method - Iterative method: Gauss-Seidel method.

UNIT II   INTERPOLATION AND APPROXIMATION   12

Interpolation - equal intervals - Newton's forward and backward difference formulae - problems. Interpolation-unequal intervals - Newton's divided difference formula - Lagrange's and inverse interpolation-problems.

UNIT III   NUMERICAL DIFFERENTIATION AND INTEGRATION   12

Numerical differentiation - Newton's forward and backward difference - Divided differences and finite differences - Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules. Two and Three point Gaussian quadrature formulae - Double integrals using trapezoidal and Simpson's rules.

UNIT IV   INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS   12

Single step methods: Taylor series method - first order-second order and simultaneous - Euler and Modified Euler methods. Fourth order Runge - Kutta method for solving first and second order equations - Multi-step methods: Milne's and Adam's predictor and corrector methods.

UNIT V   INITIAL AND BOUNDARY VALUE PROBLEMS FOR PARTIAL DIFFERENTIAL EQUATIONS   12

Finite difference solution of second order ordinary differential equation - classification of partial differential equations - Finite difference solution of two dimensional heat flow equations Laplace and Poisson equations. One dimensional heat equation by explicit and implicit methods - One dimensional wave equation.

**   TOTAL: 60**

TEXT BOOKS:

1.   Kandasamy P, Thilagavathy K, Gunavathy K, "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.

2.   Chandrasekaran A. and Beena James, "Numerical Methods", Dhanam publications, Chennai, 2011.

REFERENCES :

1.   Burden R.L, and Faires T.D, "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002.

2.   Gerald C.F, Wheatley P.O,"Applied Numerical Analysis",Sixth Edition, Pearson Education Asia, New Delhi, 2002.

3.   Balagurusamy E, "Numerical Methods",Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1999.

CE 2401 DESIGN OF STEEL STRUCTURES -I

L T P C
3 1 0 4

PREREQUISITES: CE 2202

GOAL

To introduce the students to limit state design of structural components as per current codal provisions.

OBJECTIVES :

The course should enable the students to :

- Throw light on the of limit state design of steel structures and the design of connections.

- Be familiar with the design concepts of steel structural members subjected to tension.

- Understand the design concepts of the structural steel members subjected to compression.

- Be familiar with the design concepts of structural members subjected to bending .

- Be acquainted with the design concepts of the components of roof trusses.

OUTCOME :

The students should be able to :

- Gain knowledge on the bolted and welded connections and the properties of steel.

- Design the structural members subjected to tension.

- Design single and compound compression members and the laced and Battened columns.

- Develop knowledge in designing laterally supported and unsupported beams subjected to axial bending.

- Design purlins and elements of the roof trusses.

  [Note: Limit State Design Only]

UNIT I   INTRODUCTION   9

Properties of steel - Structural steel sections - Limit State Design Concepts - Loads on Structures - Metal joining methods using welding, bolting - Design of bolted, and welded joints - Eccentric connections - Efficiency of joints - High Tension bolts

UNIT II   TENSION MEMBERS   6

Types of sections - Net area - Net effective sections for angles and Tee in tension - Design of connections in tension members - Use of lug angles - Design of tension splice - Concept of shear lag

UNIT III   COMPRESSION MEMBERS   10

Types of compression members - Theory of columns - Basis of current codal provision for compression member design - Slenderness ratio - Design of single section and compound section compression members - Design of lacing and battening type columns .

UNIT IV BEAMS   **10**

Design of laterally supported and unsupported beams - Built up beams-Beams subjected to bi-axial bending .

UNIT V   ROOF TRUSSES AND INDUSTRIAL STRUCTURES   **10**

Roof trusses - Roof and side coverings - Design loads, design of purlin and elements of truss; end bearing.

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TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

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TEXT BOOKS :

1. N.Subramanian , "Design of Steel Structures" , Oxford University press,2008.

2. S.K.Duggal, Limit State Design of Steel Structures, Tata McGrraw Hill Education Pvt. Ltd, 2010

3. IS 800 -2007

REFERENCES:

1. Dr.Ramachandra, Virendra Gehlot, "Limit State Design of Steel Structures", Scientific Publishers, New Delhi, 2010

2. "Teaching Resources for Structural Steel Design - Vol. I & II", INSDAG, Kolkatta.

3. Dr. V.L.Shah, S.S.Karve, "Limit State Design of Steel Structures", Structures Publications, 2009.

4. www.steel _insdag.org

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CE 2402 DESIGN OF CONCRETE STRUCTURES - I

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<div align="right">

L T P C
3 1 0 4

</div>

PREREQUISITES   **CE 2201**

GOAL

To introduce the different types of philosophies related to design of Reinforced Concrete Structures and design of basic elements such as slab, beam, column and footing which form part of any structural system.

OBJECTIVES

The course should enable the students to :

• Know the methods of design of concrete structures.

• Understand the limit state design of slab and beam.

• Know the behavior of RC beam in shear and torsion.

- Get the concept of Limit state design of columns.

- Understand the Limit State design of footings and masonry structures.

OUTCOME

The students should be able to:

- Describe the concept of elastic, ultimate, working stress and limit state method of design of concrete structures.

- Design one way, two way, rectangular slab, singly and doubly reinforced rectangular beam and flanged beam by Limit State Method.

- Design RC members for combined bending shear and torsion using Limit State Method.

- Analyse and design short and long columns.

- Design axially and eccentrically loaded rectangular and combined footing.

UNIT I   METHODS OF DESIGN OF CONCRETE STRUCTURES   9

Concept of elastic method ultimate load method and limit state method- advantages of limit state method over other methods-design codes and specification -Introduction to working stress method-IS 456 - limit state philosophy as detailed in current IS code

UNIT II   LIMIT STATE DESIGN FOR FLEXURE   9

Analysis and design of one way and two way slabs - rectangular slab subjected to uniformly distributed and concentrated loads - boundary conditions and corner effects - singly and doubly reinforced rectangular and flanged beams - design aids for flexure-deflection and crack width control.

UNIT III   LIMIT STATE DESIGN FOR SHEAR, TORSION, BOND AND ANCHORAGE   9

Behaviour of RC beams in shear and torsion-shear and torsion reinforcement-limit state design of RC members for combined bending shear and torsion- use of design aids.

UNIT IV LIMIT STATE DESIGN OF COLUMNS   9

Types of columns-analysis and design of short columns for axial un axial and bi axial bending-design of long columns- use of design aids

UNIT V LIMIT STATE DESIGN OF FOOTINGS   9

Design of wall footing-design of axially and eccentrically loaded rectangular footing-design of combined rectangular footing for two columns only.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS:

1   N. Krishnaraju, and R. N.Pranesh," Reinforced Concrete Design", New Age International Pvt. Ltd., 2003

2. Varghese P C, Limit State Design of Reinforced Concrete, Prentice Hall of India, Private, Limited New Delhi, 2nd edition, 2007.

3. S Unnikrishna Pillai Menon Devadas, Tata McGraw-Hill, 2003

REFERENCES:

1. Mallick and Gupta, Reinforced Concrete Design, Oxford and IBH, Delhi, 1997

2. Design Aides to IS 456-1978 (SP-16)

3. Code of Practice for Plain and Reinforced Concrete - IS456-2000

CE 2403 MECHANICS OF SOILS

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L  T  P  C
3  1  0  4
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PREREQUISITES   **Nil**

GOAL

To gain adequate knowledge on Engineering Properties of soil.

OBJECTIVES

The course should enable the students to :

- Develop an understanding of the index properties of soils and the various methods of soil classification.

- Be acquainted with permeability effective stress concepts and seepage through porous media and floro nets.

- Understand the stress distribution and types of settlement in soil.

- Gain knowledge about the different tests carried to find out the shear strength of soil.

- Be acquainted with stability analysis of slopes.

OUTCOME

The students should be able to:

- Classify the soils based on their properties

- Assess the permeability and seepage characteristics of soil.

- Find out the settlement of soil based on the stress distribution.

- Assess the shear strength of various types of soil.

- Analyse the stability of slopes using different methods.

UNIT I INTRODUCTION   10

Nature of Soil - Problems with soil - phase relation - sieve analysis - sedimentation analysis - Atterberg limits - classification for engineering purposes - BIS Classification system - Soil compaction - factors affecting compaction - field compaction methods and monitoring.

UNIT II SOIL WATER AND WATER FLOW   8

Soil water - Various forms - Influence of clay minerals - Capillary rise - Suction - Effective stress concepts in soil - Total, neutral and effective stress distribution in soil - Permeability - Darcy's Law-Permeability measurement in the laboratory - quick sand condition - Seepage - Laplace Equation - Introduction to flow nets -properties and uses - Application to simple problems.

UNIT III STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT   10

Stress distribution in soil media - Boussinesque formula - stress due to line load and circular and rectangular loaded area - approximate methods - Use of influence charts - Westergaurd equation for point load - Components of settlement - Immediate and consolidation settlement - - laboratory consolidation test - Field consolidation curve - Normal Consolidation and Over Consolidation clays - problems on final and time rate of consolidation

UNIT IV SHEAR STRENGTH   9

Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory - Saturated soil and unsaturated soil (basics only) - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests - Drained and undrained behaviour of clay and sand

UNIT V SLOPE STABILITY   8

Slope failure mechanisms - Modes - Infinite slopes - Finite slopes - Total and effective stress analysis - Stability analysis for purely cohesive and C- soils - Method of slices - Friction circle method - stability number - problems - Slope protection measures.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1.   Punmia B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., New Delhi, 16th Edition, (2005).

2.   Gopal Ranjan and Rao A.S.R., "Basic and applied soil mechanics", New Age International Publishers, New Delhi, 2000.

3.   Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 1995

REFERENCES

1.   Coduto, D.P., "Geotechnical Engineering Principles and Practices", Prentice Hall of India Private Limited, New Delhi, 2002.

2.   McCarthy D.F., "Essentials of Soil Mechanics and Foundations Basic Geotechniques", Sixth Edition, Prentice-Hall, New Jersey, 2002.

3.   Das, B.M, "Principles of Geotechnical Engineering", (fifth edition), Thomas Books/ cole, 2002

4.   Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, New York, 2000.

CE 2404 CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES

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PREREQUISITE CE   2203

GOAL

To make the students aware of the various construction techniques, practices and the equipments needed for different types of construction activities.

OBJECTIVES

The course should enable the students to :

•   Be acquainted with different construction practices used in building.

•   Understand the various practices in sub structure construction.

•   Understand the various practices in super structure construction.

•   Understand the techniques in repair and rehabilitation of structures.

•   Familiarize the various construction equipments used in the construction industry.

OUTCOME

The students should be able to:

•   Develop knowledge in construction of masonry and the various erection techniques.

•   Develop knowledge in jacking, piling, dewatering and grouting techniques.

•   Be acquainted with launching of girders, bridge decks, construction sequences in cooling towers, silos, chimney, sky scrapers and erection of articulated structures, braced domes and space decks.

•   Choose the suitable repair techniques for the damaged building.

•   Develop knowledge in various equipment needed for construction of various types of structures from foundation to super structure.

UNIT I   CONSTRUCTION PRACTICES   15

Specifications, details and sequence of activities and construction co-ordination - Site Clearance - Marking - Earthwork - masonry - stone masonry - concrete hollow block masonry - flooring - damp proof courses - construction joints - movement and expansion joints - pre cast pavements - Building foundations - basements - temporary shed - centering and shuttering sheet piles - slip forms - scaffoldings - de-shuttering forms - Fabrication and erection of steel trusses - laying brick -- weather and water proof - roof finishes - air conditioning - acoustic and fire protection.

UNIT II   SUB STRUCTURE CONSTRUCTION   15

Techniques of Box jacking - Pipe Jacking -under water construction of diaphragm walls and basement- Tunneling techniques - Piling techniques- driving well and caisson -Dewatering-- well points- sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting

UNIT III   SUPER STRUCTURE CONSTRUCTION   15

Launching girders, bridge decks, off shore platforms - special forms for shells - techniques for heavy decks -Introduction to pre-stressing and Post tensioning, aerial transporting handling - erection of transmission towers - Construction sequences in cooling towers, silos, chimney, sky scrapers, bow string bridges, cable stayed bridges -Support structure for heavy Equipment and conveyors -Erection of articulated structures, braced domes and space decks

UNIT IV   REPAIR AND REHABILITATION   5

Study on causes of building damage and deterioration -Methods of repair and restoration -Materials for repair

UNIT V   CONSTRUCTION EQUIPMENT   10

Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, earth movers - Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunneling, drilling, blasting -- dewatering and pumping equipment - Transporters.

TOTAL = 60

TEXT BOOKS:

1.   Varghese , P.C. Building construction, Prentice Hall of India Pvt. Ltd, New Delhi, 2007.

2.   Shetty, M.S, Concrete Technology, Theory and Practice, S. Chand and Company Ltd, New Delhi, 2005.

3.   Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, 1997.

REFERENCES:

1. Gambhir, M.L, Concrete Technology, Tata McGraw - Hill Publishing Company Ltd, New Delhi, 2004

2. Jha J and Sinha S.K., Construction and Foundation Engineering, Khanna Publishers, 1993.

3. Sharma S.C. "Construction Equipment and Management", Khanna Publishers New Delhi, 1988.

4. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, 1988.

CE2431 ENVIRONMENTAL ENGINEERING LABORATORY

L T P C
0 0 3 2

PREREQUISITES   CE 2305

GOAL

To get exposure about water and sewage analysis.

OBJECTIVES

The course should enable the students to :

• Conduct experiments for characterization of water and municipal sewage.

OUTCOME

The students should be able to:

• The students will be able to analyze the various parameters like pH, Total Solids, Total dissolved solids, iron and manganese, BOD, COD and chlorides , sulphate and dissolved oxygen in water and waste water.

LIST OF EXPERIMENTS

1. Sampling and preservation methods and significance of characterisation of water and wastewater.   3

2. Determination of   3

i) PH and turbidity

ii) Hardness

3. Determination of iron & fluoride   3

4. Determination of residual chlorine   3

5. Determination of Chlorides   3

6. Determination of Ammonia Nitrogen   3

7. Determination of Sulphate   3

8.	Determination of Optimum Coagulant Dosage	3
9.	Determination of available Chlorine in Bleaching powder	3
10.	Determination of dissolved oxygen	3
11.	Determination of suspended, volatile and fixed solids	3
12.	B.O.D. test	6
13.	C.O.D. test	3
14.	Introduction to Bacteriological Analysis (Demonstration only)	3

TOTAL : 45

REFERENCES:

1.   Garg, S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi.

2.   Modi, P.N., "Environmental Engineering Vol. I & II", Standard Book House, Delhi-6.

CE 2432 GEO TECHNICAL LABORATORY

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PREREQUISITES   CE 2403

GOAL

To expose the students in testing of different types of soils and to determine its characteristics experimentally.

OBJECTIVES

The course should enable the students to :

•   Conduct experiments in different types of soils to determine the properties and characteristics.

OUTCOME

The students should be able to:

•   The student acquires the capacity to test the soil and assess its Engineering and Index properties.

LIST OF EXPERIMENTS

1.	Grain size distribution - Sieve analysis	3
2.	Grain size distribution - Hydrometer analysis	3
3.	Specific gravity of soil grains	3
4.	Relative density of sands	3
5.	Atterberg limits test	3
6.	Determination of moisture - Density relationship using standard Proctor test.	3

7.	Permeability determination (constant head and falling head methods)	3
8.	Determination of shear strength parameters.	3
9.	Direct shear test on cohesionless soil	3
10.	Unconfined compression test on cohesive soil	3
11.	Triaxial compression test	3
12.	One dimensional consolidation test (Determination of co-efficient of consolidation only)	6
13.	Field density test (Core cutter and sand replacement methods)	6

TOTAL : 45

REFERENCES

1. "Soil Engineering Laboratory Instruction Manual", Published by the Engineering College Co-operative Society, Chennai, 2002.

2. Head, K.H, "Manual of Soil Laboratory Testing (Vol-1 to 3)", John Wiley & Sons, Chichester, 1998.

3. Lambe T.W., "Soil Testing for Engineers", John Wiley and Sons, New York, 1990.

4. "I.S.Code of Practice (2720) Relevant Parts", as amended from time to time.

5. Saibaba Reddy, E. and Rama Sastri, K., "Measurement of Engineering Properties of Soils", New Age International Publishers, New Delhi, 2002.

CE 2433 PROJECT WORK

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0 0 6 2

PREREQUISITES

CE 2301, CE 2401, CE 2402, CE 2331, CE 2332, CE 2305, CE 2403, CE2303.

GOAL

To impart and improve the design capability of the students in any one of the disciplines of Civil Engineering.

OBJECTIVES:

The course should enable the students to :

• Impart and improve the design capability of the students in any one of the disciplines of Civil Engineering

OUTCOME:

The students should be able to:

• Design RC structures, waste water treatment plants, foundation system, traffic intersection,

Hydraulic Structures etc.

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1. Internal Marks : 20 marks
   (Decided by conducting 3 reviews by the guide appointed by theInstitution)

2. Evaluation of Project Report : 30 marks
   (Evaluated by the external examiner appointed by the University).

   Every student belonging to the same group gets the same mark

3. Viva voce examination : 50 marks
   (Evaluated by the internal examiner appointed by the HOD, external examiner appointed by the University and Guide of the course - with equal Weightage)

The design problem can be allotted to either an individual student or a group of students comprising of not more than six. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, specifications if any and complete set of drawings which follow the design.

CE 2501 STRUCTURAL ANALYSIS - II

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PREREQUISITES   **CE 2302**

GOAL

To introduce the students to basic theory and concepts of structural analysis and, the classical methods of analysis of buildings.

OBJECTIVES:

The course should enable the students to :

* Understand the principles involved in the analysis of determinate structures

* Study the concept of influence lines for the analysis of beams and trusses.

