BAPATLA ENGINEERING COLLEGE
(*Autonomous*)
BAPATLA - 522 101.

SCHEME & SYLLABI for B.Tech.
CIVIL ENGINEERING
I-IV Year (Semester I & II)

Academic Rules & Regulations

(Effective for students admitted into

first year B.Tech.

from the academic year 2010-2011).

1.0 EXTENT: All the rules and regulations, specified herein after shall be read as a whole for the purpose of interpretation and when a doubt arises, the interpretation of the Chairman, Academic Council, Bapatla Engineering College (Autonomous) is final. As per the requirements of the Statutory Bodies, Principal, Bapatla Engineering College (Autonomous), shall be the Chairman of the College Academic Council.

2.0 ADMISSIONS:

2.1 **Admission to first year of any Four Year B.TechProgrammes of study in Engineering:** Admissions into first year of B.TechProgramme of Bapatla Engineering College (Autonomous) (***Subsequently referred to as*** **B.E.C**) will be as per the norms stipulated by AcharyaNagarjuna University & Govt. of Andhra Pradesh.

2.2 **Admission to the Second year of any Four year B.TechProgramme of study in Engineering:** Admissions into second year of B.TechProgramme of B.E.C will be as per the norms stipulated by AcharyaNagarjuna University & Govt. of Andhra Pradesh.

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

1) When a student seeks transfer from other colleges to B.E.C and desires to pursue study at B.E.C in an eligible branch of study.
2) When students of B.E.C get transferred from one regulation to another regulation or from previous syllabus to revised syllabus.
3) When a student after long discontinuity rejoins the college to complete his Programme of study for the award of a degree.
4) When a student is not able to pursue his/her existing Programme of study but wishes to get transferred to another Programme of study.

These admissions may be permitted by the Academic Council of B.E.C as per the norms stipulated by the statutory bodies and the Govt. of Andhra Pradesh. In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Programme of study at B.E.C will be governed by the transitory regulations given in ***5.3.***

3.0 DURATION OF THE PROGRAMME AND MEDIUM OF INSTRUCTION: The duration of the B.Tech. Programme is four academic years consisting of two semesters in each academic year. The medium of instruction and examination is English.

4.0 MINIMUM INSTRUCTION DAYS: Each semester shall consist of a minimum of 110 working days which includes instruction, term examinations and final examinations.

5.0 B.Tech. Programmes of study:

5.1 The Four year B.TechProgramme is offered in the following branches of study:

1) Biotechnology.
2) Chemical Engineering.
3) Civil Engineering.
4) Computer Science & Engineering.
5) Electrical & Electronics Engineering.
6) Electronics & Communication Engineering.
7) Electronics & Instrumentation Engineering.
8) Information Technology.
9) Mechanical Engineering.

5.2 Structure of the Programme:

5.2.1 Each Programme of a Discipline or branch of study shall consist of:

1) General core courses in Basic Sciences, Engineering Sciences, Humanities, Mathematics and Management.
2) Interdisciplinary courses in Engineering, to impart the fundamentals of Engineering to the student.
3) Compulsory core courses to impart broad based knowledge needed in the concerned branch of study.
4) Elective courses from either discipline or interdisciplinary areas to be taken by the student based on his/her interest and specialization preferred.
5) A Term paper and a Project approved by the Department to be submitted in the fourth year of study.

Every Programme of study shall be designed to have 45-50 theory courses and 20-25 laboratory courses and the distribution of types of courses from the above is indicated in the following table.

General Core courses	20 -35%
Interdisciplinary courses in engineering	15-25%
Compulsory Core courses in the branch of study	45-55%
Elective Courses	10-15%

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

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

5.2.3 Credits: Credits are assigned to each course as per norms mentioned in the following table.

Subject	Credits
Theory Course (3 Theory Periods/Week)	03
Theory Course (More than 3 Theory Periods/Week)	04
Laboratory Course	02
Term paper	02
Final year Project	10

5.3 Transitory Regulations: For students admitted under advance standing (mentioned in 2.3) these transitory regulations will provide the *modus operandi*.

At the time of such admission, based on the Programme pursued (case by case)

1) Equivalent courses completed by the student are established by the BOS concerned.
2) Marks/Credits are transferred for all such equivalent courses and treated as successfully cleared in the Programme of study prescribed by B.E.C.
3) A Programme chart of residual courses not cleared will be derived and a Programme of study with duration specified will be prescribed for pursuit at B.E.C.
4) Marks obtained in the previous system if the case be, are converted to grades and CGPA is calculated.

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

5.4 **Curriculum for each Programme of study**:

1) The Four year curriculum of any B.TechProgramme of study in any branch of engineering is formulated based on the guidelines mentioned in 5.2 and will be recommended by the concerned Board of Studies and is approved by the Academic council of the college.
2) In case of students admitted under lateral entry, the respective regular curriculum contents from second year onwards are to be pursued by them.
3) In case of students admitted under advanced standing, the Programme curriculum will be prepared by the concerned Board of Studies and the Academic Council has to approve the same.
4) After approval from the Academic Council, Programme curriculum for the same shall be prepared and made available to all the students along with the academic regulations.

5.5 The Maximum duration permitted and cancellation of admission:

5.5.1 The maximum duration permitted for any student to successfully complete any four year B.Tech. Programme of study shall be:

1) Eight academic years in sequence from the year of admission for a normal student admitted into first year of any Programme and
2) Six academic years in sequence from the year of admission for a Lateral entry student admitted into second year of any Programme and
3) For students admitted with advanced standing, the maximum time for completion of Programme study shall be twice the period in terms of academic years in sequence, stipulated in the Programme curriculum defined at the time of admission.

5.5.2 In case, any student fails to meet the applicable conditions for the eligibility of degree in the maximum stipulated period as in ***5.5.1***, his/her admission stands cancelled.

6.0 EXAMINATION SYSTEM & EVALUATION:

6.1 The performance of the students in each semester shall be assessed course wise. All assessments will be done on absolute mark basis. However, for the purpose of reporting the performance of a candidate, letter grades and grade points will be awarded as per section ***11.0.*** The performance of a student in each course is assessed with assignment tests, term examinations on a continuous basis during the semester called Continuous Assessment (CA)and a Final Examination (FE) conducted at the end of the semester. For each theory, design and/or drawing course, there shall be a comprehensive Final Examination (FE) of three hours duration at the end of each Semester, except where stated otherwise in the detailed Scheme of Instruction.

6.2 The distribution of marks between Continuous Assessment(CA) and Final Examination(FE) to be conducted at the end of the semester will be as follows:

Nature of the course	CA	FE
Theory subjects	40	60
Drawing	40	60
Practicals	40	60
Term Paper	40	60
Project work	50	100

6.3 Continuous Assessment (CA) in Theory and Drawing subjects:

1) Ineach Semester there shall be two Term examinations and two Assignment Tests in every theory course. The duration of the Assignment Test shall be 45 minutes and that of the Term Examination shall be 90 minutes. Assignment sheets shall be given at least one week in advance of the commencement of the tests. Students shall answer the question(s) [or question(s) similar in model] from the Assignment sheet stapled to or printed on the script which is distributed in the examination hall.

   The Term Examination is conducted in the regular mode according to a schedule which will be common for a particular year of study. The maximum weightage for Term Examinations, Assignment Tests and the calculation of marks for CA in a theory course is given in the following table.