* Understand the concepts involved in the analyses of different types of arches.

* Study the analysis of continuous beams and frames using the classical method of analysis.

* Understand the concept of analysis of multi storey buildings.

OUTCOME:

The students should be able to:

* Analyse trusses and frames using unit load method.

* Gain knowledge on the analysis procedure for moving loads and to get the shear force and bending moment for any complex type of moving loads.

* Analyse Hinged and fixed arches used in the construction industry.

* Analyse the different types of beams and portal frames using one of the classical methods of Slope Deflection Method.

* Gain knowledge to analyse Multistorey buildings using the Moment Distribution method, which is an iterative method often used in the analysis of indeterminate structures.

UNIT I   FLEXIBILITY METHOD FOR INDETERMINATE FRAMES   **9**

Equilibrium and compatibility - Determinate Vs Indeterminate structures - Indeterminacy - Primary structure - Compatibility conditions - Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

UNIT II   MATRIX STIFFNESS METHOD   **9**

Element and global stiffness matrices - Analysis of continuous beams - Co-ordinate transformations - Rotation matrix - Transformations of stiffness matrices, load vectors and displacements vectors - Analysis of pin-jointed plane frames and rigid frames.

UNIT III FINITE ELEMENT METHOD **9**

Introduction - Discretisation of a structure - Displacement functions - Truss element - Beam element.

UNIT IV PLASTIC ANALYSIS OF STRUCTURES **9**

Statically indeterminate axial problems - Beams in pure bending - Plastic moment of resistance - Plastic modulus - Shape factor - Load factor - Plastic hinge and mechanism - Plastic analysis of indeterminate beams and frames - Upper and lower bound theorems

UNIT V SPACE AND CABLE STRUCTURES **9**

Analysis of Space trusses using method of tension coefficients - Suspension bridges- cables with two and three hinged stiffening girders

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. Vaidyantha, R. and Perumal, P., "Comprehensive structural Analysis - Vol.I & II", Laxmi Publications, New Delhi, 2003.

2. S.S. Bhavikatti, Structural Analysis, Vol I & II, Vikas Publishing House Pvt.Ltd, 2011

3. L.S.Negi & R.S.Jangid, " Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2003.

REFERENCES

1. Ghali.A, Nebille, A.M. and Brown,T.G. "Structural Analysis" A unified classical and Matrix approach" -5th edition. Spon Press, London and New York, 2003.

2. Vazirani V.N, & Ratwani, M.M, "Analysis of Structures", Khanna Publishers, Delhi.

3. Structural Analysis - A Matrix Approach - G.S. Pandit & S.P. Gupta, Tata McGraw Hill.

4. Matrix Analysis of Framed Structures - Jr. William Weaver & James M. Gere, CBS Publishers and Distributors, Delhi.

CE 2502 DESIGN OF STEEL STRUCTURES - II

L T P C
3 1 0 4

PREREQUISITES   CE 2401

GOAL

To give exposure to the advanced design of steel structures such as plate girder, gantry girder, columns, light gauge steel sections and design of beams using plastic theory.

OBJECTIVES

The course should enable the students to :

- Understand the design concepts of plate girder.

- Familiar with the design concepts of gantry girder.

- Understand the behavior of columns subjected to axial load and bending moment.

- Know about light gauge sections and its design concepts.

- Familiar with the design concepts of beams using plastic theory.

OUTCOME

The students should be able to:

- Design the plate girder and its components.

- Gain knowledge on the design of gantry girder for moving loads .and fatigue effects.

- Design simple and built up columns subjected to axial load and bending moment.

- Design beams and columns using light gauge steel sections.

- Design the steel and concrete beams using plastic theory.

UNIT I   PLATE GIRDER   9

Design of plate girders - web and flange design - curtailment of flange plates - Design of stiffeners and splices.

UNIT II   GANTRY GIRDERS   9

Introduction - Loading Considerations - Maximum Loads Effects - Fatigue Effects - Selection of Gantry Girder - Design of Gantry Girder.

UNIT III COLUMNS SUBJECTED TO COMBINED BENDING AND AXIAL LOADS   9

Design of simple and built up columns subject to combined bending and axial loads - design of column base and connection to foundation.

UNIT IV LIGHT GAUGE STEEL SECTIONS   9

Behaviour - Design of flexural and compression members

UNIT V PLASTIC THEORY 9

Shape factor - plastic hinge - plastic moment - plastic analysis of beams - design of beams.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS:

1. N.Subramanian, "Design of Steel Structures" , Oxford University press, 2008.

2. S.K.Duggal, Limit State Design of Steel Structures, Tata McGrraw Hill Education Pvt. Ltd, 2010

3. IS.800 -2007

4. IS 801- 1975

REFERENCES:

1. Dr.Ramachandra, Virendra Gehlot, "Limit State Design of Steel Structures", Scientific Publishers, New Delhi, 2010

2. "Teaching Resources for Structural Steel Design - Vol. I & II", INSDAG, Kolkatta.

3. Dr. V.L.Shah, S.S.Karve, "Limit State Design of Steel Structures", Structures Publications, 2009.

4. www.steel _insdag.org

5. J.Rhodes, "Design of Cold-Formed Steel Members", Elsevier Science Publishers 1991.

CE 2503 DESIGN OF CONCRETE STRUCTURES - II

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PREREQUISITES   CE 2402

GOAL

To give an exposure to advanced topics in structural design comprising of RCC retaining walls, water tanks, yield line theory and pre stressed concrete structures.

OBJECTIVES

The course should enable the students to :

• Understand the basic principles of designing RCC cantilever and counter fort retaining walls.

• Understand the design and detail of different types of water tanks.

• Know about the pre stressed concrete materials and systems.

• Create an awareness on yield line theory of slabs.

- Have a comprehensive design knowledge related to structures that are likely to be encountered in professional practice.

OUTCOME

The students should be able to:

- Design Reinforced Concrete cantilever and counter fort retaining walls.

- Design underground and overhead circular and rectangular water tanks.

- Gain knowledge on the prestressing methods and the design and analysis of the Pre tensioned and post tensioned concrete beams and losses in pre stress.

- Analyse square, rectangular and triangular slabs using yield line theory.

- Familiarise the design principles of road bridges and design the flat slabs and staircases.

UNIT I   RETAINING WALLS   9

Design of cantilever and counter fort retaining walls

UNIT II WATER TANK   9

Underground rectangular tanks - Overhead circular and rectangular tanks - Design of staging and foundations.

UNIT III PRINCIPLES OF PRESTRESSING   9

Materials for prestressed concrete - Different methods and systems - introduction to prestrerssing and post tensioning- Uniform and non uniform pre - stressing - Losses in prestress - Analysis of simply supported beams with straight and parabolic tendons.

UNIT IV YIELD LINE THEORY   9

Application of virtual work method to Square, Rectangular and Triangular slabs.

UNIT V ADVANCED TOPICS   9

Design of staircases (ordinary and doglegged) - Design of flat slabs - Principles of design of road bridges for IRC loading.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS:

1.   N. Krishnaraju, R.N.Pranesh, "Design of Reinforced Concrete Design" New Age International (P) Ltd. Publishers, 2003

2.   Jaikrishna and O.P. Jain, Plain and Reinforced Concrete, Vol. I & II, Nem chand & Brothers, 2007.

3.   N. Krishnaraju, "Bridge Engineering", Oxford and IBH publications.

REFERENCES:

1.   S.N.Sinha, "Reinforced Concrete Design", Tata Mc Graw Hill, New Delhi, 2002.

2.   A.M. Neville, Properties of Concrete Structures, 4th Edition., - Longman (Pearson Education).

NOTE: IS 456:2000, IRC Bridge codes, BIS 3370, IS 1343 are permitted in the Examinations.

CE 2504 IRRIGATION ENGINEERING

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PREREQUISITES   Nil

GOAL

To introduce the students to the basic concepts of Irrigation system as they pertain to agriculture and power generation.

OBJECTIVES

The course should enable the students to :

•   Understand the necessity of irrigation.

•   Be familiar with different methods of irrigation.

•   Be acquainted with the different hydraulic structures.

•   Be familiar with the types of irrigation.

•   Be acquainted with integration of management with irrigation systems.

OUTCOME

The students should be able to:

•   Identify the need for irrigation.

•   Describe the different types of irrigation.

•   Describe the canal irrigation system.

•   Design the hydraulic structures based on hydraulic parameters.

•   Describe how the management and irrigation system are integrated.

UNIT I   INTRODUCTION   9

Irrigation - Need for irrigation - Merits and demerits of irrigation - Crop and crop seasons - consumptive use of water - Duty - Factors affecting duty - Irrigation efficiencies - Planning and Development of irrigation projects.

UNIT II IRRIGATION METHODS   9

Canal irrigation - Lift irrigation - Tank irrigation - Flooding methods - Merits and demerits - Sprinkler irrigation - Drip irrigation.

UNIT III DIVERSION AND IMPOUNDING STRUCTURES   9

Weirs - elementary profile of a weir - weirs on pervious foundations - Types of impounding structures - Tanks, Sluices and Weirs - Gravity dams - Earth dams - Arch dams - Spillways - Factors affecting location and type of dams - Forces on a dam.

UNIT IV CANAL IRRIGATION   9

Classification of canals - Alignment of canals- Canal drops -Cross drainage works - Canal Head works - Canal regulators - River Training works.

UNIT V IRRIGATION WATER MANAGEMENT   9

Need for optimisation of water use - Minimising irrigation water losses - On farm development works -Participatory irrigation management - Water users associations - Changing paradigms in water management.

TOTAL = 45

TEXT BOOKS:

1.   S.K. Garg, "Irrigation Engineering And Hydraulic Structures" , Khanna publishers, 2004

2.   Sharma R.K., and Sharma T.K., "Irrigation Engineering", S. Chand and company, New Delhi, 2008.

3.   Gupta, B.L, & Amir Gupta, "Irrigation Engineering", Satya Praheshan, New Delhi

REFERENCES:

1.   A.M.Michael, "Irrigation, Theory and Practices", Vikas Publishing House Pvt.Ltd, Second Edition , 2008

2.   Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd.

3.   Basak, N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co.

CE 2505 HYDRAULIC ENGINEERING

L T P C
3 1 0 4

PREREQUISITES   CE 2303

GOAL

To introduce the students to the basic concepts of open channel flow and to provide the students with skills to design Hydraulic Mechanics.

OBJECTIVES

The course should enable the students to :

•   Understand the principles behind open channel flow.

•   Differentiate between uniform and non- uniform flow.

•   Throw light on impulse momentum principle.

•   Be acquainted with the design the concepts of turbines.

•   Be familiar with the design the concepts of pumps.

OUTCOME

The students should be able to:

•   Describe the principles of most economical sections.

•   Identifying the gradually varied flow profiles.

•   Apply the velocity triangle concepts to find out the force & power of hydraulic machines.

•   Describe the different types of turbines and their performance.

•   Describe the principles of pumps and their applications.

UNIT I   OPEN CHANNEL FLOW   9

Open channel flow - Types of flow - Velocity distribution in open channel - Wide open channel - Specific energy - Critical flow and its computation.

UNIT II   UNIFORM AND NON UNIFORM FLOW   9

Uniform flow - Velocity measurement - Manning's and Chezy's formula - Determination of roughness coefficients -Most economical rectangular and trapezoidal sections- Hydraulic Jumps.

UNIT III IMPULSE MOMENTUM PRINCIPLE   9

Application of momentum principle - Introduction to impact of jets on vanes - velocity triangles.

UNIT IV TURBINES   9

Turbines - classification - Impulse and Reaction turbines - draft tube and cavitations - performance of turbines.

UNIT V PUMPS 9

Centrifugal pump - multistage Pumps - Jet and submersible pumps - reciprocating pump - negative slip - flow separation conditions - air vessels -indicator diagram.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS:

1. Subramanyam K., "Flow in Open channels", Tata McGraw-Hill Publishing Company, 2004.

2 P.N.Modi,S.M.Seth," Hydraulics and Fluid Mechanics", Standard Book House,15th Edition,2005

3. R.K. Bansal "Fluid Mechanics and Hydraulic Machines", Laxmi Publication (P) Publishing House (P) Ltd., 2002.

4. Ranga Raju, K.G., "Flow through Open Channels", Tata McGraw-Hill.

REFERENCES:

1. Ven Te Chow, "Open-Channel Hydraulics", McGraw-H: Q Book company, 1996.

2. Ramamirtham S., "Fluid Mechanics, Hydraulics and Fluid Machines", Dhanpat Rai & Sons, Delhi, 1998.

3. John A. Roberson, "Hydraulic Engineering", Jaico Publishing House, 1998.

EL 2431 COMMUNICATION SKILLS & PERSONALITY DEVELOPMENT

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GOAL

The goal of the programme is to provide the learners with the methods and materials required for becoming accomplished personalities through the medium of English.

OBJECTIVES

The course is expected to enable students to:

• Be aware of self-knowledge by exposure to soft skills, values, behaviour, attitudes, temperamental changes, and a positive attitude to life.

• Learn personality traits and undergo personality tests to determine their own personality characteristics and the scope for improvement.

• Cultivate the art of speaking fluently making use of proper gestures, tone and voice modulation, adding humour to the speech.

• Figure out the need to work in teams, adorn or accept team leadership, and make use of body language to enhance team spirit.

- Be familiar with the art of managing self, people, work and time, keeping in mind problems like time-wasters and stress-builders.

OUTCOME

The students should be able to:

- Apply the knowledge gained to improve upon their values, behaviour, attitude, and develop the soft skills required for home, workplace and the society.

- Employ the concept of personality traits and build up an accomplished personality that would be pleasing to people around so as to influence them positively.

- Develop a personal style and communicate fearlessly and effectively in a convincing manner so as to impress listeners or the audience.

- Participate in presentations, group discussions, debates and mock interviews making good use of language skills and interpersonal relationships.

- Comprehend stress-management tips to overcome stress-prone habits and develop a career plan with personal, familial and societal goals for success.

UNIT I   **12**

Values and attitudes - Value-formation - Values & education - Terminal & Instrumental values - Civic responsibilities - The power of Personal/ Cultural/ Social valves -- Behaviour and attitudes -- Features of attitudes - Developing positive attitude - Overcoming negative attitude -- People skills - Soft skills as per the Work Force Profile - The four temperaments - Sanguine - Choleric - Melancholic - Phlegmatic -- Tests for Personal Chemistry.

UNIT II   **12**

What is personality development? - Types of personalities as per (i) Heredity (ii) Environment (iii) Situation - the 16 personality factors - MBTI Tests - Personality types - Increasing self awareness: Assessing one's locus of control, Machiavellianism, self-esteem, self-monitoring, risk-taking, Type A, Type B personality elements - Intellectual and physical abilities for jobs -- Personality tests.

UNIT III   **12**

Developing the art of speaking - How to get rid of stage fright? - Enhancing fluency - Modulating voice - Enunciation - Positive and negative gestures - Preparation - How to begin? - How to convince the listeners? - How to wind up the speech? - Adding humour and illustration - Developing one's own style - Types of style - How to influence the audience? - How to become an effective speaker? -- Tests for effective speaking.

UNIT IV   **12**

Team work - Team building - Team leadership -- How to face an interview? -- How to participate in a group discussion? - How to argue for or against in a debate? - Body language - Non-verbal communication - Personal appearance - Facial expression - Posture - Gestures - eye contact - Etiquette - Voluntary and involuntary body language - Gender implications -- Tests.

UNIT V 12

Managing self, people, work, situations - Time-management - Secrets of time-management - Time-wasters - Stress -- Kinds of stress - Spotting stress - Stress-builders - Stress -management tips - Stress-prone habits -- Goals - Career planning - Interpersonal interaction - Interpersonal relationships -- Tests.

TOTAL : 60

REFERENCES:

1. Burlington, V.T. Group Interaction in High Risk Environments. Ashgate Publication, 2004.

2. Fisher, Kimball. Leading Self-directed Work Terms: A Guide to Developing New Team Leadership Skills. New York, NY: McGraw Hill, 2000.

3. Ted W. Engstrom and R. Alec Mackenzie. Managing Your Time: Practical Guidelines on the Effective Use of Time. 2008.

4. Burnard, Philip. Training Games for Interpersonal Skills. McGraw Hill, Inc., New York, 1992.

5. Greenwich, Carolyn. The Fun Factor, McGraw Hill, Inc., New York, 1997.

- Study material will be prepared by the Department of Languages.

- Tests suggested will be prepared by a senior faculty of the department.

- Movies will be screened to discuss and debate on the topics introduced in each unit.

LABORATORY REQUIREMENTS:

1. Career Lab:1 room

2. 2 Computers as a Server for Labs (with High Configuration)

3. Headphones with Mic (i-ball) - 100 Nos

4. Speakers with Amplifiers, Wireless Mic and Collar Mic - 2 Sets

5. Teacher table, Teacher Chair - 1 + 1

6. Plastic Chairs - 75 Nos

CE 2531 STRENGTH OF MATERIALS LABORATORY

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PREREQUISITES   CE 2301

GOAL

To expose the the testing of different materials under the action of various forces and to determine the characteristics experimentally.

OBJECTIVES

The course should enable the students to :

•   Expose the students to different methods available for testing materials under the action of various forces like axial compression axial tension, torsion, flexure, shear etc.

OUTCOME

The students should be able to:

•   Obtain the strength of the materials and stiffness properties of structural elements experimentally.

LIST OF EXPERIMENTS

1.   Test involving axial compression to obtain the stress - strain curve   6

2.   Test involving axial tension to obtain the stress - strain curve and the strength   6

3.   Test involving torsion to obtain the torque vs. angle of twist and hence the stiffness   6

4.   Test involving flexure to obtain the load deflection curve and hence the stiffness   6

5.   Tests on springs   3

6.   Hardness tests   3

7.   Shear test   6

8.   Test for impact resistance   3

      The student should learn the use of deflectometer, extensometer, compressometer and strain gauges.   6

                                                                                                                              TOTAL : 45

LIST OF EQUIPMENTS
(For a batch of 30 students)

Sl. No.	Description of Equipments	Quantity
1.	UTM of minimum 400 KN capacity	1
2.	Torsion testing machine for steel rods	1
3.	Izod impact testing machine	1
4.	Hardness testing machine Rockwell Vicker's (any 2) Brinnel	1 each
5.	Beam deflection test apparatus	1
6.	Extensometer	1
7.	Compressometer	1
8.	Dial gauges	few

MG 2001   PRINCIPLES OF MANAGEMENT

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PREREQUISITES   Nil

GOAL

To make the students to understand the different managerial functions like planning,organizing,staffing,leading and controlling .

OBJECTIVES

The course should enable the students to :

•   Be familiar with the historical development of organizations.

•   Understand the various steps involved in planning.

•   Understand the Structure and Process involved in formal and informal organization.

•   Impart knowledge on the principles of leadership and human factors.

•   Impart knowledge on System and process of Controlling.

OUTCOME

The students should be able to:

•   Visualize the development of various business organizations.

•   Be acquainted with steps involved in planning.

•   Gain knowledge in departmentation by different strategies.

•   Be acquainted with different motivation techniques.

•   Describe the various issues on process control.

UNIT I   HISTORICAL DEVELOPMENT   9

Definition of Management - Science or Art - Management and Administration - Development of Management Thought - Contribution of Taylor and Fayol - Functions of Management - Types of Business Organisation.

UNIT II   PLANNING   9

Nature & Purpose - Steps involved in Planning - Objectives - Setting Objectives - Process of Managing by Objectives - Strategies, Policies & Planning Premises- Forecasting - Decision-making.

UNIT III ORGANISING   9

Nature and Purpose - Formal and informal organization - Organization Chart - Structure and Process - Departmentation by difference strategies - Line and Staff authority - Benefits and Limitations - De-

Centralization and Delegation of Authority - Staffing - Selection Process - Techniques - HRD - Managerial Effectiveness.

UNIT IV DIRECTING   9

Scope - Human Factors - Creativity and Innovation - Harmonizing Objectives - Leadership - Types of Leadership Motivation - Hierarchy of needs - Motivation theories - Motivational Techniques - Job Enrichment - Communication - Process of Communication - Barriers and Breakdown - Effective Communication - Electronic media in Communication.

UNIT V CONTROLLING   9

System and process of Controlling - Requirements for effective control - The Budget as Control Technique - Information Technology in Controlling - Use of computers in handling the information - Productivity - Problems and Management - Control of Overall Performance - Direct and Preventive Control - Reporting - The Global Environment - Globalization and Liberalization - International Management and Global theory of Management.

TOTAL = 45

TEXT BOOKS:

1. G.K. Vijaya Raghavan, M.Sivakumar, Principles of Management, Lakshmi Publications, Jan 2010.

2. M. Govindarajan, S. Natarajan, Principles Of Management, Prentice Hall of India Learning Pvt. Ltd2005

3. Harold Kooritz & Heinz Weihrich "Essentials of Management", Tata McGraw-Hill,1998

4. Joseph L Massie "Essentials of Management", Prentice Hall of India,(Pearson) Fourth Edition, 2003.

REFERENCES:

1. Tripathy PC And Reddy PN, "Principles of Management", Tata McGraw-Hill, 1999.

2. Decenzo David, Robbin Stephen A, "Personnel and Human Reasons Management", Prentice Hall of India, 1996

3. JAF Stomer, Freeman R. E and Daniel R Gilbert Management, Pearson Education, Sixth Edition, 2004.

4. Fraidoon Mazda, "Engineering Management", Addison Wesley, 2000.

<h1 style="text-align:center">CE 2601   FOUNDATION ENGINEERING</h1>

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PREREQUISITES   CE 2403

GOAL

To make the students understand the need of soil investigation, its importance in the choice of foundation and the design of suitable foundation

OBJECTIVES

The course should enable the students to :

- Get a basic understanding of the geotechnical site investigation.

- Understand the types of foundation and the design concepts of shallow foundation.

- Get exposed to footings and rafts.

- Get the concepts of pile foundation.

- Know about Retaining walls.

OUTCOME

The students should be able to:

- Describe different soil exploration techniques.

- Gain knowledge on the factors affecting bearing capacity of shallow foundation, various tests to find the bearing capacity and the components of settlement of foundation.

- Know the contact pressure distribution below footings and rafts, types and proportioning of isolated and combined footings and mat foundation.

- Describe the types of piles, their functions, factors influencing the selection of pile, load carrying capacity of pile and pile group and the settlement of pile groups.

- Calculate the plastic equilibrium in soils, earth pressure on retaining walls and the pressure on the wall due to line loads.

UNIT I   SITE INVESTIGATION AND SELECTION OF FOUNDATION   9

Scope and objectives - Methods of exploration-averaging and boring - Wash boring and rotary drilling - Depth of boring - Spacing of bore hole - Sampling - Representative and undisturbed sampling - sampling techniques - Split spoon sampler, Thin tube sampler, Stationary piston sampler - Bore log report - Penetration tests (SPT and SCPT)

UNIT II   SHALLOW FOUNDATION   9

Introduction - Location and depth of foundation - codal provisions - bearing capacity of shallow foundation on homogeneous deposits - Terzaghi's formula and BIS formula - factors affecting bearing capacity - problems - Bearing Capacity from insitu tests (SPT, plate load) - Allowable bearing pressure, Settlement

- Components of settlement -Allowable settlements- Methods of minimising settlement, differential settlement.

UNIT III FOOTINGS AND RAFTS 9

Types of foundation - Contact pressure distribution below footings & raft - Isolated and combined footings - types - proportioning - mat foundation - types - use - proportioning

UNIT IV PILES 9

Types of piles and their function - Factors influencing the selection of pile - Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley's)- Negative skin friction - uplift capacity - Group capacity by different methods (Feld's rule, Converse Labarra formula) - Settlement of pile groups - Interpretation of pile load test -- under reamed piles

UNIT V RETAINING WALLS 9

Plastic equilibrium in soils - active and passive states - Rankine's theory - cohesionless and cohesive soil - Coloumb's wedge theory - condition for critical failure plane - Earth pressure on retaining walls of simple configurations - Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS :

1. Arora K.P, " Soil Mechanics and Foundation Engineering" , Standard Publishers, 2009

2. Gopal Ranjan and Rao, A.S.R. "Basic and Applied Soil Mechanics", Wiley Eastern Ltd., New Delhi (India), 2003.

3. Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd, New Delhi, 2008.

REFERENCES :

1. Das, B.M. "Principles of Foundation Engineering (Fifth edition), Thomson Books / COLE, 2003.

2. Swamisaran, "Analysis and Design of Structures - Limit state Design", Oxford IBH Publishing Co-Pvt. Ltd., New Delhi, 1998

3. Kaniraj, S.R, "Design aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill publishing company Ltd., New Delhi, 2002

4. Bowles J.E, "Foundation analysis and design", McGraw-Hill, 1994

5. Punmia, B.C., "Soil Mechanics and Foundations", Laxmi publications pvt. Ltd., New Delhi, 1995.

6. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 1995

7. N.N. Som and S.C. Das, "Theory and Practice of Foundation Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2003.

CE 2602 TRANSPORTATION ENGINEERING - I

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PREREQUISITES   CE 2203

GOAL

To introduce the various components of Highway Engineering, their geometric elements, the geometric design of pavements and the various highway materials, their properties and the practices adopted for highway construction and maintenance.

OBJECTIVES

The course should enable the students to :

*   Familiarize about Highway Planning and alignment and the Engineering surveys for highway alignment.

*   Understand the geometric design of highways.

*   Understand the design principles of Pavements.

*   Get exposed to the various highway materials and their testing.

*   Know about highway maintenance and pavement evaluation techniques.

OUTCOME

The students should be able to:

*   Familiarize with the different methods of road construction, highway development in India, ongoing Highway Development Programmes and the institutions for Highway development at national level, Highway Cross sectional elements etc.

*   Design the horizontal and vertical alignments, sight distances and to understand the IRC recommendations for the geometric design of hill roads.

*   Design the flexible and rigid pavements by IRC method.

*   Describe how the laboratory tests can be conducted on aggregates and bitumen..

*   Identify the defects in flexible and rigid pavements and suggest their remedies, do the evaluation of pavement failure and strengthening.

UNIT I   HIGHWAY PLANNING AND ALIGNMENT   9

Tresaguet and Macadam's method of Road Construction, Highway Development in India - Jayakar Committee Recommendations and Realisations, Twenty-year Road Development Plans, Concepts of On-going Highway Development Programmes at National Level, Institutions for Highway Development at National level - Indian Roads Congress, Highway Research Board, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute. Requirements of Ideal Alignment, Factors Controlling Highway Alignment Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing, GIS and GPS techniques)

Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements - Right of Way, Carriage Way, Camber, Kerbs, Shoulders and Footpaths [IRC Standards], Cross sections of different Class of Roads.

UNIT II GEOMETRIC DESIGN OF HIGHWAYS 9

Design of Horizontal Alignments - Superelevation, Widening of Pavements on Horizontal Curves and Transition Curves [Derivation of Formulae and Problems] Design of Vertical Alignments - Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves Sight Distances - Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD] Geometric Design of Hill Roads [IRC Standards Only]

UNIT III DESIGN OF RIGID AND FLEXIBLE PAVEMENTS 9

Rigid and Flexible Pavements- Components and their Functions Design Principles of Flexible and Rigid Pavements, Factors affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic Design Practice for Flexible Pavements [CBR method, IRC Method and Recommendations-Problems] Design Practice for Rigid Pavements - [IRC Recommendations-Problems] - Joints

UNIT IV HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE 9

Desirable Properties and Testing of Highway Materials: - (Tests have to be demonstrated in Highway Engineering Laboratory) Soil - California Bearing Ratio Test, Field Density Test

Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value test Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening point Tests. Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications] Highway Drainage [IRC Recommendations]

UNIT V HIGHWAY MAINTENANCE 9

Types of defects in Flexible pavements - Surface defects, Cracks, Deformation, Disintegration - Symptoms, Causes and Treatments. Types of Pavement, Failures in Rigid Pavements - Scaling, Shrinkage, Warping, Structural Cracks Spalling of Joints and Mud Pumping - and Special Repairs.

Pavement Evaluation - Pavement Surface Conditions and Structural Evaluation, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method [Procedure only], Principles of Highway Financing.

TOTAL = 45

TEXT BOOKS :

1. Khanna K and Justo C E G Justo, Highway Engineering, Khanna Publishers, Roorkee, 2001.

2. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publications, Delhi, 2000.

REFERENCES:

1.   IRC Standards (IRC 37 - 2001 & IRC 58 -1998)

2.   Bureau of Indian Standards (BIS) Publications on Highway Materials

3.   Specifications for Road and Bridges, MORTH (India)

CE 2603   ESTIMATION AND QUANTITY SURVEYING

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PREREQUISITES   CE 2331, CE 2402, CE 2404, CE 2503

GOAL

To provide the student with the ability to estimate the quantities of item of works involved in buildings, water supply and sanitary works, road works and irrigation works, and also to equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items.

OBJECTIVES

The course should enable the students to :

•   Know about various methods of estimates.

•   Be familiar with the estimated of load bearing & framed structures.

•   Be familiar with the estimate of irrigation system.

•   Understand the procedures involved in valuation of structure.

•   Acquire knowledge in detailed report preparation of estimates.

OUTCOME

The students should be able to :

•   Produce site estimation report considering building plan, water supply, sanitary works, road works and irrigation works.

•   Make a detailed estimate of buildings.

•   Do a detailed estimation of irrigation systems and water supply systems.

•   Gain knowledge on the schedule of rates, analysis of rates, detailed and general specifications.

•   Prepare report on estimate of residential building, Culverts, Roads , Water supply and sanitary installations.

UNIT I   INTRODUCTION   3

Types of estimates - Units of measurements - Methods of estimates - Advantages

UNIT II   ESTIMATE OF BUILDINGS   12

Load bearing and framed structures - Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof - Various types of arches - Calculation of brick work and RCC works in arches - Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.

UNIT III   ESTIMATE OF OTHER STRUCTURES   12

Estimating of septic tank, soak pit - sanitary and water supply installations - water supply pipe line - sewer line - tube well - open well - estimate of bituminous and cement concrete roads - estimate of retaining walls - culverts - estimating of irrigation works - aqueduct, syphon, fall.

UNIT IV   SPECIFICATION   6

Data - Schedule of rates - Analysis of rates - Specifications - sources - Detailed and general specifications -Arbitration and legal requirements.

UNIT V   VALUATION   6

Necessity - Basics of value engineering - Capitalized value - Depreciation - Escalation - Value of building - Calculation of Standard rent - Mortgage - Lease

UNIT VI   REPORT PREPARATION   6

Principles for report preparation - report on estimate of residential building - Culvert - Roads - Water supply and sanitary installations - Tube wells - Open wells.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS:

1. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 2003

2. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand & Company Ltd., 2004.

CE 2604   ENVIRONMENTAL SCIENCE AND ENGINEERING

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PREREQUISITES   CE 2305, CY 2101

GOAL

To create the awareness and comprehensive knowledge in environmental science.

OBJECTIVES

The course should enable the students to:

•   Understand the various components of the environment.

•   Study the science of water, air and land - to environment.

•   Get awareness about the importance of current environmental issues.

•   To throw tight on different Environmental techniques to reduce environmental stresses.

•   Become familiar with the tools for better environmental management.

OUTCOME

The students should be able to:

•   Describe the environmental components, eco system and the sustainable development.

•   Gain knowledge on the environmental objectives, goals and policies on development projects and their impacts.

•   Describe the current environmental issues ,bio diversity, ozone depletion etc.

•   Gain knowledge in handling the environmental problems independently with new techniques

•   Prepare report on environmental issues of at least one environmentally sensitive site and describe the different tools for environmental management.

UNIT I   COMPONENTS OF ENVIRONMENT   9

Components - Water, air and land - Inter-relationship between components - Subcomponents; Ecosystem - Structure and functional components of ecosystem - Development and evolution of ecosystem - Energy flow and material cycling in ecosystem - Natural and man made impacts on water, air and land; Environment and development - Concept of sustainable development.

UNIT II SCIENCE OF ENVIRONMENT   9

Chemistry, Physics and biology of water, air and land; Stress on the Chemistry, Physics and Biology of water, air and land owing to the impacts; Environmental quality objectives and goals - Policies on development projects and their impacts, with emphasis on the branch of engineering of the student.

UNIT III CURRENT ENVIRONMENTAL ISSUES   9

Current Environmental issues at Country level - management of municipal sewage, municipal solid

waste, Hazardous waste and Bio-medical waste - Air pollution due to industries and vehicles; Global issues - Biodiversity, Climatic change, Ozone layer depletion.

UNIT IV ENGINEERING INTERVENTIONS TO REDUCE THE ENVIRONMENTAL STRESSES
9

Minimisation of Stress - Principles of Physics, chemistry and biology in engineering interventions such as waste treatment - Flow sheets of engineering interventions relevant to the Engineering discipline of the student - Waste minimization techniques - Clean technology options - Standards of performance of the interventions.

UNIT V (A) TOOLS FOR ENVIRONMENTAL MANAGEMENT **9**

Environmental impact assessment; Precautionary Principle and Polluter Pays Principle; Constitutional provisions, Legal and economic instruments in Environmental Management; Role of Non-government organizations - Community participation in environmental management works; International conventions and protocols; Pollution Control Boards and Pollution Control Acts.

(B) FIELD STUDY

In-depth study of environmental issues of at least one environmentally sensitive site related to the students and preparation of a report thereupon.

TOTAL = 45

TEXT BOOKS:

1. Gilbert M. Masters, "Introduction to Environmental Engineering and Science", Prentice-Hall of India Pvt. Ltd, New Delhi, 2004.

2. J. Glynn Henry and Gary W. Heinke, Environmental Science and Engineering", 2nd edition, Prentice-Hall of India Pvt. Ltd., New Delhi, 2004.

REFERENCES:

1. R. Pannirselvam and S. Karthikeyan, "Environmental Impact Assessment", SPGS Publishers, Chennai - 600 088, 2005.

2. David H. F. Liu and Bela G. Liptak "Environmental Engineers' Handbook", 2nd edition, Lewis Publishers, Newyork, 1997.

CE 2631 FLUID MECHANICS & MACHINERY LABORATORY

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PREREQUISITES   **CE 2303, CE 2505**

GOAL

To get exposed to the functions of various hydraulic devices and machines.

OBJECTIVES

The course should enable the students to :

- To get exposed to the working of various hydraulic devices such as orifice meter, Venturimeter and notches.

- To get exposed to the working of various hydraulic machines such as pumps and turbines.

OUTCOME

The students should be able to:

- The students will be able to describe the performance characteristics of turbines and pumps

- The students will be able to describe the performance characteristics of turbines and pumps.

LIST OF EXPERIMENTS

1. Determination of co-efficient of discharge for orifice

2. Determination of co-efficient of discharge for notches

3. Determination of co-efficient of discharge for venturimeter

4. Determination of co-efficient of discharge for orifice meter

5. Study of impact of jet on flat plate (normal / inclined)

6. Study of friction losses in pipes

7. Study of minor losses in pipes

8. Study on performance characteristics of Pelton turbine.

9. Study on performance characteristics of Francis turbine

10. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)

11. Study on performance characteristics of reciprocating pump.

CE 2632 IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING

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PREREQUISITES   CE 2305, CE 2504

GOAL

The student shall be able to conceive, design and draw all types of irrigation and environmental structures in detail showing plan, elevation sections.