Weightage for different heads to calculate CA for 40 marks in a Theory course			
	Term Exams (Max. 20 marks)	Assignment Tests (Max. 15 marks)	Attendance (Max. 5 marks)
Better Performed test/exam	13	10	5
Other test/exam	7	5	

2) For drawing courses, there shall be only two Term examinations in a semester with no Assignment Tests. In case of such courses a maximum of 15 marks shall be given for day-to-day class work and a maximum of 20 marks shall be awarded to the Term examinations taking into account the performance of both the Term examinations giving

weightage of 13 marks for the Term Examination in which the student scores more marks and the remaining 7 marks for the other term examination.

3) A maximum weightage of 5 marks will be given in the CA for attendance in all theory and drawing courses as indicated in ***7.1.1.***

6.4 Final Examination (FE) in Theory and Drawing subjects:

1) For each theory, design and/or drawing course, there shall be a comprehensive Final Examination (FE) of three hours duration at the end of each Semester for 60 marks, except where stated otherwise in the detailed Scheme of Instruction. Question paper setting shall be entrusted to external examiners from the panels approved by the respective Boards of Studies.

2) A minimum of 24 marks (40%) are to be secured exclusively in the final examination (FE) of theory/drawing course and a minimum total of 40 marks in FE and CA put together in a theory / drawing course is to be secured in order to be declared as passed in that course and for the award of the grade in the course.

6.5 Continuous Assessment (CA) in laboratory courses:

1) The evaluation for Laboratory course is based on CA & FE. The CA for 40 marks comprises of 20 marks for day to day laboratory work, 5 marks for record submission and 15 marks for a laboratory examination at the end of the semester.
2) In any semester, a minimum of 90 percent of prescribed number of experiments / exercises specified in the syllabi for laboratory course shall be taken up by the students. They shall complete these experiments / exercises in all respects and get the record certified by the concerned internal lab teacher and the Head of the Department to be eligible to appear for the Final Examination in that laboratory course.

6.6 Final Examination (FE) in laboratory courses:

1) For each laboratory course, the final examination (FE) shall be conducted by one internal and one external examiner appointed by the Principal and the duration of the exam shall be for three hours. The FE is for 60 marks which include 30 marks for a lab experiment/exercise, 20 marks for Viva-voce and 10 marks for the certified record.
2) A minimum of 30 marks (50%) shall be obtained in FE and a minimum total of 40 marks in FE and CE put together in a laboratory course are to be secured in order to be declared as passed in the laboratory course and for the award of the grade in that laboratory course.

6.7 Evaluation of term paper:

1) A term paper is to be submitted by each student in the 7th semester which would be a precursor to the project work to be done in the 8th semester. The evaluation is based on CA for 40 marks, which includes a minimum of two seminars/presentations for 20 marks and the report submitted at the end of the semester which is evaluated for 20 marks.
2) The final examination (FE) shall be conducted for 60 marks by one internal and one external examiner appointed by the Principal. The FE contains Viva-voce and the demonstration of the model developed or work performed as a part of the term paper.
3) A minimum of 30 marks (50%) shall be obtained in FE and a minimum total of 40 marks in FE and CE put together in the term paper are to be secured in order to be declared as passed in the term paper and for the award of the grade in the term paper.

6.8 Evaluation of Project:

1) In case of the Project work, the evaluation shall be based on CA and FE. The CA for 50 marks consists of a minimum of two Seminars/ presentations for 25 marks and the Project Report submitted at the end of the semester which is evaluated for 25 marks.
2) FE shall be in the form of a Viva- voce and the demonstration of the thesis work for 100 marks. Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the Principal. A minimum of 50 marks shall be obtained in FE exclusively and a minimum total of 60 marks in FE and CE put together are to be secured in order to be declared as passed in the Project and for the award of the grade.

6.9 A student who could not secure a minimum of 50% aggregate marks in CA of a semester is not eligible to appear for the Final Examinations conducted at the end of the semester and shall have to repeat that semester.

NOTE : A student who is absent for any Test / Exam / Seminar / Presentation as a part of Continuous Assessment (CA), for any reason whatsoever, shall be deemed to have scored zero marks in the respective component and no provision for make-up shall be provided.

7.0 ATTENDANCE REGULATIONS:

7.1 Regular course of study means a minimum average attendance of 75% in all the courses of study prescribed for a semester in the curriculum, computed by considering total number of hours / periods conducted in all courses as the denominator and the total number of hours / periods actually attended by the student in all courses, as the numerator.

7.1.1 A maximum of 5 marks weightage in CA in each theory/drawing course shall be given for those students who put in a minimum of 75% attendance in the respective theory/drawing course in a graded manner as indicated below:

Attendance of 75% and above but less than 80%	1 mark
Attendance of 80% and above but less than 85%	2 marks
Attendance of 85% and above but less than 90%	3 marks
Attendance of 90% and above	5 marks

7.2 Condonation of shortage in attendance may be recommended on genuine medical grounds, up to a maximum of 10% provided the student puts in at least 65% attendance as calculated in *7.1* above and provided the principal is satisfied with the genuineness of the reasons.

7.3 A student, who could not satisfy the minimum attendance requirements, as given above, in any semester, is not eligible to appear for the Final examinations and shall have to repeat that semester.

8.0 DETENTION: A student is said to have been detained and not allowed to appear for Final Examination(FE) at the end of the semester when

8.1 The student does not have a minimum 75% attendance or 65% attendance with condonation in all subjects put together in that semester or the student has not scored a minimum of 50% of marks in CA in all the courses of that semester put together.

Such a student shall have to repeat the same semester subsequently and satisfy the above requirements afresh to become eligible to appear for the Final Examination (FE), conducted at the end of the semester.

9.0 CONDITIONS FOR PROMOTION

9.1 A student not detained in the first semester of a year of study shall be promoted to second semester of that year of study.

9.2 A student shall be eligible for promotion to II year of B.Tech. Programme if he/she is not detained in the second semester of first year B.Tech. Programme irrespective of the number of backlog courses in I year B.Tech.

9.3 A student shall be eligible for promotion to III year of B.Tech. Programme if he/she is not detained in the second semester of II year B.Tech. Programme and has passed all but **three** courses of I year B.Tech. (including laboratory course).

9.4 A student shall be eligible for promotion to IV year of B.Tech. Programme if he/she is not detained in the second semester of III year B.Tech. Programme and has passed all but **three** courses of II B.Tech. (including laboratory course) and all but **one** course of I B.Tech. (including laboratory course).

10.0 Registration: Every eligible student (not detained and promoted) has to register himself /herself at the beginning of every semester indicating all the Courses taken up for pursuit by him/her during that Semester.

10.1 When a student is debarred for one or more semesters, his/her registration in the present semester is cancelled and the student is debarred from registering in future during the debarred period.

10.2 In any case while re registering in any semester, he or she will have to pay the requisite fee once again.

11.0 GRADING SYSTEM

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

Table: Grades & Grade Points

Grade	Grade points	% of Marks
O	10	90% and above
A+	9	80% – 89%
A	8	70% – 79%
B+	7	60% – 69%
B	6	50% – 59%
C	5	40% – 49%
F	Failed, 0	Less than 40%

11.2 A student who earns a minimum of 5 grade points (C grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course. **However it should be noted that a pass in any course/term paper/Project shall be governed by the rules mentioned in 6.0**.