OBJECTIVES

The course should enable the students to :

• Understand the concepts of hydraulic design and to draw detailed drawings of hydraulic Structures.

• Introduce the design concepts of major units associated with water and sewage treatment

OUTCOME

The students should be able to:

• Design and draw plan, elevation and sections of irrigation structures in detail.

• Design the sewage treatment plant units and draw the general arrangement

PART A

1.   TANK IRRIGATION STRUCTURES   9

Tank surplus weirs - Tank sluices weirs on pervious foundations - Detailed drawings showing foundation details, plan and elevation - gravity dams - earth dams

2.   CANAL TRANSMISSION STRUCTURES   9

Canal head works - Canal regulator Aqueducts - Canal drops - Notch type - Drawing showing plan, elevation, foundation details

TEXT BOOKS :

1. Garg, S.K, "Irrigation Engineering and Design of Structures"

2. Satyanarayana Murthy, "Irrigation Design and Drawing", Published by Mrs. L. Banumathi, Tuni, East Godavari District, A.P. 1998.

3. Sharma R.K, "Irrigation Engineering and Hydraulic Structures", Oxford and IBH Publishing Co., New Delhi, 2002.

PART B

1. General layout of water treatment of plant - Design & drawing Slow sand filter - Rapid sand filter - Pressure filter - Chlorinator - Bleaching powder doser - Softeners - Demineralisation plant   6

2. Design and drawing of infiltration gallery.   3

3. General layout of wastewater treatment plant - Sludge digester - Sludge drying beds - Waste stabilisation ponds   6

4. Drawing of raw water - Intake towers - Manholes - Sewer lines - Pumping stations for water and sewage   6

5. Design and drawing of: Water supply and drainage for buildings - Septic tanks and disposal arrangements - House service connection for water supply and drainage - Appurtenances in water supply and drainage   6

TOTAL : 45

REFERENCES :

1. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999

2. Manual of Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi, 1993

3. Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987

4. Peary, H.S., Rowe, D.R., and Tchobanoglous, G., "Environmental Engineering", McGraw-Hill Book Co., New Delhi, 1995

5. Metcalf & Eddy, "Wastewater Engineering (Treatment and Reuse)", 4th Edition, Tata McGraw-Hill, New Delhi, 2003.

MG 2002 TOTAL QUALITY MANAGEMENT

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PREREQUISITES   Nil

GOAL

To understand the Total Quality Management concepts and principles and the various tools available to achieve Total Quality Management and also to understand the statistical approach for quality control.

OBJECTIVES

The course should enable the students to :

* Understand the basic concepts of Total Quality Management.

* Be familiar with the total quality management principles.

* Know about the various process control tools available to achieve Total Quality Management.

* Study about quality function deployment and total productive maintenance.

* Get awareness about the ISO certification process and their need in various industries.

OUTCOME

The students should be able to :

* Apply the concepts of quality planning, quality control etc., in the appropriate places.

* Apply the total quality management principles in issues like customer complaints, customer retention, relationship development etc.,

* Describe the tools of quality, management tools, process capability etc.,

* Describe quality function deployment and total productive maintenance.

* Implement the quality systems for various industries.

UNIT I   INTRODUCTION   **9**

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership - Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT II   TQM PRINCIPLES   **9**

Customer satisfaction - Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement - Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement - Juran Trilogy, PDSA

Cycle, 5S, Kaizen, Supplier Partnership - Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures - Basic Concepts, Strategy, Performance Measure.

UNIT III   STATISTICAL PROCESS CONTROL (SPC)   9

The seven tools of quality, Statistical Fundamentals - Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT IV   TQM TOOLS   9

Benchmarking - Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) - House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) - Concept, Improvement Needs, FMEA - Stages of FMEA.

UNIT V   QUALITY SYSTEMS   9

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System - Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 - Concept, Requirements and Benefits.

TOTAL = 45

TEXT BOOK:

1.   Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

REFERENCES:

1.   James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).

2.   Feigenbaum.A.V. "Total Quality Management, McGraw Hill, 1991.

3.   Oakland.J.S. "Total Quality Management Butterworth - Hcinemann Ltd., Oxford. 1989.

4.   Narayana V. and Sreenivasan, N.S. Quality Management - Concepts and Tasks, New Age International 1996.

CE 2701   BASICS OF DYNAMICS AND ASEISMIC DESIGN OF STRUCTURES

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PREREQUISITES   MA 2101, MA 2201, CE 2501

GOAL

To introduce to the student the phenomena of earthquakes, the process, measurements and the factors that affects the design of structures in seismic areas.

OBJECTIVES

The course should enable the students to :

- Understand the concepts involved in finding the response of Structures for Dynamic forces.

- Know about the mode shapes of the structures under dynamic loading.

- Throw light on the causes of earthquake and its characteristics.

- Have knowledge about the response of structures under earthquake loading.

- Be familiarize with   the codal provisions and the aseismic design methodology.

OUTCOME

The students should be able to:

- Analyze the structures with single degree of freedom for dynamic loading conditions.

- Find out the natural frequencies and the mode shapes of structures under dynamic loading.

- Gain knowledge on the causes of earthquake and the damage on the structures caused by earthquake.

- Find out the response,of the structures, such as acceleration and displacement, for earthquake loading.

- Design earthquake resistant structures and adopt appropriate vibration control techniques.

UNIT I   THEORY OF VIBRATIONS   **9**

Concept of inertia and damping - Types of Damping - Difference between static forces and dynamic excitation - Degrees of freedom - SDOF idealization - Equations of motion of SDOF system for mass as well as base excitation - Free vibration of SDOF system - Response to harmonic excitation - Impulse and response to unit impulse - Duhamel integral.

UNIT II   MULTIPLE DEGREE OF FREEDOM SYSTEM   **9**

Two degree of freedom system - Normal modes of vibration - Natural frequencies - Mode shapes - Introduction to MDOF systems - Decoupling of equations of motion - Concept of mode superposition (No derivations).

UNIT III ELEMENTS OF SEISMOLOGY   **9**

Causes of Earthquake - Geological faults - Tectonic plate theory - Elastic rebound - Epicentre -

Hypocentre - Primary, shear and Raleigh waves - Seismogram - Magnitude and intensity of earthquakes - Magnitude and Intensity scales - Spectral Acceleration - Information on some disastrous earthquakes

UNIT IV RESPONSE OF STRUCTURES TO EARTHQUAKE 9

Response and design spectra - Design earthquake - concept of peak acceleration - Site specific response spectrum - Effect of soil properties and damping - Liquefaction of soils - Importance of ductility - Methods of introducing ductility into RC structures.

UNIT V DESIGN METHODOLOGY 9

IS 1893, IS 13920 and IS 4326 - Codal provisions - Design as per the codes - Base isolation techniques - Vibration control measures - Important points in mitigating effects of earthquake on structures.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS

1. S.R.Damodarasamy, S.Kavitha "Basics of Structural dynamics and Aseismic Design", PHI Learning Private Limited., 2009.

2. Pankaj Agarwal, "Earthquake Resistant Design of Structures", Prentice Hall of India, 2007.

REFERENCES

1. Mario Paz,William Leigh, " Structural Dynamics Theory and Computation", Springer - 2004.

2. Madhujit Mukhopdhyay, " Structural Dynamics, Vibrations and Systems", Anne Books India, 2006.

CE2702 TRANSPORTATION ENGINEERING - II

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PREREQUISITES   CE 2203

GOAL

To impart the students with the knowledge of planning, design, construction and maintenance of railway tracks, airport and harbours.

OBJECTIVES

The course should enable the students to :

*   Get exposed to Railway Planning and design.

*   Throw light on Railway track and its operation.

*   Know the concepts of airport planning and design.

*   Known about different types of airport layouts and the navigational aids for air traffic control.

*   Acquire knowledge about Harbour Engineering

OUTCOME

The students should be able to:

• Gain knowledge about the Engineering surveys for track alignment, Permanent way, its components and their functions.

• Design turnouts, points and crossings and signaling and interlocking.

• Identify the components of airports and execute the design.

• Gain knowledge about different airport layouts airport buildings, runway taxiway markings and lightings for air traffic control.

• Describe the classification of harbours, their planning and layouts, coastal structures and the navigational aids.

UNIT I   RAILWAY PLANNING AND DESIGN   12

Role of Indian Railways in National Development - Engineering Surveys for Track Alignment - Obligatory points - Conventional and Modern methods (Remote Sensing, GIS & GPS, EDM and other equipments) Permanent Way, its Components and Functions of each Component:

Rails - Types of Rails, Rail Fastenings, Concept of Gauges, Coning of Wheels, Creeps and kinks

Sleepers - Functions, Materials, Density Ballasts - Functions, Materials, Ballastless Tracks

Geometric Design of Railway Tracks - Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal and Vertical Curves (Derivations of Formulae and Problems)

UNIT II   RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION   12

Points and Crossings - Design of Turnouts, Working Principle Signalling, Interlocking and Track Circuiting Construction & Maintenance - Conventional, Modern methods and Materials, Track Drainage Track Modernisation- Automated maintenance and upgrading, Technologies, Re-laying of Track, Lay outs of Railway Stations and Yards, Rolling Stock, Tractive Power, Track Resistance, Level Crossings

UNIT III AIRPORT PLANNING AND DESIGN   12

Advantages and Limitations of Air Transport, Components of Airports Airport Planning - Air traffic potential, Site Selection, Design of Components, Cost Estimates, Evaluation and Institutional arrangements Runway Design- Orientation, Cross wind Component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems), Drainage Taxiway Design - Geometric Design Elements, Minimum Separation Distances, Design Speed, Airport Drainage Airport Zoning - Clearance over Highways and Railways

UNIT IV AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL   12

Airport Layouts - Apron, Terminal Building, Hangers, Motor Vehicle Parking Area and Circulation Pattern, Case studies of Airport Layouts Airport Buildings - Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities Visual Aids - Runway and Taxiway Markings,

Wind Direction Indicators, Runway and Taxiway Lightings Air Traffic Control - Basic Actions, Air Traffic Control Network Helipads, Hangars, Service Equipments.

UNIT V   HARBOUR ENGINEERING & OTHER MODES OF TRANSPORT   12

Definition of Terms - Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports Requirements and Classification of Harbours Site Selection & Selection Investigation - Speed of water, Dredging, Range of Tides, Waves and Tidal Currents, Littoral Transport with Erosion and Deposition, Soundings, Anchoring Grounds, Geological Characteristics, Winds & Storms, Position and Size of Shoals Shore Considerations- Proximity to Towns/Cities, Utilities, Construction Materials, Coast Lines Dry and Wet Docks,, Planning and Layouts Entrance, Position of Light Houses, Navigating Terminal Facilities - Port Buildings, Warehouse, Transit Sheds, Inter-modal Transfer Facilities, Mooring Accessories, Navigational Aids Coastal Structures- Piers, Breakwaters, Wharves, Jetties, Quays, Spring Fenders Coastal Shipping, Inland Water Transport and Container Transportation. Pipe Ways, Rope Ways,

TOTAL = 60

TEXT BOOKS:

1.   Saxena Subhash C and Satyapal Arora, A Course in Railway Engineering, Dhanpat Rai and Sons, Delhi, 1998.

2.   Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 1994.

3.   S P Bindra, A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, 1993.

REFERENCES:

1.   S.C Rangwala, "Railway Engineering" , Charotar Publishing House, 1995.

2.   S.C. Rangwala, "Airport Engineering" , Charotar Publishing House, 1996.

3.   Oza and Oza, "A course in Docks & Harbour Engineering".

4.   J.S. Mundrey, "A course in Railway Track Engineering".

CE2703 CONSTRUCTION MANAGEMENT

L T P C
3 0 0 3

PREREQUISITES   MG2001

GOAL

To introduce to students the functions of management, network planning techniques, contract system & accounting procedures in government organization & groom them to match to the requirement of employer expectation in construction industry.

OBJECTIVES

The course should enable the students to :

*   Understand the functions of management and various organizational structures.

*   Throw light on construction planning, resource planning and various labour legislations

*   Understand the concept of network planning methods and principles of cost control

*   Study the concept of tender and contracts and impart idea about quality control and safety requirements

*   Throw light on various accounting procedures adopted in government organizations

OUTCOME

The students should be able to:

*   Describe the importance of management and know the merits and demerits of various organizational structures

*   Gain knowledge on resource planning for civil engineering projects and know the labour requirements

*   Make use of network planning techniques like CPM and PERT and apply methods of cost control for civil engineering projects.

*   Execute the project works by inviting tenders and document and interpret project work progress.

*   Document and Communicate Schedule and Cost Impacts

UNIT I   PRINCIPLES OF MANAGEMENT   9

Definition - importance - function of management - relevance to Government and Quasi Government departments - private contractors and contracting firms - organisational structure.

UNIT II   CIVIL ENGINEERING MANAGEMENT   9

a)   Construction Planning : Collection of field data - preliminary estimates - approval and sanction of estimates - budget provision - construction stages - scheduling methods - progress reports and charts

b) Resource Planning: Planning for materials, machines, men and organisation - resource allocation.

c) Labour and Labour Welfare

Relationship between management and labour - problems - labour Legislations - Minimum Wages Act - settlement of disputes - industrial psychology.

UNIT III   MANAGEMENT METHODS 9

Concepts of network - network planning methods CPM/PERT - management by network analysis and control - principles of cost control - control by graphical representation, by bill of quantities and by network analysis.

UNIT IV   EXECUTION OF WORK 9

a) Departmental Works : Procedure - departmental labour - quality control, inspection and duties of personnel - safety requirements.

b) Contracts: Contract system - types of contracts - specifications, documents, procedures, condition, taxes, law of contractors and legal implications are penalties.

c) Tender and Tender Documents: Definition - calling for tenders - tender documents - submission of tenders - processing of tenders - negotiations and settlement of contracts-agreement between the owner and the contractor

d) Quality Control: Quality of materials - role of site engineer- workmanship

UNIT V   ACCOUNTS AND STORES 9

Measurements of work - recording - checking - types of bills - mode of payment - budget estimate - revised estimates - completion of reports and certificates - claims - banking settlement - types of accounts - drawal and transfer classifications of transactions - ledger accounts - interest account - cash book.

Suspense classification - storing - maintenance inspection - inventories - transfer of surplus and accounting of shortage stores - procedures adopted in P.W.D. and C.P.W.D.

TUTORIAL: 15

L = 45, T = 15, TOTAL = 60

TEXT BOOKS:

1. Sanga Reddy and Meyyappan - Construction management - Kumaran Publications.

2. Joseph L. Massie, Essentials of Management, Prentice Hall of India

3. Cholt and Dhir - Construction Management

REFERENCE BOOKS:

1. C.P.W.D. Manuals

2. Public Works Accounts Code, PWD, Tamilnadu

CE 2731 COMPUTER AIDED DESIGN AND DRAFTING

L T P C
0 0 3 2

PREREQUISITES   **CE2331, CE2402, CE2503**

GOAL

To acquire hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

OBJECTIVES

The course should enable the students to :

• Understand the design principles of various types of Retaining walls, Bridges, Water tanks and Plate Girder Bridges and to draw the structural drawings using Auto CADD.

OUTCOME

The students should be able to:

• Design and prepare structural drawings for concrete / steel structures normally encountered in Civil Engineering practice

LIST OF EXPERIMENTS

• Design and drawing of RCC cantilever and counter fort type retaining walls with reinforcement details   12

• Design of solid slab and RCC Tee beam bridges for IRC loading and reinforcement details
                                                                                                                       9

• Design of pressed, rectangular and hemispherical bottom steel tank - Staging - Detailed drawings
                                                                                                                       9

• Design and drafting of Intz type water tank, Detailing of circular and rectangular water tanks
                                                                                                                       6

• Design of plate Girder Bridge - Truss Girder bridges - Detailed Drawings including connections.
                                                                                                                       9

TOTAL:45

LIST OF EQUIPMENTS

(For a batch of 30 students)

SI. No.	Description of Equipments	Quantity
1.	Computer system of Pentium IV or equivalent	1 for each student
2.	Licensed version of AUTO CADD	1 copy for a set of 3 students

TEXT BOOKS:

1. Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", CBS Publishers

2. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Design of steel structures", Lakshmi publications Pvt. Ltd.

REFERENCES:

1. Krishnamurthy, D., "Structural Design & Drawing - Vol. II", CBS Publishers & Distributors, Delhi

2. Krishnamurthy, D., "Structural Design & Drawing - Vol. III Steel Structures", CBS Publishers & Distributors, New Delhi

CE 2732 CONSTRUCTION SOFTWARE LABORATORY

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PREREQUISITES CE 2703

GOAL

To gain knowledge in software applications in the field of construction engineering and planning which helps the students as an effective tool to manage huge construction projects.

OBJECTIVES

The course should enable the students to :

• Gain knowledge in software applications in the field of construction engineering and planning.

OUTCOME

The students should be able to:

• Use an effective tool to manage huge construction projects which includes planning, scheduling, estimation, inventory and equipment handling, execution and successful completion with in the time frame and budget allocated.

1.   ESTIMATION OF BUILDINGS   **24**

Estimation and costing of building structures

2.   ESTIMATION OF BRIDGES   **21**

Estimation and costing of bridge structures

                                                                                    TOTAL : 45

Software required

1. PRIMAVERA Software

SEMESTER VIII

GE 2001   PROFESSIONAL ETHICS AND HUMAN VALUES

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PREREQUISITES   Nil

GOAL

To introduce the students to basic concepts of Engineering Ethics and Human Values.

OBJECTIVES

The course should enable the students to :

• Create an awareness on Human Values.

• Be familiar with the various theories on Engineering Ethics.

• Throw light on moral social values and Loyalty of professional.

• Create am awareness about the safety aspects responsibilities and various rights of professionals.

OUTCOME

The students should be able to:

• Gain knowledge in Human values.

• Use the senses of Engineering Ethics and ethical theories..

• Be acquainted with the Global issues on Environmental Ethics and Computer Ethics.

• Get awareness on the Ethics and responsibilities of a professional.

• Get awareness on Engineering Ethics and Human Values.

UNIT I   HUMAN VALUES   10

Morals, Values and Ethics - Integrity - Work Ethic - Service Learning - Civic Virtue - Respect for Others - Living Peacefully - caring - Sharing - Honesty - Courage - Valuing Time - Co-operation - Commitment - Empathy - Self-Confidence - Character - Spirituality

UNIT II   ENGINEERING ETHICS   9

Senses of 'Engineering Ethics' - variety of moral issued - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy - Models of Professional Roles - theories about right action - Self-interest - customs and religion - uses of ethical theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION   9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

UNIT IV   SAFETY, RESPONSIBILITIES AND RIGHTS   **9**

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the three mile island and chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT V   GLOBAL ISSUES   **8**

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India, etc.

TOTAL = 45

TEXT BOOKS:

1.   Mike Martin and Roland Schinzinger, "Ethics in engineering", McGraw-Hill, New York 1996.

2.   Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1.   Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey, 2004 (Indian Reprint)

2.   Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics - Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available)

3.   John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.

4.   Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

CE 2831   PROJECT & VIVA - VOCE

L T P C
0 0 24 6

PREREQUISITES

CE 2301, CE 2401, CE 2402, CE 2331, CE 2332, CE 2305, CE 2403, CE2303.

GOAL

*   To impart and improve the design capability of the students in any one of the disciplines of Civil Engineering.

OBJECTIVES

The course should enable the students to :

*   Work on a project involving theoretical and experimental studies related to Civil Engineering.

OUTCOME

The students should be able to:

*   Widen their knowledge based on the experimental or theoretical studies carried out in any one of the Civil Engineering areas such as Structural Engineering, Environmental Engineering, Water Resources Engineering, Transportation Engineering, Soil Mechanics and Remote sensing.

PROJECT DESCRIPTION

Students shall work in convenient groups of not more than six members in a group. Every Project Work shall have a Guide who is a member of the faculty of the University. Twenty four periods per week shall be allotted in the Time Table for this important activity and this time shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis or field work as assigned by the Guide and also to present in periodical seminars the progress made in the project.

Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, Project work details and conclusions. This final report shall be typewritten form as specified in the guidelines.

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1.   Internal Marks   : 20 marks

     (Decided by conducting 3 reviews by the guide appointed by the Institution)

2.   Evaluation of Project Report   : 30 marks

     (Evaluated by the external examiner appointed by the University).

     Every student belonging to the same group gets the same mark

3.   Viva voce examination   : 50 marks

     (Evaluated by the internal examiner appointed by the HOD, external examiner appointed by the University

ELECTIVE SUBJECTS
SEMESTER V

CE 2551 ELECTRONIC SURVEYING

L T P C
3 0 0 3

PREREQUISITES   CE 2304

GOAL

To equip the students with knowledge about advance surveying techniques, Electronic Distance Measurement and Electronic Surveying.

OBJECTIVES

The course should enable the students to :

•   Know about electronic devices which are used in electronic surveying.

•   To throw light on various conductors and equipment used.

•   Provide students with the fundamental technical knowledge about electromagnetic waves.

•   Understand the various techniques of micro waves

•   Understand the principles of Electronic Distance Measurement(EDM)

OUTCOME

The students should be able to :

•   Use different conductors for surveying.

•   Gain knowledge about different propagation of electromagnetic waves.

•   Use the techniques, skills, and modern surveying engineering tools necessary for surveying engineering practice

•   Gain knowledge about different propagation of micro waves.

•   Conduct survey using the EDM for measurement of distances, traversing and base line measurement.

UNIT I   BASICS   7

Methods of measuring distance, historical development, basic principles, classifications, applications and comparison with conventional surveying.

UNIT II CONDUCTORS   8

 Fundamentals of electronics, resonant circuits, semiconductors, Lasers, Cathode ray tube, photo multiplier tube, transducers, oscillators, frequency mixing, modulation and demodulation, Kerrcell modulator, measurement of phase difference, reflectors and power sources.

UNIT III ELECTROMAGNETIC WAVES   8

Definition, classification, applications, propagation properties, wave propagation at lower and higher frequencies. Refractive index, factors affecting, computation of group refractive index for light and near infrared waves at standard conditions and ambient conditions, reference refractive index, first velocity correction.

UNIT IV MICRO WAVES   7

Definition, classification, applications, propagation properties, wave propagation at lower and higher frequencies, computation of refractive index for microwaves, measurement of atmospheric parameters, mean refractive index, real time application of first velocity correction, second velocity correction and total atmospheric correction.

UNIT V ELECTROMAGNETIC DISTANCE MEASURING SYSTEM   15

Electro-optical system, measuring principle, working principle, sources of error, infrared EDM instruments, Laser EDM instruments and total station. Microwave system, measuring principle, working principle, sources of error, microwave EDM instruments, comparison with Electro-optical system, care and maintenance of EDM instruments, Modern Positioning Systems, EDM traversing, trilateration and base line measurement using EDM.

TOTAL = 45

TEXT BOOKS:

1. Burnside, C.D. Electromagnetic distance measurement 3rd edition, Blackwell Science, 1991.

2. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1996.

REFERENCES:

1. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1983.

2. Soastamoinen, J.J. Surveyor's guide to electro-magnetic Distance Measurement, Adam Hilger Ltd., 1967.

CE 2552   APPLIED HYDROLOGY

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L T P C
3 0 0 3

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PREREQUISITES   **CE 2504**

GOAL

To make the students understand the components of hydrologic cycle and its measurement along with flood routing and ground water hydrology.

OBJECTIVES

The course should enable the students to :

•   Understand the concepts of hydrologic cycle.

•   Learn the various methods of measurement of rainfall.

•   Get acquainted with the principles of hydrograph.

•   Understand the concepts behind flood rooting and ground water hydrology.

•   Understand the concepts of ground Water flow.

OUTCOME

The students will be able to:

•   Describe the various components of hydrologic cycle.

•   Analyse the basic data for rainfall prediction.

•   Describe the unit hydrograph techniques.

•   Gain knowledge on various methods of flood routing .

•   Describe the principles of Ground water hydrology.

UNIT I   PRECIPITATION   **10**

Hydrologic cycle - Types of precipitation - Forms of precipitation - Measurement of Rainfall - Spatial measurement methods - Temporal measurement methods - Frequency analysis of point rainfall - Intensity, duration, frequency relationship - Probable maximum precipitation.

UNIT II   ABSTRACTION FROM PRECIPITATION   **10**

Losses from precipitation - Evaporation process - Reservoir evaporation - Infiltration process - Infiltration capacity - Measurement of infiltration - Infiltration indices - Effective rainfall.

UNIT III HYDROGRAPHS   **10**

Factors affecting Hydrograph - Baseflow separation - Unit hydrograph - Derivation of unit hydrograph - S curve hydrograph - Unit hydrograph of different deviations - Synthetic Unit Hydrograph

UNIT IV FLOODS AND FLOOD ROUTING 9

Flood frequency studies - Recurrence interval - Gumbel's method - Flood routing - Reservoir flood routing - Muskingum's Channel Routing - Flood control

UNIT V GROUND WATER HYDROLOGY 6

Types of aquifers - Darcy's law - Dupuit's assumptions - Confined Aquifer - Unconfined Aquifer - Recuperation test - Transmissibility - Specific capacity - Pumping test - Steady flow analysis only.

TOTAL = 45

TEXT BOOKS:

1. Subramanya, K., "Engineering Hydrology", Tata McGraw-Hill Publishing Co., Ltd., 2000

2. Raghunath, H.M., "Hydrology", Wiley Eastern Ltd., 2000

REFERENCES:

1. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2000

2. Singh, V.P., "Hydrology", McGraw-Hill Inc., Ltd., 2000

3. Dr.Jaya Rami Reddy, "A Text Book of Hydrology" , University Science Press, Laxmi Publications, second edition, 2011.

CE 2553 REMOTE SENSING TECHNIQUES AND APPLICATIONS

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PREREQUISITES   CE 2304

GOAL

To equip the students with knowledge about remote sensing techniques and its application in natural resource management.

OBJECTIVES

The course should enable the students to :

•   Understand the concepts of Electromagnetic radiance.

•   Learn the various types of land use/ land cover.

•   Get acquainted with the principles of mapping flood risk zone.

•   Understand the concepts behind agriculture, forest and soil.

•   Understand the concepts of earth science.

OUTCOME

The students will be able to:

• Describe the various components of electromagnetic radiation

• Analyse the basic data for urban land use planning

• Identify ground water potential zones, recharge area and assess drought.

• Prepare crop inventory mapping and can produce estimation.

• Describe the principles of lithological and structural mapping.

UNIT I INTRODUCTION 9

Definition - Physics of remote sensing - electromagnetic radiation (EMR) - remote sensing windows - interaction of EMR with atmosphere, earth surface, soils, water and vegetation - platform and sensors - image interpretations.

UNIT II LAND USE STUDIES 9

Definition of land use - land use / land cover classification - schemes and levels of classification systems with RS data - land use mapping - change detection - urban land use planning, site suitability analysis, transportation planning.

UNIT III WATER RESOURCES 9

Arial assessment of surface water bodies - Capacity survey of water bodies - mapping of snow - covered areas - flood risk zone mapping - identification of groundwater potential zones, recharge areas - droughts, definition, drought assessment and management.

UNIT IV AGRICULTURE, SOIL AND FORESTRY 9

Crop inventory mapping - production estimation - command area monitoring - soil mapping - crop stress detection - estimation of soil erosion - forest types and density mapping - forest fire risk zone mapping.

UNIT V EARTH SCIENCE 9

Lithology - lithological mapping - structural mapping - Geomorphology - nature and type of landforms - identification - use of remote sensing data for land slides - targeting mineral resource - Engineering geology and Environmental geology.

TOTAL = 45

TEXT BOOK:

1. Michael Hord, R. Remote Sensing Methods and Application, John Wiley and Sons, New York, 1986.

REFERECNES:

1. Lillesand, T.M and Kicter R.W. Remote Sensing and Image Interpretation, John Willey and Sons, inc, new York, 2002.

2. Steven, M.D, and Cllark, J.A. Application of Remote Sensing in Agriculture, Butterworths, London, 1990.

3. Space Applications Centre, Manual for Forest Mapping and Damage Detection Using Satellite Data, Report No. IRS-UP/SAC/FMDD/TN/16/90, 1990, pp - 253.

4. Sabins, F.F. Jr. Remote Sensing Principles and Interpretation, W.H. Freeman & Co., 1978.

5. Manual of Remote Sensing Vol. II. American Society of Photogrammetry.

CE 2554 ENGINEERING GEOLOGY

L T P C
3 0 0 3

PREREQUISITES   CE 2203

GOAL

To equip the students with the basic & advanced skills needed to become a specialized engineer in Engineering Geology.

OBJECTIVES

The course should enable the students to :

•   Know about earth structures composition and earthquake belts.

•   Know about the physical properties and engineering significance of minerals.

•   Study about different classification of rocks and its engineering properties.

•   Know about seismic and electrical methods for Civil Engineering investigations.

•   Exposure to the geological conditions necessary FQ Civil Engineering constructions.

OUTCOME

The students should be able to:

•   Describe the earth structures, composition and earthquake belts.

•   Describe the engineering significance physical properties of minerals such as quartz , auguite, muscovite etc.,

•   Describe the engineering properties of different types of rock materials.

•   Apply the seismic and electrical methods for Civil Engineering investigations.

•   Describe the geological conditions necessary for construction of dams, tunnels, buildings, load cuttings etc.,

UNIT I   GENERAL GEOLOGY   9

Geology in Civil Engineering - Branches of geology - Earth Structures and composition - Elementary knowledge on continental drift and plate technologies. Earth processes - Weathering - Work of rivers,

wind and sea and their engineering importance - Earthquake belts in India. Groundwater - Mode of occurrence - prospecting - importance in civil engineering

UNIT II MINERALOGY 9

Elementary knowledge on symmetry elements of important crystallographic systems - physical properties of minerals - study of the following rock forming minerals - Quartz family. Feldpar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet - properties, behaviour and engineering significance of clay minerals - Fundamentals of process of formation of ore minerals - Coal and petroleum - Their origin and occurrence in India.

UNIT III PETROLOGY 9

Classification of rocks - distinction between igneous, sedimentary and metamorphic rocks. Description occurrence, engineering properties and distribution of following rocks. Igneous rocks - Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt Sedimentary rocks sandstone, Limestone, shale conglo, Conglomerate and breccia. Metamorphic rocks. Quartizite, Marble, Slate, Phyllite, Gniess and Schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD 9

Attitude of beds - Outcrops - Introduction to Geological maps - study of structures - Folds, faults and joints - Their bearing on engineering construction. Seismic and Electrical methods for Civil Engineering investigations

UNIT V GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING 9

Remote sensing techniques - Study of air photos and satellite images - Interpretation for Civil Engineering projects - Geological conditions necessary for construction of Dams, Tunnels, Buildings, Road cuttings, Land slides - Causes and preventions. Sea erosion and coastal protection.

TOTAL = 45

TEXT BOOKS:

1. Parbin Singh, "Engineering and General Geology", S.K. Kataria and Sons, 2008.

2. Krynine and Judd, "Engineering Geology and Geotechniques", McGraw-Hill Book Company, 1990.

REFERENCES:

1. Legeet, "Geology and Engineering", McGraw-Hill Book Company 1998

2. Blyth, "Geology for Engineers", ELBS, 1995

CE 2555   BUILDING SERVICES

L T P C
3 0 0 3

PREREQUISITES

GOAL

To impart the students with the various aspects of pumps and machinery involved in Civil Engineering practice and the principles of electrical and air conditioning facilities involved.

OBJECTIVES

The course should enable the students to :

• Study about machineries used in the Civil Engineering field.

• Acquire knowledge about electrical systems in the buildings.

• Impart knowledge on the principles of Lighting and Illumination in the buildings.

• Familiarize with refrigeration principles and its applications.

• Create an awareness of the fire safety aspects in the buildings.

OUTCOME

The students should be able to:

• Describe the different machineries used in the construction.

• Plan the electrical wiring for the buildings.

• Design the lighting system required for different types buildings.

• Choose suitable refrigeration and air conditioning systems for different types of buildings.

• Describe the fire safety aspects of building services.

UNIT I   MACHINERIES   **8**

Hot Water Boilers - Lifts and Escalators - Special features required for physically handicapped and elderly - Conveyors - Vibrators - Concrete mixers - DC/AC motors - Generators - Laboratory services - Gas, water, air and electricity

UNIT II   ELECTRICAL SYSTEMS IN BUILDINGS   **10**

Basics of electricity - Single / Three phase supply - Protective devices in electrical installations - Earthing for safety - Types of earthing - ISI specifications - Types of wires, wiring systems and their choice - Planning electrical wiring for building - Main and distribution boards - Transformers and switch gears - Layout of substations

UNIT III   PRINCIPLES OF ILLUMINATION & DESIGN   **8**

Visual tasks - Factors affecting visual tasks - Modern theory of light and colour - Synthesis of light - Additive and subtractive synthesis of colour - Luminous flux - Candela - Solid angle illumination -

Utilisation factor - Depreciation factor - MSCP - MHCP - Lans of illumination - Classification of lighting - Artificial light sources - Spectral energy distribution - Luminous efficiency - Colour temperature - Colour rendering.

Design of modern lighting - Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV REFRIGERATION PRINCIPLES & APPLICATIONS   10

Thermodynamics - Heat - Temperature, measurement transfer - Change of state - Sensible heat - Latent heat of fusion, evaporation, sublimation - saturation temperature - Super heated vapour - Subcooled liquid - Pressure temperature relationship for liquids - Refrigerants - Vapour compression cycle - Compressors - Evaporators - Refrigerant control devices - Electric motors - Starters - Air handling units - Cooling towers - Window type and packaged air-conditioners - Chilled water plant - Fan coil systems - Water piping - Cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A.C. Systems

UNIT V FIRE SAFETY INSTALLATION   9

Causes of fire in buildings - Safety regulations - NBC - Planning considerations in buildings like non-combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types - Heat and smoke detectors - Fire alarm system, snorkel ladder - Fire lighting pump and water storage - Dry and wet risers - Automatic sprinklers.

TOTAL = 45

TEXT BOOKS:

1. Udayakumar, R, "A Text Book of Building Services", Eswar Press (2007 R.G.Hopkinson and J.D.Kay, "The Lighting of buildings", Faber and Faber, London, 1969.

2. William H.Severns and Julian R.Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 1988.

REFERENCES:

1. E.R.Ambrose, "Heat Pumps and Electric Heating", John and Wiley and Sons, Inc., New York, 1968.

2. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.

3. Philips Lighting in Architectural Design, McGraw-Hill, New York, 1964.

4. A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 1980.

5. National Building Code.

CE 2651   HOUSING PLANNING AND MANAGEMENT

L T P C
3 0 0 3

PREREQUISITES   CE 2331

GOAL

To enable the students to develop skills on Housing Policies, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies and to decide appropriate New Constructions Techniques.

OBJECTIVES

The course should enable the students to :

• Understand the principles of sustainable housing and strategies of National housing policies.

• Gain knowledge on the standards for different housing programmes.

• Understand the concepts involved in the planning and design of housing projects.

• Familiarise with the construction techniques and different materials for construction.

• Know about Housing Finance.

OUTCOME

The students should be able to :

• Gain knowledge about the housing laws at state level at urbans and rural local bodies.

• Describe the standards for apartments, rental housing, slum housing etc.