12.0 GRADE POINT AVERAGE

12.1 The Grade Point Average (GPA) will be calculated according to the formula:

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

Where C_i = number of credits for the course *i*,

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

12.2 Semester Grade Point Average (SGPA) is awarded to candidates considering all the courses of the semester. Zero grade points are also included in this computation.

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

13.0 ELIGIBILITY FOR AWARD OF B.TECH. DEGREE: A student shall be eligible for award of the B.Tech degree if he/she fulfils all the following conditions;

1) Registered and successfully completed all the components prescribed in theProgramme of study to which he/she is admitted,
2) Obtained CGPA greater than or equal to 5.0 (Minimum requirements for Pass),Has no dues to the Institute, hostels, Libraries, NCC/NSS etc., and
3) No disciplinary action is pending against him/her.

14.0 AWARD OF CLASS: A candidate who becomes eligible for the award of B.Tech. Degree shall be placed in one of the following Classes based on CGPA.

Table: CGPA required for award of Degree

Distinction	**≥ 8.0***
First Class	**≥ 7.0**
Second Class	**≥ 6.0**
Pass	**≥ 5.0**

* In addition to the required CGPA of 8.0, the student must have necessarily passed all the courses of every semester **in the minimum stipulated period for the Programme**.

14.1 Grade Sheet: A grade sheet (Memorandum) will be issued to each student indicating his performance in all courses taken in that semester and also indicating the Grades and SGPA.

14.2 **Transcripts**: After successful completion of the total Programme of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee. Partial transcript will also be issued up to any point of study to any student on request and by paying the stipulated fee in force.

14.3 Candidates shall be permitted to apply for recounting/revaluation of FE scripts within the stipulated period with payment of prescribed fee.

14.4 The Governing body of B.E.C (Autonomous) has to approve and recommend to the AcharyaNagarjuna University for the award of a degree to any student.

15.0 IMPROVEMENT OF CLASS:

15.1 A candidate, after becoming eligible for the award of the Degree, may reappear for the Final Examination in any of the theory courses as and when conducted, for the purpose of improving the aggregate and the class. But this reappearance shall be within a period of two academic years after becoming eligible for the award of the Degree.
However, this facility shall not be availed of by a candidate who has taken the Original Degree Certificate. Candidates shall not be permitted to reappear either for CA in any course or for Final Examinations (FE) in laboratory courses (including Project Viva-voce) for the purpose of improvement.

16.0 SUPPLEMENTARY EXAMINATIONS: In addition to the Regular Final Examinations held at the end of each semester, Supplementary Final Examinations will be conducted during the academic year. Candidates taking the Regular / Supplementary examinations as Supplementary candidates may have to take more than one Final Examination per day. A student can appear for any number of supplementary examinations till he/she clears all courses which he/she could not clear in the first attempt. However the maximum stipulated period cannot be relaxed under any circumstances.

17.0 INSTANT SUPPLEMENTARY EXAMINATIONS: Candidates who fail in one theory course of 4th year 2nd semester can appear for Instant Supplementary Examination conducted after declaration of the revaluation results of the said exam.

18.0 MALPRACTICES: The Principal shall refer the cases of malpractices in Continuous Assessments (CA) and Final Examinations (FE) to an Enquiry Committee constituted by him / her. The Committee will submit a report on the malpractice committed by the student to the Principal. The Principal along with the members of the Committee is authorised to award a suitable punishment.

19.0 ADDITIONAL ACADEMIC REGULATIONS:

19.1 Any attempt to impress upon the teachers, examiners, faculty and staff of Examinations, bribing for either marks or attendance will be treated as malpractice.

19.2 When a student is absent for final examination, he/she is treated as to have appeared and obtained zero marks in that component and Grading is done so.

19.3 When a component of Continuous Assessment (CA) or Final Examination (FE) is cancelled as a penalty, he/she is awarded zero marks in that component.

20.0 AMENDMENTS TO REGULATIONS:

The Academic Council of Bapatla Engineering College (Autonomous) reserves the right to revise, amend or change the Regulations, Schemes of Examinations, and/ or Syllabi or any other matter pertained suitable to the needs of the students, society, industry without any notice.

BAPATLA ENGINEERING COLLEGE : BAPATLA
(Autonomous)
SCHEME OF INSTRUCTION & EXAMINATION
FOR
CIVIL ENGINEERING
w.e.f 2010-2011 (Semester System)

First Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
CE111/MA01	Mathematics - I	4	1		40	60	100	4
CE112/PH01	Engineering Physics – I	3	1		40	60	100	3
CE113/CY01	Engineering Chemistry – I	3	1		40	60	100	3
CE114/EN01	English Language and Communication	3	1		40	60	100	3
CE115/CE01	Engineering Mechanics	4	1		40	60	100	4
CE116/ME01	Engineering Graphics	3	3		40	60	100	3
CE151/PHL01	Physics Laboratory - I	-	-	3	40	60	100	2
CE152/CYL01	Chemistry Laboratory - I	-	-	3	40	60	100	2
CE153/MEL01	Work Shop	-	-	3	40	60	100	2
	Total	**20**	**8**	**9**	**360**	**540**	**900**	**26**

CA: Continuous Assessment **FE:** Final Examination

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First Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
CE121/MA02	Mathematics - II	4	1		40	60	100	4
CE122/PH02	Engineering Physics – II	3	1		40	60	100	3
CE123/CH02	Engineering Chemistry – II	3	1		40	60	100	3
CE124	Elements of Electrical and Mechanical Engineering	3	1		40	60	100	3
CE125	Environmental Studies	3			40	60	100	3
CE126/CS01	Computer Programming with C	4	1		40	60	100	4
CE161/PHCYL01	Physics &Chemistry Laboratory – II	-	-	3	40	60	100	2
CE162/ENL01	English Language Lab	-	-	3	40	60	100	2
CE163/CSL01	Computer Programming Lab	-	-	3	40	60	100	2
	Total	**20**	**5**	**9**	**360**	**540**	**900**	**26**

CA: Continuous Assessment **FE:** Final Examination

BAPATLA ENGINEERING COLLEGE : BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION

FOR

CIVIL ENGINEERING

w.e.f 2010-2011 (Semester System)

Second Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
CE211/MA03	Mathematics - III	4	-		40	60	100	4
CE212	Building Materials, Planning & Construction.	3	1		40	60	100	3
CE213	Surveying – I	4	1		40	60	100	4
CE214	Solid Mechanics - I	4	1		40	60	100	4
CE215	Fluid Mechanics	4	1		40	60	100	4
CE216	Engineering Geology	3	1		40	60	100	3
CE251	Engineering Geology Laboratory	-	-	3	40	60	100	2
CE252	Surveying Field Work – I	-	-	3	40	60	100	2
CE253	Building Drawing	-	-	3	40	60	100	2
	Total	**22**	**5**	**9**	**360**	**540**	**900**	**28**

CA: Continuous Assessment **FE:** Final Examination

BAPATLA ENGINEERING COLLEGE : BAPATLA
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SCHEME OF INSTRUCTION & EXAMINATION
FOR
CIVIL ENGINEERING
w.e.f 2010-2011 (Semester System)