• Make site analysis and execute the layout design and housing unit design.

• Choose the suitable techniques and materials for constructions.

• Make cash flow analysis and pricing of housing units.

UNIT I   INTRODUCTION TO HOUSING   9

Definition of Basic Terms - House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies - levels - Development Control Regulations, Institutions for Housing at National, State and Local levels.

UNIT II HOUSING PROGRAMMES   9

Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS **9**

Formulation of Housing Projects - Site Analysis, Layout Design, Design of Housing Units (Design Problems).

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS **9**

New Construction Techniques - Cost Effective Modern Construction Materials, Building Centres - Concept, Functions and Performance Evaluation.

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL **9**

Appraisal of Housing Projects - Housing Finance, Cost Recovery - Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).

TOTAL = 45

TEXT BOOKS:

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi. 1999.

2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997.

REFERENCES:

1. Development Control Rules for Chennai Metropolitan Aera, CMA, Chennai, 2002

2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.

3. National Housing Policy, 1994, Government of India.

CE 2652 MANAGEMENT OF IRRIGATION SYSTEMS

L T P C
3 0 0 3

PREREQUISITES **CE 2504**

GOAL

To provide the students with a clear concept of irrigation water management practices.

OBJECTIVES

The course should enable the students to:

• Understand the different cropping patterns and crop water requirements.

• Be familiar with irrigation scheduling.

• Gain knowledge on the strategies in water use.

• Understand the operation of canal irrigation system.

• Be familiar with participatory irrigation management.

OUTCOME

The students should be able to:

• Identify the crop water requirement for different crops.

• Describe scheduling for irrigation.

• Describe conjugative use of water and manage during deficit years

• Describe the regulation of water through canals by the knowledge obtained through case studies.

• Be acquainted with the advantages of Farmer's participation in System operation.

UNIT I   IRRIGATION SYSTEM REQUIREMENTS   9

Irrigation systems - Supply and demand of water - Cropping pattern - Crop rotation - Crop diversification - Estimation of total and peak crop water requirements - Effective and dependable rainfall - Irrigation efficiencies.

UNIT II   IRRIGATION SCHEDULING   8

Time of irrigation - Critical stages of water need of crops - Criteria for scheduling irrigation - Frequency and interval of irrigation.

UNIT III   MANAGEMENT   9

Structural and non-structural strategies in water use and management - Conjunctive use of surface and ground waters - Quality of irrigation water.

UNIT IV   OPERATION   9

Operational plans - Main canals, laterals and field channels - Water control and regulating structures - Performance indicators - Case study

UNIT V   INVOLVEMENT OF STAKE HOLDERS   10

Farmer's participation in System operation - Water user's associations - Farmer councils - Changing paradigms on irrigation management - Participatory irrigation management.

TOTAL = 45

TEXT BOOKS:

1. Dilip Kumar Majumdar, "Irrigation Water Management - Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000

2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi

REFERENCES:

1. Hand Book on Irrigation System Operation Practices, Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 1990

2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 1994.

CE 2653 ENVIRONMENTAL IMPACT ASSESSMENT

L T P C
3 0 0 3

PREREQUISITES   **CE 2305, CE 2604**

GOAL

To introduce the student the basic theory and concepts of various impact assessment procedures to protect the Environment.

OBJECTIVES

The course should enable the students to:

• Know about the basics of Environmental Impact Assessment(EIA) and the legal provisional in EIA.

• Study about the various methods involved in EIA.

• Predict and assess the impact of various developmental activities on environment.

• Get knowledge about the environmental management plan to take care of adverse impacts.

• Study the impact due to highway projects, airport projects and other infrastructure projects.

OUTCOME

The students should be able to:

• Describe the importance of EIA studies.

• Apply the various methods for carrying out EIA studies.

• Apply the various techniques for predicting and assessing the impact.

• Mitigate the adverse impacts arising out of development projects.

• Carry out EIA studies and prepare EIA report for various infrastructure and development projects.

UNIT I   INTRODUCTION   5

Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) - EIA capability and limitations - Legal provisions on EIA.

UNIT II METHODOLOGIES   5

Methods of EIA -Check lists - Matrices - Networks - Cost-benefit analysis - Analysis of alternatives - Case studies.

UNIT III PREDICTION AND ASSESSMENT   10

Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation - Rapid EIA.

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN   **10**

Plan for mitigation of adverse impact on environment - options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People - ISO 14000

UNIT V CASE STUDIES   **15**

EIA for infrastructure projects - Bridges - Stadium - Highways - Dams - Multi-storey Buildings - Water Supply and Drainage Projects.

          TOTAL = 45

TEXT BOOKS:

1. R. Pannirselvam and S. Karthikeyan, "Environmental Impact Assessment", SPGS Publishers, Chennai - 600 088, 2005.

2. Canter, R.L., "Environmental Impact Assessment", McGraw-Hill Inc., New Delhi, 1996.

3. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.

REFERENCES:

1. John G. Rau and David C Hooten (Ed)., "Environmental Impact Analysis Handbook", McGraw-Hill Book Company, 1990.

2. "Environmental Assessment Source book", Vol. I, II & III. The World Bank, Washington, D.C., 1991.

3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II", Blackwell Science, 1999.

CE 2654 INDUSTRIAL WASTE MANAGEMENT

        L T P C
        3 0 0 3

PREREQUISITES   **CE 2305**

GOAL

To familiarize the students about the characterize of industrial waster waters, cleaner production, recycling of waste, various types of industrial waste waters, treatment technologies and hazardous wastes management.

OBJECTIVES

The course should enable the students to:

• Understand the various types of Industrial waste waters, their characteristics and their effects on the environmental resources viz, air, water and land.

• Study and understand the various legislative measures related to prevention and control of industrial wastes.

- Study and understand the cleaner production, waste audit, recycling and by- product recovery.

- Know about the waste generated in selected industries like textiles, tanneries , electro plating, Pulp and paper etc.,

- Know about the various treatment technologies like equalization, Neutralisation, chemical oxidation, adsorption etc.,

- Study about hazardous waste management.

OUTCOME

The students should be able to:

- Characterize the various types of wastewaters coming out from industries like textiles, tanneries, pulp and paper, etc.,

- Design specific flow sheets to treat the various types of industrial waste.

- Liase with the statutory agencies like pollution control boards and Ministry of Environment and Forests.

- Practice cleaner production technologies by interacting with the production people of industries in which they join and work.

- Manage the hazardous wastes generated in the industry.

UNIT I   INTRODUCTION 7

Types of industries and industrial pollution - Characteristics of industrial wastes - Population equivalent - Bioassay studies - effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health - Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II   CLEANER PRODUCTION 8

Waste management Approach - Waste Audit - Volume and strength reduction - Material and process modifications - Recycle, reuse and by-product recovery - Applications.

UNIT III POLLUTION FROM MAJOR INDUSTRIES 10

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants - Wastewater reclamation concepts

UNIT IV   TREATMENT TECHNOLOGIES 12

Equalisation - Neutralisation - Removal of suspended and dissolved organic solids - Chemical oxidation - Adsorption - Removal of dissolved inorganics - Combined treatment of industrial and municipal wastes - Residue management - Dewatering - Disposal

UNIT V HAZARDOUS WASTE MANAGEMENT 8

Hazardous wastes - Physico chemical treatment - solidification - incineration - Secured land fills

TOTAL = 45

TEXT BOOKS:

1. M.N.Rao & A.K.Dutta, "Wastewater Treatment", Oxford - IBH Publication,2001.

2. W .W. Eckenfelder Jr., "Industrial Water Pollution Control", McGraw-Hill Book Company, New Delhi, 2000.

REFERENCES:

1. T.T.Shen, "Industrial Pollution Prevention", Springer, 1999.

2. R.L.Stephenson and J.B.Blackburn, Jr., "Industrial Wastewater Systems Hand book", Lewis Publisher, New Yark, 1998

3. H.M.Freeman, "Industrial Pollution Prevention Hand Book", McGraw-Hill Inc., New Delhi, 1995.

4. Bishop, P.L., "Pollution Prevention: Fundamental & Practice", McGraw-Hill, 2000.

CE 2655   AIR POLLUTION MANAGEMENT

L T P C
3 0 0 3

PREREQUISITES   CE 2305

GOAL

To make the students familiar with various types of Air Pollutants, their effects and control methods, and to expose the students to the various Air Pollution dispersion models.

OBJECTIVES

The course should enable the students to :

• Understand the various types of Air Pollutants and their effects of human beings, materials, vegetations and animals.

• Understand the meteorological factor responsible for dispersion of pollutants.

• Know about the measurement of the Air Pollutants in the ambient air using high volume air samplers.

• Study about the control methods adopted for different types of Air Pollutants coming out from different types of industries.

• Study about the noise pollution problems and the noise standards.

OUTCOME

The students should be able to:

• Categorise the various type of Air Pollutants coming out from different sources.

• Gain knowledge in the dispersion of pollution, meteorological factors and dispersion models.

• Sample and analyse the major air pollutants present in the ambient air.

4. Select appropriate control equipment to minimize the air pollution problems in industries.

5. Measure noise levels in industries and compare with standards and to suggest appropriate measures to noise pollution problems.

UNIT I SOURCES AND EFFECTS OF AIR POLLUTANTS 9

Classification of air pollutants - Particulates and gaseous pollutants - Sources of air pollution - Source inventory - Effects of air pollution on human beings, materials, vegetation, animals - global warming-ozone layer depletion, Sampling and Analysis - Basic Principles of Sampling - Source and ambient sampling - Analysis of pollutants - Principles.

UNIT II DISPERSION OF POLLUTANTS 9

Elements of atmosphere - Meteorological factors - Wind roses - Lapse rate - Atmospheric stability and turbulence - Plume rise - Dispersion of pollutants - Dispersion models - Applications.

UNIT III AIR POLLUTION CONTROL 15

Concepts of control - Principles and design of control measures - Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation - Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion - Pollution control for specific major industries.

UNIT IV AIR QUALITY MANAGEMENT 7

Air quality standards - Air quality monitoring - Preventive measures - Air pollution control efforts - Zoning - Town planning regulation of new industries - Legislation and enforcement - Environmental Impact Assessment and Air quality

UNIT V NOISE POLLUTION 5

Sources of noise pollution - Effects - Assessment - Standards - Control methods - Prevention

TOTAL = 45

TEXT BOOKS:

1. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.

2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.

3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.

REFERENCES :

1. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New Yark, 1997

2. Mahajan S.P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company, New Delhi, 1991.

3. Peavy S.W., Rowe D.R. and Tchobanoglous G. Environmental Engineering, McGraw Hill, New Delhi, 1985.

4. Garg, S.K., "Environmental Engineering Vol. II", Khanna Publishers, New Delhi

5. Mahajan, S.P., "Pollution Control in Process Industries", Tata McGraw-Hill, New Delhi, 1991.

CE 2656 MUNICIPAL SOLID WASTE MANAGEMENT

L T P C
3 0 0 3

PREREQUISITES   CE 2305

GOAL

To make the students learn about the various types of solid waste produced the collection and transportation methods, and the treatment in disposal methods.

OBJECTIVES

The course should enable the students to :

*   Become familiar with the problems associated with   the solid waste of Municipalities and Industries.

*   Know about the collection, segregations, and treatment of solid waste.

*   Aware of the various treatment technologies available for treating solid waste.

*   Know about various methods of collection and disposal of solid waste .

*   Be familiar with the biogas production from solid waste.

OUTCOME

The students should be able to:

*   Describe the solid waste collection and transportation methodology.

*   Describe the on-site storage methods, segregation and treatment of solid waste.

*   Be familiar with biogas generation and to develop vermin culture for composting of solid waste.

*   Describe the various methods of collection and disposal of solid waste.

*   Describe the biogas production from solid waste.

UNIT I   SOURCES AND TYPES OF MUNICIPAL SOLID WASTES   9

Sources and types of solid wastes - Quantity - factors affecting generation of solid wastes; characteristics - methods of sampling and characterization; Effects of improper disposal of solid wastes - public health effects. Principle of solid waste management - social & economic aspects; Public awareness; Role of NGOs; Legislation.

UNIT II ON-SITE STORAGE & PROCESSING   9

On-site storage methods - materials used for containers - on-site segregation of solid wastes - public health & economic aspects of storage - options under Indian conditions - Critical Evaluation of Options.

UNIT III COLLECTION AND TRANSFER   9

Methods of Collection - types of vehicles - Manpower requirement - collection routes; transfer stations - selection of location, operation & maintenance; options under Indian conditions.

UNIT IV OFF-SITE PROCESSING   9

Processing techniques and Equipment; Resource recovery from solid wastes - composting, incineration, Pyrolysis - options under Indian conditions.

UNIT V DISPOSAL   9

Dumping of solid waste; sanitary land fills - site selection, design and operation of sanitary landfills - Leach ate collection & treatment.

TOTAL = 45

TEXT BOOKS:

1.   George Tchobanoglous et.al., "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993.

2.   B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, "Waste Management", Springer, 1994.

REFERENCES:

1.   Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000

2.   R.E.Landreth and P.A.Rebers, "Municipal Solid Wastes - problems and Solutions", Lewis Publishers, 1997.

3.   Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, 1993.

CE 2657   MODERN CONSTRUCTION MATERIALS

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PREREQUISITES   **Nil**

GOAL

To educate students on protective, preventive and corrective actions, to be taken in a building with regards to various materials, details and stages in construction, for comprehensive understanding of practices to cover water proofing, types of insulation, covering, paints and enamels.

OBJECTIVES

The course should enable the students to :

•   Understand the various materials and membranes for water- proofing their method of application depending on the context like basements, floors and terraces, through detail drawing.

•   Study the heat transfer into buildings by various materials, their properties, uses and methods of application in floors, walls and roofs, through detail drawing.

- Enable the students understand the importance acoustical or sound treatment in building through use of various boards, quilts, and mats available in the market, their properties and uses for contextual applications.

- Understand the various floor and wall finishing materials, their properties, method of laying and making them to adopt for barrier free environment, through detail drawing.

- Understand the properties, uses and applications of various paints, enamels, emulsions, varnishes and their varieties for contextual application in buildings.

OUTCOME

The students should be able to:

- Able to make proper choice of material for water proofing for different applications.

- Aware of process of heat transfer; in various materials & can make proper choice of thermal constructive material.

- Gain knowledge in various acoustic insulation materials & its importance.

- Make proper choice of floor & wall finishing materials & aware of proper method of laying.

- Gain knowledge of paint, enamels, and varnishes & make proper choice for contextual application in buildings.

UNIT I   DAMP AND WATER PROOFING   9

Damp proofing- hot applied and cold applied- Emulsified asphalt, Bentonite clays, butyl rubber, silicon, vinyl's Epoxy resins and metallic water proofing materials properties, uses.(Water proofing membranes such as rag, asbestos, glass, felt- plastic and synthetic rubber- vinyl, butyl rubber, neoprene polyvinyl chloride (PVC)- Application of the above under various situations- basement floors, swimming pool, terraces, etc.

UNIT II   THERMAL INSULATION   9

Heat transfer and heat gain by materials- vapor barriers and rigid insulation- properties and uses of spun glass, foamed glass, cork, vegetable fibers,mineral fibers, foamed plastics, and vermiculite and glass fibers. Gypsum- manufacture, properties and uses, plaster of paris and hydride gypsum.

UNIT III   ACOUSTIC INSULATION   9

Porous, Baffle and perforated materials such as acoustic plastic, acoustic tiles, wood, partial board, fiber board, cork, quilts and muts- Brief study on properties and uses of the above- current developments.

UNIT IV   FLOOR AND WALL COVERINGS   9

Floor coverings- flooring- softwood, hardwood- Resilient flooring- terrazzo- properties, uses and laying. Wall coverings - Porcelain, enameled metal, wood veneer, Vinyl, plastic surfaced paneling - properties uses and lying. Wall and floor tiles- Ceramic glazed mosaic, quarry and cement files- properties uses and lying. Market study of current developments.

UNIT V   PROTECTIVE AND DECORATIVE COATINGS   9

Paints - Enamels, distempers, plastic emulsions, cement based paints- properties, uses and applications- defects in painting, varnishes, special purpose paints- luminous & fire retardant paints, properties, uses & application.

TOTAL = 45

TEXT BOOKS

1.   S.C.Rangwala, "Building Construction" , Charotar Publishing House, Anand, India, 2008.

2.   B.C.Punmia, "Building Construction", Laxmi Publications Pvt. Ltd., New Delhi, 1993.

3.   Francis. D. K. Ching, "A Visual Dictionary of Architecture", Van Nostrand Reinhold - 1997.

4.   Arora S.P. and Bindra S.P., Building Construction Planning Techniques and Method of Construction, Dhanpat Rai Sons, 1997.

REFERENCES

1.   Jack M.Launders, "Construction Materials, Methods", Careers pub, J.Holland, Illinois Wileox Co., Inc. 1983.

2.   Arthur R.Llons, "Materials for architects and builders An introduction", Holder Headline group, Great Britain, 1997.

3.   Don.A.Watson, "Construction Materials and Processes", McGraw-Hill Book Co., 1972

CE 2751 TRAFFIC ENGINEERING MANAGEMENT

L T P C
3 0 0 3

PREREQUISITES   CE 2602, CE 2702

GOAL

To explore the students how to provide for the safe, rapid, comfortable, convenient, economical and environmentally compatible movement of people and goods.

OBJECTIVES

The course should enable the students to :

• Study the various components of Traffic Engineering.

• Familiarize with   traffic surveys and their analysis.

• Understand the aids to control traffic.

• Understand the principles involved in the geometric design of Intersection.

• Get the concepts of Traffic management.

OUTCOME

The students should be able to:

• Describe the road, traffic and land use characteristics.

• Describe different components of traffic survey and analayse it.