Second Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
CE221	Professional Ethics and Human Values	3	1		40	60	100	3
CE222	Concrete Technology	3	1		40	60	100	3
CE223	Surveying - II	4	1		40	60	100	4
CE224	Solid Mechanics - II	4	1		40	60	100	4
CE225	Hydraulics & Hydraulic Machines	4	1		40	60	100	4
CE226	Environmental Engineering - I	4	-		40	60	100	4
CE261	Environmental Engineering Laboratory - I	-	-	3	40	60	100	2
CE262	Hydraulics & Hydraulic Machines Laboratory	-	-	3	40	60	100	2
CE263	Materials Testing Laboratory	-	-	3	40	60	100	2
	Total	**22**	**5**	**9**	**360**	**540**	**900**	**28**

CA: Continuous Assessment **FE:** Final Examination

BAPATLA ENGINEERING COLLEGE : BAPATLA
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SCHEME OF INSTRUCTION & EXAMINATION
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w.e.f 2010-2011 (First System)

Third Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
CE311	Structural Analysis - I	4	1		40	60	100	4
CE312	Water Resource Engineering-I	4	0		40	60	100	4
CE313	Design of Concrete Structures-I	4	1		40	60	100	4
CE314	Design of Steel Structures-I	4	1		40	60	100	4
CE315	Geo-Technical Engineering - I	4	-		40	60	100	4
CE316	Environmental Engineering - II	4	-		40	60	100	4
CE351	Soft Skills Laboratory	-	-	3	40	60	100	2
CE352	Geo-Technical Engineering Laboratory	-	-	3	40	60	100	2
CE353	Computer Applications in Civil Engineering Laboratory	-	-	3	40	60	100	2
	Total	**24**	**3**	**9**	**360**	**540**	**900**	**30**

CA: Continuous Assessment **FE:** Final Examination

BAPATLA ENGINEERING COLLEGE : BAPATLA
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SCHEME OF INSTRUCTION & EXAMINATION
FOR
CIVIL ENGINEERING
w.e.f 2010-2011 (Semester System)

Third Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
CE321	Structural Analysis - II	4	1		40	60	100	4
CE322	Water Resource Engineering-II	4	0		40	60	100	4
CE323	Design of Concrete Structures-II	4	1		40	60	100	4
CE324	Design of Steel Structures-II	4	1		40	60	100	4
CE325	Geotechnical Engineering - II	4			40	60	100	4
CE326	Elective - I	4	-		40	60	100	4
CE361	Surveying Field Work - II	-	-	3	40	60	100	2
CE362	Computer Aided Analysis and Design in Civil Engineering Laboratory	-	-	3	40	60	100	2
CE363	Design Practice Lab			3	40	60	100	2
	Total	**24**	**3**	**9**	**360**	**540**	**900**	**30**

CA: Continuous Assessment **FE:** Final Examination

Elective – I

CE326 (A): Remote Sensing and GIS

CE326 (B): Repair and Rehabilitation of Structures

CE326(C): Environmental Geotechnics

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Final Year B.Tech., (SEMESTER – I)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
CE411	Transportation Engineering - I	4	0	-	40	60	100	4
CE412	Structural Analysis - III	4	1	-	40	60	100	4
CE413	Estimation & Quantity Surveying	3	1	-	40	60	100	3
CE414	Pre-stressed Concrete	4	1	-	40	60	100	4
CE415	Elective - II	4	1	-	40	60	100	4
CE416	Open Elective	3	1	-	40	60	100	3
CE451	Term Paper	-	-	3	40	60	100	2
CE452	Computer Aided Detailing of Structures	-	-	3	40	60	100	2
CE453	Transportation Engineering Laboratory	-	-	3	40	60	100	2
	Total	**22**	**5**	**9**	**360**	**540**	**900**	**28**

CA: Continuous Assessment **FE:** Final Examination

Elective – II:

CE415 (A): Water Resources System Analysis

CE415 (B): Advanced Foundation Engineering

CE 415 (C): Earthquake Resistant Design of Structures

CE 415 (D): Structural Dynamics

Open Elective:

The students of CE will choose an Inter department Elective offered by other Departments.

List of Open Electives offered by other departments:

Department	Subject Name	Subject Code
Biotechnology.	INTELLECTUAL PROPERTY RIGHTS, PATENT LAWS &ETHICAL ISSUES	BT 100
	BIOINFORMATICS ALGORITHMS	BT 200
Chemical Engineering.	INDUSTRIAL POLLUTION & CONTROL	ChE 100
	ENERGY ENGINEERING	ChE 200
Civil Engineering.	AIR POLLUTION AND CONTROL	CE 100
	REMOTE SENSING AND GIS	CE 200
Computer Science & Engineering.	DATABASE MANAGEMENT SYSTEMS	CS 100
	JAVA PROGRAMMING	CS 200
Electrical & Electronics Engineering.	OPTIMIZATION TECHNIQUES	EE 100
	NON-CONVENTIONAL ENERGY SOURCES	EE 200
Electronics & Communication Engineering.	CONSUMER ELECTRONICS	EC 100
	EMBEDDED SYSTEMS	EC 200
Electronics & Instrumentation Engineering.	VIRTUAL INSTRUMENTATION USING LABVIEW	EI 100
	SENSORS and TRANSDUCERS	EI 200
Information Technology.	WEB TECHNOLOGIES	IT 100
	.NET TECHNOLOGIES	IT 200
Mechanical Engineering.	ROBOTICS	ME 100
	POWER PLANT ENGINEERING	ME 200

BAPATLA ENGINEERING COLLEGE : BAPATLA

(Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION

FOR

CIVIL ENGINEERING

w.e.f 2010-2011 (Semester System)

Final Year B.Tech., (SEMESTER – II)

Code No.	Subject	Scheme of Instruction (Periods per week)			Scheme of Examination (Maximum marks)			No. of Credits
		Lecture	Tutorial	Lab	CA	FE	Total Marks	
CE421	Transportation Engineering - II	4	-	-	40	60	100	4
CE422	Construction Management	3	-	-	40	60	100	3
CE423	Elective-III	4	1	-	40	60	100	4
CE424	Elective – IV	4	1	-	40	60	100	4
CE461	Quantity Estimation & Project Management	-	-	3	40	60	100	2
CE462	Project Work	-	-	6	50	100	150	10
	Total	**15**	**2**	**9**	**250**	**400**	**650**	**27**

CA: Continuous Assessment **FE:** Final Examination

Elective III

CE 423(A): Finite Element Analysis

CE423 (B): Bridge Engineering

CE423 (C): Environmental Impact Assessment and Management

CE423 (D): Ground Improvement Techniques

Elective IV

CE 424(A): Advanced Reinforced Concrete Design

CE424 (B): Pavement Analysis and Design

CE424 (C): Advanced Environmental Engineering

CE424 (D): Ground Water Development and Management

CE111/MA01

MATHEMATICS – I
(Common for all branches)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

Matrix Algebra:

Rank of a Matrix, Linear Independence, Vector Space, Solutions of Linear Systems, Inverse of a Matrix by Gauss-Jordan Elimination, Vector Spaces, Inner Product Spaces, Linear Transformations. Eigen Values, Eigen Vectors, Some applications of Eigen value problems. Symmetric, Skew-Symmetric and Orthogonal Matrices.

UNIT - II

Matrix Algebra:

Complex Matrices: Hermitian, Skew-Hermitian and Unitary.