• Design Traffic signals and its co-ordination using the knowledge obtained about the computer applications in signal design.

• Design the Intersections.

• Develop the skill on Traffic Management and Traffic Forecasting techniques and the Intelligence Transport System.

UNIT I   INTRODUCTION   9

Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering - Road, Traffic and Land Use Characteristics.

UNIT II   TRAFFIC SURVEYS AND ANALYSIS   9

Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrain Studies, Accident Studies and Safety Level of Services - Problems.

UNIT III TRAFFIC CONTROL 9

Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design.

UNIT IV GEOMETRIC DESIGN OF INTERSECTIONS 9

Conflicts at Intersections, Classification of Intersections at Grade. - Channelized and Unchannelized Intersection - Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Channelization and Rotary design (Problems), Grade Separators.

UNIT V TRAFFIC MANAGEMENT 9

Traffic Management - Traffic System Management (TSM) and Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS).

TOTAL = 45

TEXT BOOKS:

1. Khanna K and Justo C E F, Highway Engineering, Khanna Publishers, Roorkee, 2001.

2. Kodiyali I.R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.

REFERENCES:

1. Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management.

2. Guidelines of Ministry of Road Transport and Highways, Government of India.

3. Subhash C. Saxena, A. Course in Traffic Planning and Design, Dhapat Rai Publications, New Delhi, 1989.

CE 2752 PRESTRESSED CONCRETE

L T P C
3 0 0 3

PREREQUISITES   CE 2402, CE 2503

GOAL

To posses the students with knowledge about behaviour, analysis and design requirements for prestressed concrete members according to Indian design code requirements.

OBJECTIVES

The course should enable the students to :

• Understand the basic concepts of prestressing.

• Be acquainted with the codal provision for the design of prestressed concrete elements.

• Understand the principles involved in the design of tensioned bridge decks.

• Have comprehensive design knowledge about circular prestressing.

• Understand the design concepts of pressure composite constructions.

Outcome

The students should be able to:

• Describe the systems and methods of prestressing and find the deflection of prestressed elements.

• Design the prestressed concrete elements as per the codal provisions.

• Design prestressed concrete tanks, poles and sleepers.

• Find the flexural and shear strength of prestressed concrete composite members.

• Design pretensioned and post tensioned concrete bridge decks.

UNIT I   INTRODUCTION - THEORY AND BEHAVIOUR   **9**

Basic concepts - Advantages - Materials required - Systems and methods of prestressing - Analysis of sections - Stress concept - Strength concept - Load balancing concept - Effect of loading on the tensile stresses in tendons - Effect on tendon profile on deflections - Factors influencing deflections - Calculation of deflections - Short term and long term deflections - Losses of prestress - Estimation of crack width

UNIT II   DESIGN   **9**

Flexural strength - Simplified procedures as per codes - strain compatibility method - Basic concepts in selection of cross section for bending - stress distribution in end block, Design of anchorage zone reinforcement - Limit state design criteria - Partial prestressing - Applications.

UNIT III CIRCULAR PRESTRESSING   **9**

Design of prestressed concrete tanks - Poles and sleepers

UNIT IV COMPOSITE CONSTRUCTION   **9**

Analysis for stresses - Estimate for deflections - Flexural and shear strength of composite members

UNIT V PRE-STRESSED CONCRETE BRIDGES   **9**

General aspects - pretension prestressed bridge decks - Post tensioned prestressed bridge decks - Advantages over R.C. bridges - Principles of design only

                            TOTAL = 45

TEXT BOOKS:

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi 2011

2. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH publishing Co.Pvt. Ltd. 1997.

REFERENCES:

1. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990

2. Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995.

3. David A.Sheppard, William R. and Philips, Plant Cast precast and prestressed concrete - A design guide, McGraw Hill, New Delhi 1992.

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CE 2753 FINITE ELEMENT ANALYSIS

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PREREQUISITES   CE 2501

GOAL

To posses the students with knowledge about basic finite-element theory, computer implementation of this theory, and its practical applications.

OBJECTIVES

The course should enable the students to :

• Understand finite-element analysis modeling and various methods involved in it.

• Understand the concepts of finite element analysis of one dimensional problem.

• Get knowledge on finite element formulation of two dimensional elements through generalized coordinates approach.

• Study about Isoparametric elements and formulation of element equations.

• Study about finite element analysis of problems related to field applications.

OUTCOME

The students should be able to:

* Solve simple problems using Ritz method and weighted residuals method.

* Discretize one dimensional elements, formulate the element equation and find the solution of equation using cholesky method.

* Discretize the two dimensional elements using triangular and quadrilateral elements, assemble element. matrices and find solution for different boundary conditions.

* Describe the Isoparametric elements and formulate element equations in one and two dimensions.

* Apply finite element analysis for field applications such as Heat - transfer, Fluid flow etc.,

UNIT I   INTRODUCTION - VARIATIONAL FORMULATION   9

General field problems in Engineering - Modelling - Discrete and Continuous models - Characteristics - Difficulties involved in solution - The relevance and place of the finite element method - Historical comments - Basic concept of FEM, Boundary and initial value problems - Gradient and divergence theorems - Functionals - Variational calculus - Variational formulation of VBPS. The method of weighted residuals - The Ritz method.

UNIT II   FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS   9

One dimensional second order equations - discretization of domain into elements - Generalised coordinates approach - derivation of elements equations - assembly of elements equations - imposition of boundary conditions - solution of equations - Cholesky method - Post processing - Extension of the method to fourth order equations and their solutions - time dependant problems and their solutions - example from heat transfer, fluid flow and solid mechanics.

UNIT III   FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS   9

Second order equation involving a scalar-valued function - model equation - Variational formulation - Finite element formulation through generalised coordinates approach - Triangular elements and quadrilateral elements - convergence criteria for chosen models - Interpolation functions - Elements matrices and vectors - Assembly of element matrices - boundary conditions - solution techniques.

UNIT IV ISOPARAMETRIC ELEMENTS AND FORMULATION   9

Natural coordinates in 1, 2 and 3 dimensions - use of area coordinates for triangular elements in - 2 dimensional problems - Isoparametric elements in 1,2 and 3 dimensional - Largrangean and serendipity elements - Formulations of elements equations in one and two dimensions - Numerical integration.

UNIT V   APPLICATIONS TO FIELD PROBLEMS IN TWO DIMENSIONALS   9

Equations of elasticity - plane elasticity problems - axisymmetric problems in elasticity - Bending of elastic plates - Time dependent problems in elasticity - Heat - transfer in two dimensions - incompressible fluid flow.

TOTAL = 45

TEXT BOOK:

1. Chandrupatla, T.R., and Belegundu, A.D., "Introduction to Finite Element in Engineering", Third Edition, Prentice Hall, India, 2003

REFERENCES:

1. J.N.Reddy, "An Introduction to Finite Element Method", McGraw-Hill, Intl. Student Edition, 1985.

2. Zienkiewics, "The finite element method, Basic formulation and linear problems", Vol.1, 4/e, McGraw-Hill, Book Co.

3. S.S.Rao, "The Finite Element Method in Engineering", Pergaman Press, 2003.

4. C.S.Desai and J.F.Abel, "Introduction to the Finite Element Method", Affiliated East West Press, 1972.

CE 2754 WATER RESOURCES ENGINEERING

L T P C
3 0 0 3

PREREQUISITES   CE 2303, CE 2505

GOAL

To expose the students with the National water policy and reservoir planning and management.

OBJECTIVES

The course should enable the students to:

- Get exposure to economics of water resources planning and National water policy.

- Impart knowledge on the analysis of hydrologic data.

- Know about estimation of water requirement, water budget and development plan.

- Be familiar with reservoir planning and management.

- Understand the benefits of cost Analysis and discounting techniques.

OUTCOME

The students should be able to:

- Describe the water resources in India and Tamil Nadu and the meteorological and hydrological data for water resources development.

- Analyse the hydrologic data.

- Make estimation of water requirement for irrigation , drinking and navigation and also development plan.

- Gain knowledge about reservoir planning and its management.

- Be acquainted with the various economic analysis techniques.

UNIT I GENERAL 9

Water resources survey - Water resources of India and Tamilnadu - Description of water resources planning - Economics of water resources planning, physical and socio economic data - National Water Policy - Collection of meteorological and hydrological data for water resources development.

UNIT II NETWORK DESIGN 9

Hydrologic measurements - Analysis of hydrologic data - Hydrologic station network - Station network design - Statistical techniques in network design.

UNIT III WATER RESOURCE NEEDS 9

Consumptive and non-consumptive water use - Estimation of water requirements for irrigation, for drinking and navigation - Water characteristics and quality - Scope and aims of master plan - Concept of basin as a unit for development - Water budget and development plan.

UNIT IV RESERVOIR PLANNING AND MANAGEMENT 9

Reservoir - Single and multipurpose - Multi objective - Fixation of Storage capacity -Strategies for reservoir operation - Sedimentation of reservoirs - Design flood-levees and flood walls - Channel improvement.

UNIT V ECONOMIC ANALYSIS 9

Estimation of cost and Evaluation of Benefits - Discount rate - Discounting factors - Discounting techniques - Computer Applications.

TOTAL = 45

TEXT BOOKS :

1. Linsley R.K. and Franzini J.B, "Water Resources Engineering", McGraw-Hill Inc, 2000.

2. Douglas J.L. and Lee R.R., "Economics of Water Resources Planning", Tata McGraw-Hill Inc. 2000.

3. Duggal, K.N. and Soni, J.P., "Elements of Water Resources Engineering", New Age International Publishers

REFERENCES :

1. Chaturvedi M.C., "Water Resources Systems Planning and Management", Tata McGraw-Hill Inc., New Delhi, 1997.

2. Goodman Alvin S., "Principles of Water Resources Planning", Prentice-Hall, 1984.

3. Maass et al. Design of Water Resources Systems, Macmillan, 1968.

CE 2755   PAVEMENT DESIGN AND ENGINEERING

L T P C
3 0 0 3

PREREQUISITES   CE 2602, CE 2702

GOAL

To introduce the students on various IRC guidelines for designing rigid and flexible pavements.

OBJECTIVES

The course should enable the students to :

- Understand the types of pavements and the stress distribution in them.
- Understand the methods of design of flexible pavements.
- Familiarize with the various methods of design of rigid pavements.
- Understand the pavement evaluation techniques and their maintenance.
- Get exposed to the pavement stabilization techniques.

OUTCOME

The students should be able to:

- Describe the various types of pavements, stress and deflections in pavements under repeated loading.
- Design the flexible pavement as per IRC.
- Design the rigid pavement as per IRC.
- Perform pavement evaluation by surface appearance and by deflection measurement.
- Choose the suitable soil stabilisers and Geo-synthetics for rural roads.

UNIT I   TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 9

Introduction - Pavement as layered structure - Pavement types - rigid and flexible -Stress and

deflections in pavements under repeated loading

UNIT II   DESIGN OF FLEXIBLE PAVEMENTS   9

Flexible pavement design - Empirical - Semi empirical and theoretical Methods - Design procedure as per latest IRC guidelines - Design and specification of rural roads

UNIT III DESIGN OF RIGID PAVEMENTS   9

Cement concrete pavements - Modified Westergaurd approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE   9

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection

Measurements, Present Serviceability Index]

Pavement maintenance. [IRC Recommendations Only]

UNIT V   STABILISATION OF PAVEMENTS   **8**

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control -Stabilisation for rural roads in India -use of Geo-synthetics (geo-textiles & geo-grids) in roads.

TOTAL = 45

TEXT BOOKS:

1.   Kadiyali, L.R., "Principles and Practice of Highway Engineering", Khanna tech. Publications, New Delhi, 2000.

2.   A. T. Papagiannakis, E. A. Masad ," Pavement Design and Materials "

3.   Wright, P.H., "Highway Engineers", John Wiley & Sons, Inc., New York, 1996

4.   Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001

REFERENCES:

1.   Yoder R.J and Witczak M.W., "Principles of Pavement Design", John Wiley, 1975.

2.   Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.

3.   Guideline for the Design of Rigid Pavements for Highways, IRC:58-1998, The Indian Roads Congress, New Delhi.

CE 2756   GROUND IMPROVEMENT TECHNIQUES

L T P C
3 0 0 3

PREREQUISITES

GOAL

To equip the students with latest available ground improvement techniques for Civil Engineering Structures.

OBJECTIVES

The course should enable the students to:

•   Understand the geotechnical problems in various types of soils and the suitable ground improvement techniques.

•   Be familiar with the various dewatering techniques that can be used in the soils with higher ground water level.

- To know the various techniques and procedures adopted for ground improvement.

- Understand the concept, types and applications of earth reinforcement.

- Gain knowledge about the various types, materials and techniques used for grouting

OUTCOME

The students should be able to :

- Assess the geotechnical problems in various types of soils and suggest suitable ground improvement techniques.

- Choose the suitable dewatering techniques for construction sites where the ground water table is at a higher level.

- Identify the apt ground improvement technique for various types of soils and site conditions.

- Apply the earth reinforcement techniques for retaining walls and slopes.

- Use the various types of grouting materials and techniques to strengthen the soil.

UNIT I   INTRODUCTION   **9**

Role of ground improvement in foundation engineering - methods of ground improvement - Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

UNIT II   DRAINAGE AND DEWATERING   **9**

Drainage techniques - Well points - Vacuum and electro osmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

UNIT III IN-SITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS   **9**

In-situ densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains - Stone columns - Lime piles - Installation techniques only - relative merits of various methods and their limitations.

UNIT IV EARTH REINFORCEMENT   **9**

Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth - use of Geotextiles for filtration, drainage and separation in road and other works.

UNIT V GROUT TECHNIQUES   **9**

Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring - Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

TOTAL = 45

TEXT BOOK :

1. Purushothama Raj, P. "Ground Improvement Techniques", Tata McGraw-Hill Publishing Company, New Delhi, 1999.

REFERENCES :

1 Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.

2. Koerner, R.M., "Design with Geosynthetics", (3rd Edition) Prentice Hall, New Jersey, 2002

3. Jewell, R.A., "Soil Reinforcement with Geotextiles", CIRIA special publication, London, 1996

4. Das, B.M., "Principles of Foundation Engineering", Thomson Books / Cole, 2003.

CE 2757   DESIGN OF STEEL SKELETAL STRUCTURES

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3  0  0  3
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PREREQUISITES   CE 2401, CE 2502

GOAL

To introduce the students to the design of skeletal structures such as transmission line towers,steel monopoles,communication towers

OBJECTIVES

The course should enable the students to :

• Understand the design concepts of transmission line.

• Know about the design concepts of steel monopoles.

• Be familiar with the design concepts of communication towers.

• To understand the design concepts of steel frames for building.

• Be acquainted with the analysis and design of braced and unbraced frames.

OUTCOME

The students should be able to :

• Design the different types of Transmission line towers including the foundation as per codal provision.

• Design the tabular poles along with the foundation.

• Analyse the communication towers for wind loud and design its components as per codal provision.

• Analyze the steel space frames usingcomputer and design it as per codal provision.

• Analyse the braced and unbraced frames using computer and design as per codal provision.

UNIT I TRANSMISSION LINE TOWERS 9

Various components of transmission line towers - Types of transmission line towers -single circuit-double circuit - Load tree generation as per IS:802 - calculation of conductor loads - calculation of body wind forces- design of members - effective length of main legs - primary bracings - secondary bracings - Types of foundations - Design of simple tower foundations -Brief description on mandatory testing of towers.

UNIT II DESIGN OF STEEL MONOPOLES 9

Type of monopole steel structures - load tree generation for monopole structures - design of tubular poles - fabrication practices - design of monopole foundations.

UNIT III COMMUNICATION TOWERS 9

Communication towers - type - square base - triangular base - roof top towers with flat-sided members - circular pipe section - hybrid towers with flat sided and circular pipes. Types of antenna mountings GSM , dish - calculation of wind loads on antenna and on body of tower - Wind load calculation using IS:875-Part III - design of members as per IS:800(2007) foundation design on roof top.

UNIT IV SPACE FRAMES STRUCTURES 9

Types of medium and large span - spans and suitability of different schemes- flat and curved vaults - Design of simple double layered grid space frames - different type of connectors - wind load calculation as per IS:875 - analysis of simple space frames using computers - design using IS:800(2007).

UNIT V STEEL FRAMES FOR BUILDINGS 9

Types of steel frames for buildings - braced frames- unbraced frames - load carrying mechanism for braced and unbraced frames - stability design of plane frames with large gravity load - design of columns of braced and unbraced frames using formulae in IS:800(2007) - analysis of simple braced and unbraced frames using computer - Preliminary and final design of members - drift restrictions in frames structures for buildings etc.

TOTAL = 45

TEXT BOOKS:

1.   Dr.N.Subramanian," Principles of Space Structures", Wheeler Publishing Co. (1999)

2.   A.R.Santhakumar and S.S.Murthy, Transmission Line structures, Tata MCGraw- Hill (1992).

REFERENCES:

1.   IS:875 Part III

2.   IS 800 (2007) Indian Standard code of practice for general construction in steel.

3.   IS:802 - Code of Practice for the use of structural steel in overhead transmission line towers - Parts 1-3.

CE2758 CONCRETE TECHNOLOGY

L T P C
3 0 0 3

PREREQUISITES   CE 2203

GOAL

To impart knowledge about advanced concrete technology which would help the students to match their skills in materials understanding with the current requirements of the construction industry

OBJECTIVES

The course should enable the students to :

- Study about the properties of cement.

- Get exposure to different types of mineral admixture.

- Know about the mechanical properties of aggregates.

- Understand the concepts of mix proportioning of concrete.

- Study about the properties and durability of concrete.

OUTCOME

The students should be able to :

- Describe the manufacture and hydration process of cement.

- Chcose suitable retarders, air entraining agents, and plasticizers that should be used in concrete.

- Describe physical durability and chemical stability of aggregates.

- Execute mix proportioning of concrete and describe how the strength of concrete can be modified using fibers

- Describe the properties and durability of concrete.

UNIT I   CEMENT   9

Composition of OPC-Manufacture-Modified Portland cements-Hydration process of Portland cements-Structure of Hydrated cement Pastes

UNIT II   ADMIXTURES   9

Mineral admixtures-Slags-Pozolanas and Fillers-Chemical Admixtures-Solutes Retarders-Air Entraining Agents-Water proofing compounds-Plasticizers and Super Plasticizers

UNIT III AGGREGATES   9

Shape and Mechanical properties-Absorption and Physical durability-Chemical stability and packing Characteristics

UNIT IV FRESH CONCRETE   **9**

Workability-Mix proportioning-Mixes incorporating Fly-Ash Mixes for High performance concrete-Fibre reinforced concrete.

UNIT V PROPERTIES AND DURABILITY OF CONCRETE   **9**

Interfacial Transition zone-Fracture strength-Mechanical properties-High strength concrete-Shrinkage-Creep- Other properties.Basic consideration-Stability of constituents-Chemical Attack-Corrosion of Reinforcing steel.

TOTAL = 45

TEXT BOOK:

1.   Neville, A.M., "Properties of concrete ", 4th edition, Longman, In printed.

REFERENCES:

1.   Metha P.K. and Montreio P.J.M., "Concrete Structure Properties and Materials ", 2nd edition, Prentice Hall, 1998.

2.   Mindaas and Young, "Concrete ", Prentice Hall, 1998.

CE 2851   BRIDGE STRUCTURE

L T P C
3 0 0 3

PREREQUISITES   CE 2402, CE 2503, CE 2401, CE 2502

GOAL

To introduce the students to basic theory and concepts of design of steel, reinforced concrete and pre stressed concrete bridge design for IRC loading conditions

OBJECTIVES

The course should enable the students to :

•   Understand the design concepts of through type and deck type steel highway bridges.

•   Be familiar with the design concepts of Pratt type truss girder highway bridges and plate girder railway bridges.

•   Be acquainted with the design concepts of reinforced concrete slab bridges.

•   Study the design concepts of reinforced concrete girder bridges.

•   Be acquainted with the design techniques involved in prestressed concrete bridges.

OUTCOME

The students should be able to:

•   Design through type and deck type steel highway bridges for IRC loading.

•   Design the components of pratt type trusses girder and the components of plate girder including wind effects.

•   Design reinforced concrete bridges for IRC loading.

•   Design reinforced concrete tee beam bridges and balanced cantilever bridges.

•   Design the components of the prestressed concrete bridges such as girder section, end block etc.

UNIT I   INTRODUCTION   **9**

Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders.

UNIT II STEEL BRIDGES   **9**

Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

UNIT III REINFORCED CONCRETE SLAB BRIDGES   **9**

Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading.

UNIT IV REINFORCED CONCRETE GIRDER BRIDGES   **9**

Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

UNIT V PRESTRESSED CONCRETE BRIDGES   **9**

Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder - Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflection.

TOTAL = 45

TEXT BOOKS:

1.   Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 2007.

2.   Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 1997.

REFERENCE:

1.   Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi, 2000.

CE 2852 STORAGE STRUCTURES

L T P C
3 0 0 3

PREREQUISITES   CE 2401,CE 2402,CE 2502, CE 2503

GOAL

To introduce the student to basic theory and concepts of storage structures design and steel and concrete tanks, bunkers and silos.

OBJECTIVES

The course should enable the students to :

•   Understand the principles involved in the design of steel water tanks.

•   Be familiar with the design of concrete water tanks.

•   Be acquainted with the basic design concepts of steel bunkers and silos.

•   Understand the design concepts of steel bunkers and silos.

•   Understand the principles of circular prestressing.

OUTCOME

The students should be able to:

- Design the steel water tanks such as pressed water tank and water tanks with hemispherical bottom.

- Design concrete water tanks like elevated rectangular water tank, circular tank and under ground tanks.

- Apply the design concepts in the design of steel bunkers and silos.

- Design steel square bunker and steel cylindrical size.

- Design prestressed concrete circular water tanks.

UNIT I   STEEL WATER TANKS   15

Design of rectangular riveted steel water tank - Tee covers - Plates - Stays - Longitudinal and transverse beams - Design of staging - Base plates - Foundation and anchor bolts - Design of pressed steel water tank - Design of stays - Joints - Design of hemispherical bottom water tank - side plates - Bottom plates - joints - Ring girder - Design of staging and foundation.

UNIT II   CONCRETE WATER TANKS   15

Design of Circular tanks - Hinged and fixed at the base - IS method of calculating shear forces and moments - Hoop tension - Design of intze tank - Dome - Ring girders - Conical dome - Staging - Bracings - Raft foundation - Design of rectangular tanks - Approximate methods and IS methods - Design of under ground tanks - Design of base slab and side wall - Check for uplift.

UNIT III STEEL BUNKERS AND SILOS   5

Design of square bunker - Jansen's and Airy's theories - IS Codal provisions - Design of side plates - Stiffneners - Hooper - Longitudinal beams - Design of cylindrical silo - Side plates - Ring girder - stiffeners.

UNIT IV CONCRETE BUNKERS AND SILOS   5

Design of square bunker - Side Walls - Hopper bottom - Top and bottom edge beams - Design of cylindrical silo - Wall portion - Design of conical hopper - Ring beam at junction.

UNIT V PRESTRESSED CONCRETE WATER TANKS   5

Principles of circular prestressing - Design of prestressed concrete circular water tanks.

TOTAL = 45

TEXT BOOKS:

1.   Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 1998.

2.   Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1998.

CE 2853 TALL STRUCTURES

L T P C
3 0 0 3

PREREQUISITES   CE 2302, CE 2501

GOAL

To impart overall knowledge about the elements and systems with planning, analysis and design involved in Tall structures.

OBJECTIVES

The course should enable the students to :

• Understand the various aspects of planning of Tall buildings.

• Know the different types of loads considered in the analysis of Tall structures.

• Impart knowledge about the stability analysis of various structural systems.

• Introduce various structural systems used for the construction of Tall buildings.

• Understand the concepts of approximate analysis of Structural system.

OUTCOME

The students should be able to :

• Describe the various structural systems used in the construction of Tall structures.

• Capable of analyzing the tall structures using the computer based methods and approximate method of analysis.

• Execute stability analysis, overall buckling analysis of frames, Analysis for various secondary effects -such as Creep, Shrinkage and Temperature.

• Carry out approximate analysis of framed and shear wall structures.

• Describe High Rise Suspension system and Deep Beam system.

UNIT I   INTRODUCTION   9

The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading -Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

UNIT II   THE VERTICAL STRUCTURE PLANE   9

Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel - Frame Systems - Multi-storey Box Systems.

UNIT III COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDER LOAD   **9**

The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

UNIT IV APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS   **9**

Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading - Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

UNIT V OTHER HIGH-RISE BUILDING STRUCTURE   **9**

Deep Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High Rise Buildings - Capsule Architecture.

                                                   TOTAL = 45

TEXT BOOKS:

1. Taranath.B.S., Structural Analysis and Design of Tall Buildings, Mc Graw Hill 1998

2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 1991.

REFERENCES:

1. LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers", John Wiley, 1994.

2. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.

CE 2854 WIND ENGINEERING

L T P C
3 0 0 3

PREREQUISITES   CE 2701

GOAL

To posses the students with knowledge about the force generated on structure due to normal wind and gusts.

OBJECTIVES

The course should enable the students to :

* Understand the basic concepts of wind generation and flow.

* Understand the response of different type of structures to wind pressure.

* Understand the codal provisions for the safe design of high rise structures.

* Study the design concepts of towers and roof trusses

* Get exposure to wind tunnel experiments.

OUTCOME

The students should be able to:

* Analyse the structure for different wind load condition.

* Design the structure for the given wind force condition as per the codal provisions.

* Design the chimneys, towers and bridges

* Design towers and roof trusses for wind loading.

* Describe how the structural models can be tested in the wind tunnel and its uses.

UNIT I   INTRODUCTION   9

Terminology - Wind Data - Gust factor and its determination - Wind speed variation with height - Shape factor - Aspect ratio - Drag and lift.

UNIT II   EFFECT OF WIND ON STRUCTURES   9

Static effect - Dynamic effect - Interference effects (concept only) - Rigid structure - Aero elastic structure (concept only).

UNIT III   EFFECT ON TYPICAL STRUCTURES   9

Tail buildings - Low rise buildings - Roof and cladding - Chimneys, towers and bridges.

UNIT IV   APPLICATION TO DESIGN   9

Design forces on multi-storey building, towers and roof trusses.

UNIT V   INTRODUCTION TO WIND TUNNEL   **9**

Types of models (Principles only) - Basic considerations - Examples of tests and their use.

TOTAL = 45

TEXT BOOKS:

1.   Peter Sachs, "Wind Forces in Engineering, Pergamon Press, New York, 1992.

2.   Lawson T.V., Wind Effects on Buildings, Vols. I and II, Applied Science and Publishers, London, 1993.

REFERENCES:

1.   Devenport A.G., "Wind Loads on Structures", Division of Building Research, Ottowa, 1990.

2.   Wind Force on Structures - Course Notes, Building Technology Centre, Anna University, 1995.

CE 2855 INDUSTRIAL STRUCTURES

L T P C
3 0 0 3

PREREQUISITES   CE 2401, CE 2502

GOAL

To get exposed to the design of industrial structures and its functional requirements

OBJECTIVES

The course should enable the students to :

•   Familiarize with planning and layout of buildings and its components.

•   Know about the functional requirements of industries.

•   Understand the design concepts of steel storage structures.

•   Understand the design concepts of concrete storage structures.

•   Study the general principles of prefabrication and the functional requirements for Precast concrete units.

OUTCOME

The students should be able to :

•   Describe the general requirements for industries like cement, chemical and steel plants.

•   Describe the functional requirements such as lighting, ventilation and fire safety of industries.

•   Design the steel storage structures like bunkers and silos.

•   Design the concrete storage structures like bunkers and silos.

•   Describe the functional requirements of Precast concrete units.

UNIT I   PLANNING   **9**

Classification of Industries and Industrial structures - General requirements for industries like cement, chemical and steel plants - Planning and layout of buildings and components.

UNIT II   FUNCTIONAL REQUIREMENT   **9**

Lighting - Ventilation - Accounts - Fire safety - Guidelines from factories act.

UNIT III   DESIGN OF STEEL STRUCTURES   **9**

Industrial roofs - Crane girders - Mill buildings - Design of Bunkers and Silos

UNIT IV   DESIGN OF R.C. STRUCTURES   **9**

Silos and bunkers - Chimneys - Principles of folded plates and shell roofs

UNIT V   PREFABRICATION   **9**

Principles of prefabrication - Pre stressed precast roof trusses- Functional requirements for Precast concrete units

                                                       TOTAL = 45

TEXT BOOKS

1.   P.Dayaratnam - Design of Steel Structure - S. Chand and Company, 2008.

2.   P. Purushothaman Reinforced Concrete Structural elements - Tata McGraw Hills,1984

REFERENCES

1.   Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995

2.   Handbook on Functional Requirements of Industrial buildings, SP32 - 1986, Bureau of Indian Standards, New Delhi 1990

3.   Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982

4.   Koncz, J, Manual of Precast Construction Vol I & II Bauverlay GMBH, 1971.

CE 2856   PRE-FABRICATED STRUCTURES

L T P C
3 0 0 3

PREREQUISITES   CE 2402, C E 2503, CE 2401

GOAL

To impart knowledge on modular construction, industrialized construction and to design some of the pre-fabricated elements and also have the knowledge on the construction methods using these elements.

OBJECTIVES

The course should enable the students to :

- Know about modular coordination, production ,transportation and erection of pre-fabricated structures.

- Get knowledge on the construction of prefabricated components.

- Familiarize with the design of prefabricated members.

- Get knowledge on the prefabricated structural connection.

- Get acquainted with the design procedures of prefabricated structures under earthquake and cyclone loading.

OUTCOME

The students should be able to:

- Describe about the modular construction.

- Describe the procedures involved in the construction of prefabricated components such as roof, floor slab, wall panels & shear walls.

- Design prefabricated structural members.

- Design the connections for prefabricated members.

- Design prefabricated structural components when subjected to earthquake and cyclone loading.

UNIT I   INTRODUCTION   **9**

Need for prefabrication - Principles - Materials - Modular coordination - Standardization - Systems - Production - Transportation - Erection.

UNIT II   PRE-FABRICATED COMPONENTS   **9**

Behaviour of structural components - Large panel constructions - Construction of roof and floor slabs - Wall panels - Columns - Shear walls

UNIT III   DESIGN PRINCIPLES   **9**

Disuniting of structures- Design of cross section based on efficiency of material used - Problems in design because of joint flexibility - Allowance for joint deformation.

UNIT IV   JOINT IN STRUCTURAL MEMBERS **9**

Joints for different structural connections - Dimensions and detailing - Design of expansion joints

UNIT V   DESIGN FOR ABNORMAL LOADS **9**

Progressive collapse - Code provisions - Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

TOTAL = 45

TEXT BOOKS:

1.   CBRI, Building materials and components, India, 1990

2.   Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994

REFERENCES:

1.   Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.

2.   Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.

CE 2857   DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES

L T P C
3 0 0 3

PREREQUISITES   CE 2402, CE 2503, CE2401, CE 2502

GOAL

To make the students to understand the principles involved in the analysis and design of steel concrete composite structures.

OBJECTIVES

The course should enable the students to :

•   Understand the concepts of limit state design of steel concrete composite structures.

•   Get exposure in the design concepts of steel concrete composite beams.

•   Familiarize with the design concepts of   steel concrete composite trusses and columns.

•   Understand the design concepts of steel- concrete composite box girder bridges.

•   Know about the seismic behaviour of composite structures.

OUTCOME

The students should be able to:

•   Describe the principles involved in the limit state design of steel concrete composite structures.

•   Design the steel concrete composite beam with deck slabs.

- Design the steel concrete composite columns.

- Design the composite box girders.

- Describe the seismic behaviour of composite structures.

UNIT I   INTRODUCTION   9

Review of Limit State Design of steel columns and beams - Introduction to steel concrete composite structures - concepts and Theory - Typical shear connectors and interaction with concrete - Tests for strength of shear connections.

UNIT II   DESIGN OF COMPOSITE BEAMS   9

Ultimate behaviour of simply supported and continuous steel - concrete composite beams with solid deck slabs and profiled deck slabs.

UNIT III   DESIGN OF COMPOSITE TRUSSES AND COLUMNS   9

Behaviour and design of steel concrete composite Trusses - Shear connection details - Design of Steel concrete columns.

UNIT IV   COMPOSITE BOX GRIDER BRIDGES   9

Introduction to behaviour of box girder bridges - Design concepts.

UNIT V   GENERAL   9

Introduction to steel concrete sandwich construction - Seismic behavior of composite structures - case studies on steel-concrete composite construction in buildings.

TOTAL = 45

TEXT BOOK :

1.   Johnson R.P., Composite Structures of Steel and Concrete, Blackwell Scientific Publications (Second Edition), UK, 1994.

REFERENCES:

1.   Teaching Resource on Structural Steel Design - Vol II

2.   Appropriate of IS British and Euro Codes.

CE2858   REPAIR AND REHABILITATION OF STRUCTURES

L T P C
3 0 0 3

PREREQUISITES   **CE 2203, CE 2758**

GOAL

To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

OBJECTIVES

The course should enable the students to :

- Understand the causes for distress in reinforced concrete structures, the methods of maintenance, inspection and damage assessment procedure.

- Be familiar with the quality assurance procedure for concrete, construction errors, corrosion and climatic effects.

- Understand the repair materials and repair techniques

- Learn the strengthening techniques used for concrete structures subjected to weathering corrosion, wear, fire, leakage and marine exposure..

- Be familiar with the Engineered demolition techniques for Dilapidated structures.

OUTCOME

The students should be able to:

- Assess the distressed structures, conduct field monitoring and non-destructive evaluation of concrete structures and maintain the structures.

- Appreciate the mechanisms of degradation of concrete structures, the durability aspects and the quality assurance procedure for durable concrete structures.

- Select the suitable repair materials and adopt the appropriate repair techniques.

- Select the suitable strengthening technique for concrete structures subjected to weathering corrosion, wear, fire, leakage and marine exposure..

- Have knowledge of demolition procedures used for Dilapidated structures.

UNIT I   MAINTENANCE AND REPAIR STRATEGIES   8

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedures for evaluating a damaged structure. Causes of deterioration.

UNIT II   SERVICE ABILITY AND DURABILITY OF CONCRETE   12

Quality assurance for concrete construction concrete properties - strength, permeability, thermal properties and cracking - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking.

UNIT III   MATERIALS AND TECHNIQUES FOR REPAIR   15

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning, Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection.

UNIT IV   REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES   6

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

UNIT V   DEMOLITION TECHNIQUES   4

Engineered demolition techniques for Dilapidated structures - case studies

TOTAL = 45

TEXT BOOKS :

1.   A.R.Santha Kumar, " Concrete Technology", Oxford University Press India, 2007

2.   R.T. Allen and S.C. Edwards, Repair of Concrete Structures, Blakie and Sons, UK, 1987.

REFERENCES:

1.   M.S. Shetty, Concrete Technology - Theory and Practice, S. Chand and Company, New Delhi, 4th edition, 2000.

2.   Santhakumar, A.R., Training Course notes on Damage Assessment and repair in Low Cost Housing, "RHDC-NBO" Anna University, July 1992.

3.   Lakshmipathy, M. et al. Lecture notes of Workshop on "Repairs and Rehabilitation of Structures", 29 - 30th October 1999.