Similarity of Matrices, Basis of Eigen Vectors, Diagonalization.

Differential Calculus:

Rolle's Theorem, Lagrange's Mean Value Theorem and Taylor's Theorem (without Proofs), Taylor's and, Maclaurin's Series for functions of one variable. Maxima and Minima of functions of Two Variables, Lagrange's method of Multipliers.

UNIT - III

First Order Differential Equations:

Basic concepts, Geometrical meaning, Separable Differential Equations, Exact Differential Equations, Integrating Factors, Linear Differential Equations, Bernoulli's Equation, Orthogonal Trajectories of curves, Some Engineering Applications: Growth-Decay and Newton's Law of Cooling.

UNIT - IV

Linear Differential Equations of Second Order:

Homogeneous Linear Equations of Second Order, Second Order Homogeneous Equations with Constant Coefficients, Case of Complex Roots, Euler-Cauchy Equations, Non-Homogeneous Equations, Solution by Undetermined Coefficients, Solution by Variation of Parameters, Applications-Modeling of Electric Circuits.

TEXT BOOK:

Erwin Kreyszig, "Advanced Engineering Mathematics", 8th edition, John Wiley & Sons.

REFERENCE BOOK:

1. George B, Thomas, Jr. and Ross L. Finney, "Calculus and Analytic Geometry", Addison Wesley.

CE112/PH01

ENGINEERING PHYSICS – I
(Common to all branches)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

OPTICS **(11 Periods)**

INTERFERENCE:

Two-wave interference, coherence, cosine law, Michelson interferometer and its applications, (determination of wavelengths of monochromatic light and resolution of two nearby wavelengths).

DIFFRACTION:

Fresnel &Fraunhoffer diffraction, fraunhoffer diffraction due to single slit, plane diffraction grating, dispersive and resolving power of grating.

POLARISATION:

Introduction, Brewester's and Malus law, double refraction,Nicol prism, quarter wave plate, half wave plate.

UNIT – II

LASERS & FIBER OPTICS **(10 Periods)**

LASERS:

Properties of lasers, Spontaneous and stimulated emission, Population inversion, active medium, Solid state (Ruby) laser, Gas(He-Ne) laser, semiconductor (Ga-As) laser, Applications.

HOLOGRAPHY:

Principle, recording and reproduction of holography, Applications.

FIBER OPTICS:

Structure and types of optical fibers, acceptance angle, Numerical aperture, fiber optic communication and its advantages.

UNIT – III

ELECTRICITY & MAGNETISM **(10 Periods)**

Gauss's law in static electricity (qualitative only), Gauss's law of magnetism, circulating charges, Cyclotron-constructing, working and limitations, Hall effect and its applications, displacement current, Maxwell's equations (qualitative treatment), E M oscillations, velocity of EM waves, energy transport and the pointing vector, radiation pressure, AC circuit containing series LCR circuit-resonance condition.

UNIT – IV

MODERN PHYSICS **(11 Periods)**

Dual nature of light, de-Brogli's concept of matter waves, Davison-Germer electron diffraction experiment, Heisenberg's uncertainty experiment and applications (non-existence of electron in a nucleus and finite width of spectral lines), one dimensional time- independent Schrödinger wave equation, physical significance of wave function, applications of time-independent wave equation to particle in a box(one dimensional), tunneling, the scanning tunneling microscope.

TEXT BOOKS:

R.K Goure and S.C. Gupta, "Engineering Physics", New Delhi.

Halliday, Resnik, Krane, "PHYSICS", John Wiley & Sons.

REFERENCE BOOKS:

"Optics", A. Ghatak (TMH).
"Concepts of Modern Physics", AurthurBeiser (TMG).
"A text book of engineering physics", M.N. Avadhanulu, P.G. Kshirasagar, S.Chand& Co.,.
Serway and jewett, "Physics for scientist and engineers with Modern physics", 6th edition, Tomson Brooks/Cole, Indian reprint.

CE113/CY01

ENGINEERING CHEMISTRY – I
(Common to all branches)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

WATER TECHNOLOGY **(11 Periods)**

Characteristics – alkalinity – types of alkalinity and determination – hardness – types and estimation by EDTA method (problems); Domestic water treatment – disinfection methods (Chlorination, ozonation. UV treatment) – Boiler feed water – requirements – disadvantages of using hard water in boilers: Scales, Sludges, Caustic embrittlement, boiler corrosion, Priming and foaming – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning –demineralization process –Lime Soda Process- desalination of brackish water by electro dialysis and reverse osmosis.

UNIT – II

POLYMERS: **(12 Periods)**

Polymers:

Definition, Polymerization, types, addition and condensation polymerization, free radical polymerization mechanism.

Plastics:

Classification, Preparation, Properties and uses of PVC, Teflon, polycarbonate, polyurethane, nylon-6,6, PET.

Rubber:

vulcanization of rubber, synthetic Rubbers: Buna-S, Buna-N and Polyurethane rubbers.

SURFACE CHEMISTRY:

Surface Chemistry:

Solid surfaces, types of adsorption, Frendlich and Longmuir adsorption isotherm, BET adsorption equip. Calculation of surface area of solid & application adsorption: role of adsorbents in catalysis, ion-exchange adsorption and pollution abatement; classification of colloids, Electrical & optical properties micelles, applications of colloids in industry.

UNIT – III

(11 Periods)

RENWEBLE AND NON RENWEABLE ENERGY SOURCES
Thermal and Chemical energy:

Introduction to solid fuels - calorific value (lower, higher)- determination of calorific value(Bomb Calorimeter) - pulverized coal – carbonization (Bee Haive method - Otto Hoffman by product method)- Proximate and ultimate analysis of coal -Flow Chart in Thermal Power Stations.- Introduction to Geo Thermal Energy-working –applications-Introduction to Solar Cells –Solar Panels-Applications-Green House Concept - wind energy – fuel cells – hydrogen – oxygen fuel cell – batteries – alkaline batteries – lead–acid, nickel–cadmium and lithium batteries.

UNIT – IV

ENGINEERING MATERIALS **(11 Periods)**

Refractories – classification – acidic, basic and neutral refractories – properties: refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling – manufacture of alumina, magnesite and zirconia bricks, Abrasives – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide.

Composites:

Definition, types, polymer matrix composites.

Lubricants

Mechanism of lubrication, liquid lubricants - properties: viscosity index, flash and fire points, cloud and pour points, oiliness –solid lubricants – graphite and molybdenum sulphide.

Nanomaterials

Introduction to nanochemistry – preparation of few Nano materials:carbon nanotubes, Fullerenes etc – Properties of Nano materialas and their Engineering applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

P.C.Jain and Monica Jain, “Engineering Chemistry”, DhanpatRai Pub, Co., New Delhi (2002).
S.S. Dara&Mukkati K., “A text book of engineering chemistry”, S.Chand&Co.Ltd., New Delhi (2006).
“Text Books of Engineering Chemistry”, C.P. Murthy, C.V. Agarwal, A. Naidu B.S. Publications, Hyderabad (2006).

REFERENCE BOOKS:

B.K.Sharma, “Engineering chemistry”, Krishna Prakasan Media (P) Ltd., Meerut (2001).
B. Sivasankar, “Engineering Chemistry”, Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).
“Enginering Chemistry”, J.C. Kuriacase& J. Rajaram, Tata McGraw Hill co., New Delhi 1. (2004).
“Chemistry of Engineering Meterials”, R.P Mani and K.N.Mishra, CENGAGE learning.
“Applied Chemistry – A text for Engineering & Technology”, Springar (2005).
“Text Book of Engineering Chemistry”, ShasiChawla, DhantpatRai Publishing Company, NewDelhi (2008).
“Engineering Chemistry”, R. Gopalan, D. Venkatappayya, D.V. SulochanaNagarajan, Vikas Publishers (2008).

CE114/EN01

ENGLISH LANGUAGE AND COMMUNICATION
(Common to all branches)

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Objective of the course:

To impart Basic skills of communication in English in through intensive practice to the First year student, So as to enable them to function confidently and effectively in that language in the professional sphere of their life.

UNIT – 1

Grammar:

This area exposes the learners to improve the standard proficiency level, avoiding grammatical mistake in communication.

Tenses
Preposition
Parts of speech

UNIT – 2

Writing skills:

This area promotes a format and well structured sentences required in professional writing

1. Paragraph writing
2. Letter writing
3. Essay writing

UNIT – 3

Vocabulary:

This unit offers an extensive knowledge of words and word meaning, essential for communication and contemporary test

1. Analogies
2. Idioms and phrases and their use
3. Antonyms & Synonyms

UNIT – 4

Reading skills:

Reading skills enable the student to turn writing into meaning and achieve the goals of reading independently, comprehensibly and fluently

1. Reading comprehension
   i. Scanning
   ii. Skimming
   iii. Glance

TEXT BOOK:

1. "Objective English for Competitive Examination (Third edition)", Hari Mohan Prasad, Uma ReniSinha, Tata McGraw Hill.

REFFRENCE BOOKS:

1. "Effective Technical Communication", M.AshrafRizvi, Tata McGraw Hill.
2. "Cambridge Preparation Guide for TOFEL".
3. "Dictionary of Technical Terms".
4. "Cambridge Advanced Learner's Dictionary".
5. "Cambridge Idioms Dictionary".
6. "Basic Correspondence & Report Writing", Sharma, Tata McGraw Hill.
7. "Business Correspondences and Report Writing", R.C.Sharma, Krishna Mohan, Tata McGraw Hill.
8. "Dictionary of Misspelled and Easily Confused Words", David Downing, Deborah K.Williams, Tata McGraw Hill.

CE115/CE01

ENGINEERING MECHANICS
(Common to all branches except Mechanical Engineering)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

General Principles:

Mechanics, Fundamental concepts, Units of measurements, International systems of units, Numerical calculations, General procedure for analysis.

Force Vectors:

Scalars and vectors, Vector operations, Vector addition of forces, Addition of a system of coplanar forces.

Equilibrium of a Particle:

Condition for equilibrium of a particle, The free body diagram, Coplanar force system.

Force System Resultants:

Moment of a force (Scalar formation), Principle of moments, Moment of a couple (Scalar formation), and Equivalent system, Resultants of a force and couple system (Coplanar force system), further reduction of a force and couple system (Coplanar force system).

Equilibrium of a Rigid Body:

Conditions for rigid body equilibrium (Equilibrium in two dimensions), Free body diagrams, Equations of equilibrium, Two and three force members.

UNIT – II

Friction:

Characteristics of dry friction, Problems involving dry friction.

Center of Gravity and Centroid:

Center of gravity and center of mass for system of particles, Center of gravity, center of mass and centroids for a body, Composite bodies.

Moments of Inertia:

Definition of moments of inertia for areas, Parallel axis theorem for area, radius of gyration of an area, Moments of inertia of an area by integration, Moments of inertia for composite areas.

UNIT – III

Kinematics of a Particle:

Introduction, Rectilinear kinematics: Continuous motion, General curvilinear motion, Curvilinear motion: Rectangular components, Motion of a projectile, Curvilinear motion: Normal and tangential components, Absolute dependent motion analysis of two particles.

Kinetics of a Particle: Force and Acceleration:

Newton's law of motion, The equation of motion, Equation of motion for a system of particles, Equation of motion: Rectangular coordinates, Equation of motion: Normal and tangential coordinates.

UNIT – IV

Kinetics of Particle: Work and Energy:

The work of a force, Principle of work and energy, Principle of work and energy for a system of particles, Power and efficiency, Conservative forces and potential energy, Conservation of energy.

Kinetics of Particle: Impulse and Momentum:

Principle of linear impulse and momentum, Principle of linear impulse and momentum for a system of particles, Conservation of linear momentum for a system of particles, Impact.

TEXT BOOK:

1. "Engineering Mechanics Statics and Dynamics", R.C. Hibbeler and Ashok Gupta. Pearson Education.

REFERENCE BOOKS:

1. "Vector mechanics for Engineers Statics and Dynamics", Beer and Johnston, Tata McGraw-Hill publishing company, New Delhi.
2. "Engineering Mechanics", S. Timoshenko and D. H. Young – McGraw-Hill International Edition.
3. "Engineering Mechanics Statics and Dynamics", J. L. Meriam and L. Kraige.
4. "Engineering Mechanics for Engineers. Statics and Dynamics", Beer and Irving H. Shames, Pearson Education.

CE116/ME01

ENGINEERING GRAPHICS
(Common to all branches)

Lectures	:	3 Periods/Week, Tutorial: 3	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION:

Introduction to Drawing instruments and their uses, geometrical construction procedures

2x3 =6 periods

CURVES: Conic sections – general construction methods for ellipse, parabola and hyperbola.

Other methods to construct ellipse only, cycloid, involute of a circle **4x3=12periods**

UNIT – II

METHOD OF PROJECTIONS:

Principles of projection - First angle and third angle projection of points. Projection of straight lines.Traces of lines. **6x3=18periods**

UNIT – III

PROJECTIONS OF PLANES :

Projections of plane figures: circle, square, rhombus, rectangle, triangle, pentagon and hexagon.

4x3=12periods

UNIT – IV

PROJECTIONS OF SOLIDS:

Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

5x3=15 periods

UNIT – V

ISOMETRIC PROJECTIONS: I

sometric Projection and conversion of Orthographic views into isometric views. (Treatment is limited to simple objects only). **3x3=9 periods**

ORTHOGRAPHIC PROJECTIONS:

Conversion of pictorial views into Orthographic views. (Treatment is limited to simple castings).

4x3=12 periods

TEXT BOOK:

1. Engineering Drawing by N.D. Bhatt & V.M. Panchal. (Charotar Publishing House, Anand). (First angle projection)

REFERENCE BOOK:

1. Engineering Drawing by Dhananjay A Jolhe, Tata McGraw hill publishers
2. Engineering Drawing by Prof.K.L.Narayana& Prof. R.K.Kannaiah.

CE151/PH L01

PHYSICS LAB – I
(Common to all branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF EXPERIMENTS

1. Determination of acceleration due to gravity at a place using compound pendulum.
2. Study the variation of intensity of magnetic field along the axis of a circular coil using Stewart-Gee's apparatus.
3. Determination of thickness of thin wire using air wedge interference bands.
4. Determination of radius of curvature of a Plano convex lens by forming Newton's rings.
5. Determination of wavelengths of mercury spectrum using grating normal incidence method.
6. Determination of dispersive power of a given material of prism using prism minimum deviation method.
7. Draw the resonant characteristic curves of L.C.R. series circuit and calculate the resonant frequency.
8. Draw the characteristic curves of a photocell and calculate the maximum velocity of electron.
9. Verify the laws of transverse vibration of stretched string using sonometer.
10. Determination of numerical aperture of an optical fiber.

CE152/CY L01

CHEMISTRY LAB – I
(Common to all branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF EXPERIMENTS

1. Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Primary, Secondary Standard Solutions , Normality, Molarity, Molality etc and laboratory ware used, error ,accuracy, precision, Theory of indicators, use of volumetric titrations.

2. Volumetric Analysis:
    a. Estimation of acid content in un-known solution
    b. Estimation of Iron by Dichrometric method
    c. Estimation of Copper by Iodometric method
    d. Estimation of available chlorine in bleaching powder

3. ANALYSIS OF WATER: Estimation of :
    a. TOTAL HARDNESS BY EDTA METHOD
    b. TURBIDITY
    c. CONDUCTIVITY
    d. pH
    e. TOTAL DISSOLVED SALTS
    f. SALANITY
    g. ALKALINITY
    h. DISSOLVED OXYGEN

4. BACTERIAL COUNT: The student has to get his water sample and the teacher has to explain the analysis and the results are to be compared with the INDIAN STANDRDS.

5. CONSTRUCTION OF GALVANIC CELL: Based on the position of the metals in the electrochemical series a model electrochemical Cell is constructed and the values are determined and effect of metal ion concentration, Temperature etc. on emf are calculated.

TEXT BOOKS:

1. "Practical Engineering Chemistry", K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. "Inorganic quantitative analysis", Vogel.

REFERENCE BOOKS:

1. "Text Book of engineering chemistry", R. N. Goyal and HarrmendraGoel.
2. "A text book on experiments and calculation Engg.", S.S. Dara.
3. "Instrumental methods of chemical analysis", Chatwal, Anand, Himalaya publications.

CE153/ME L01

WORKSHOP
(Common to all branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. Carpentry

a. Half Lap joint
b. Dovetail joint
c. Mortise &Tenon joint

2. **Welding using electric arc welding process/gas welding**

a. Lap joint
b. Tee joint
c. Butt joint

3. Sheet metal operations with hand tools

a. Trapezoidal tray
b. Funnel
c. T-joint

4. House wiring

a. To control one lamp by a single switch
b. To control two lamps by asingle switch
c. Stair-case wiring

CE121/MA02

MATHEMATICS – II
(Common for all branches)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Fourier Series:

Periodic Functions, Trigonometric Series, Fourier Series, Functions of Any Period P = 2L, Even and Odd Functions, Half Range Expansions, Complex Fourier Series, Approximation by Trigonometric polynomials.

UNIT – II

Laplace Transforms:

Laplace Transform, Inverse Transform, Linearity, Shifting, Transforms of Derivatives and Integrals, Differential Equations, Unit Step Function, Second Shifting Theorem, Dirac's Delta Function, Convolution theorem (without proof).

UNIT – III

Integral Calculus:

Evaluation of double integrals (Cartesian & Polar), Changing the order of integration, Evaluation of triple integrals, Applications of triple integrals to find area and volume.

UNIT – IV

Vector calculus:

Scalar and vector point functions, Gradient of a scalar field, Directional derivative, Divergence of a vector field, curl of a vector field, Line integrals, Line integrals independent of path, Green's theorem in the plane (without proof), Surface integrals, Triple integrals, Divergence theorem of Gauss (without proof), Applications to Engineering problems, Stokes theorem(without proof).

TEXT BOOK:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons.

REFERENCE BOOKS:

1. "Advanced Engineering Mathematics", Peter V. O'Neil, Thomsons Brooks/Cole.
2. "Advanced Calculus", Murray R Spiegel, Schaum's outline series.

CE122/PH02

ENGINEERING PHYSICS – II
(Common to all branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

Electron theory of solids & semiconductor physics **(10 periods)**

Electron theory of solids:Failure of classical free electron theory, quantum free electron theory, Fermi-Dirac distribution and its temperature dependence, Kronig-Penny model (Qualitative), effective mass of electron, concept of hole.

Semiconductor physics: Classification of semiconductors, P-N junction diode and its characteristics, carrier concentration in P and N type semiconductors, Equation of continuity.

UNIT – II

Magnetic, Dielectric and Ferro-electric materials **(10 periods)**

Origin of magnetic moment of an atom, Bohr magneton, Weiss theory of Ferro magnetism (Qualitative), Hysteresis curve, soft and hard magnetic materials, ferrites and its applications.

Dielectric materials, Types of polarizations, internal field (qualitative), Classius – Mossetti equation, Frequency dependence of polarization, Ferroelectrics and its applications.

UNIT – III

Advanced materials **(12 periods)**

Nano-materials: Introduction to nano-materials, Fabrication of nano-materials and carbon nano tubes (CVD and sol-gel), physical and chemical properties of nano materials, Applications of nano materials (Structural point, Storage of information, Strength point)

Superconductivity: Meissner effect, types of superconductors, elements of BCS theory, Applications of superconductors.

Opto-electronic devices: Working and applications of solar cell,LED, LCD, Photo Diode.

UNIT – IV

Analytical techniques **(10 periods)**

Nuclear techniques: Radio isotopes and its applications (Medical and Industrial), GM-counter, scintillation counter.

Ultrasonics: Properties of ultrasonics, General applications of ultrasonics.

Medical applications: Cardiology, Neurology, Ultrasonic imaging.

NDT: Pulse echo technique, cavitation effect, Time of flight diffraction technique.

Structure determination: Crystal planes, Bragg's law, structural analysis of crystal using X-Ray powder diffraction method.

TEXT BOOKS:

1. "Engineering physics",M.R.Sreenivasan, Newage International Publication.
2. "Engineering Physics", Palaniswamy, ScitechPulishers.
3. "Solid State Physics", Dekkar.

REFERENCE BOOKS:

1. "Material Science for scientists and Engineers", Srinivasan&Srivastava, TMH Publishers.
2. "A text book of engineering physics", M.N.Avadhanulu& P. Krushisagar, S.Chand Pub.
3. "Material Science", VijayaRangarajan.

CE123/CY02

ENGINEERING CHEMISTRY – II
(Common to all branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I (11 Periods)

ELECTROCHEMISTRY

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance –potentiometer titrations (redox - Fe^{2+}vs dichromate and precipitation – Ag+ vs Cl-titrations) and conduct metric titrations (acid-base – HCl vs, NaOH) titrations.

UNIT - II (11 Periods)

CORROSION AND CORROSION CONTROL

Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.

GREEN CHEMISTRY: Introduction-concepts-Engineering Applications.

UNIT – III (12 Periods)

LIQUID AND GASEOUS FUELS AND COMBUSTION: Petroleum based: Petroleum processing and fractions – cracking – catalytic cracking and methods-knocking and anti-knocking Agents – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes.

Gaseous fuels- water gas, producer gas, CNG and LPG, Flue gas analysis – Orsat apparatus – theoretical air for combustion.

PHASE RULE AND ALLOYS: Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.

UNIT – IV (11 periods)

ANALYTICAL TECHNIQUES: Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy –principles – instrumentation (problem) (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) –estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C.Jain, Monica Jain, "Engineering Chemistry", DhanpatRai Pub, Co., New Delhi (2002).
2. S.S.Dara, Mukkanti K.,"A text book of Engineering Chemistry", S.Chand& Co., Ltd., New Delhi (2006).
3. B. Sivasankar, "Engineering Chemistry", Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

REFERENCE BOOKS:

1. B.K.Sharma, "Engineering Chemistry", Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. "Enginering Chemistry", J.C.Kuriacase&J.Rajaram, Tata McGraw Hill, New Delhi (2004).
3. "Chemistry of Engineering Materials", R.P Mani, K.N.Mishra, CENGAGE learning.
4. "Applied Chemistry - A text for Engineering & Technology", – Springar (2005).
5. "Text Book of Engineering Chemistry", ShasiChawla, DhantpatRai Publishing Company, NewDelhi (2008).
6. "Engineering Chemistry", R. Gopalan, D. Venkatappayya, D.V. SulochanaNagarajan, Vikas Publishers (2008).

CE 124

ELEMENTS OF ELECTRICAL AND MECHANICAL ENGINEERING

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Part A : ELECTRICAL ENGINEERING

UNIT – I

Introduction: Direct current; Alternating current; Half wave & full wave rectifiers; Comparison between DC and AC supply; Advantages of alternating current.
Electrical Machines: DC generators & motors – Principle, Parts, Types and Applications; Transformers–Principle, Classification and Applications.

UNIT – II

Electrical Machines (Contd.) : Construction and basic Principle of operation of alternators, 3 phase and single phase induction motors and their applications.
Lightning Phenomenon: What is lightning ?; Charge formation in cloud – Wilson's theory, Simpson's theory; Different forms taken by lightning; Mechanism of forked lightning ; Protection of structures against lightning using lightning rods.

Part B : MECHANICAL ENGINEERING

UNIT – III

Transmission Of Power: Belt drives; Velocity ratio; Slip; Ratio of Tensions; Power transmitted; Creep.
Principles Of Manufacturing Processes: Elementary concepts of Rolling, Drawing Casting, Turning, Drilling, Milling, Welding and Soldering

UNIT – IV

Thermal Prime Movers: Principles and operation of Boilers, Steam turbines, Gas turbines and I. C. Engines.
Compressors: Application and operation of single stage and multi-stage reciprocating Air Compressors.

TEXT BOOKS

1. Engineering Basics (Electrical, Electronics & Computer Engineering) by T. Thyagarajan, K. P. SendurChelvi and T. R. Rangaswamy, New Age International (P) Ltd., New Delhi.
2. An Introduction to High Voltage Engineering by Subir Roy, Prentice-Hall of India , 2006.
3. Elements of Mechnical Engineering by Mathur, Mehta &Tewari; Jain Brothers, New Delhi.

CE125/BT01

ENVIRONMENTAL STUDIES
(Common for all branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction: Definition, Scope and Importance, Need for public awareness.

Ecosystems: Introduction, types, Structure and Functions of Ecosystems, Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries)

Biodiversity: Definition and levels of Biodiversity, Bio-geographical Classification of India, India as a mega diversity nation and Hot Spots of Biodiversity.

Values of Biodiversity: Consumptive use, Productive use, Social, Ethical, Aesthetic and Option values.

Threats to Biodiversity: Habitat loss, Extinction of Species, Poaching of wildlife

Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT – II

Natural Resources: Exploitation and Related Pollution Problems

Land: Land as a resource, causes and effects of land degradation

Forest: Use of forests, causes and effects of deforestation and conservation of forests

Water: Distribution of Water Resources, floods and drought, causes, effects and control of water pollution.

Energy: Classification of Resources, Importance of energy, causes and effects of nuclear pollution.

Causes, Effects and Control of Air Pollution and Noise Pollution.

Solid Waste Management: Urban and Industrial wastes, Composting and Vermiculture and 3 R - approach.

UNIT –III

Sustainability: Theory and Practice, Equitable use of resources for sustainable life styles. Rain water harvesting, Watershed management, Cloud Seeding, Acid rain, Ozone layer depletion, Global warming, Population Growth and its Impact on environment, Green Revolution, Resettlement and Rehabilitation program, Mining and Dams and their conflictions, Environmental Impact Assessment

UNIT –IV

Environmental acts: Water (Prevention and Control of pollution) act, Air (Prevention and Control of pollution) act, Environmental protection act, Wild life protection act, Forest Conservation act.

International Conventions: Stockholm Conference 1972, Earth Summit 1992 and Copenhagen Conference 2009

Case Studies: Chipko movement, Narmada BachaoAndolan, Silent Valley Project, Madhura Refinery and TajMahal, Chernobyl Nuclear Diaster, Ralegaon Siddhi (Anne Hazare) and Bhopal Tragedy.

Text Book:

1. Environmental Studies by Benny Joseph,Tata McGraw-Hill Publishing Company Limited, New Delhi.

Reference Books:

1. Text Book of environmental studies, ErachBharucha, UGC.
2. Environmental Studies, AnubhaKaushik and C. P. Kaushik.
3. A basic course in environmental studies, S. Deswal and A. Deswal, DhanapathRai& Co.
4. Essentials of environmental studies, Kurian Joseph and R.Nagendram, Pearson Education Pt Ltd, Delhi.

5. Environmental studies, R.Rajagopalan, Oxford University Press.
6. Environmental Pollution Control Engineering, C. S. Rao, Wiley Eastern Ltd., New Age International Ltd.,
7. Introduction to Environmental Science, Anjaneyulu Y, B S Publications
8. Principles of Environmental Studies, Manoharachary C and Jayarama Reddy P, B S Publications.
9. Comprehensive environmental studies- JP Sharma, Laxmi Publications.
10. Environmental Science, 11th Edition – Thomson Series – By G Tyler Miller, Jr.
11. Environmental Science and Engineering by Dr. Suresh, K.Dhaneja, Publishers SK Kataria& Sons, New Delhi-110006.

CE126/CS01

COMPUTER PROGRAMMING WITH C
(Common to all Branches)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction:

Computer Fundamentals: Computer and it's components, hardware/software, algorithm, characteristics of algorithms, flowchart, symbols used in flowchart, history of C, basic structure of a C program.

C Tokens: Character set, variables, keywords, data types and sizes, type qualifiers, numeric constants and their forms of representation, character constants, string constants, declaration and initialization of variables.

Operators & Expressions: Arithmetic operators and expressions, type-conversion rules, coercion, assignment operators and expressions, increment and decrement operators, conditional operator, statements, preprocessor directives, input/ output functions and other library functions. Relational operators and expressions, boolean operators and expressions, operator precedence and associativity.

Control Statements: if-else statement, else-If statement and switch statement.

Programming Exercises for Unit I :

C-expressions for algebraic expressions, evaluation of arithmetic and boolean expressions. Syntactic errors in a given program, output of a given program, values of variables at the end of execution of a program fragment, filling the blanks in a given program. Programs using Scientific and Engineeringformulae.Finding the largest of the three given numbers.Computation of discount amount on different types of products with different discount percentages. Finding the class of an input character, finding the type of triangle formed with the given sides, computation of income-tax, computation of electricity bill and conversion of lower case character to its upper case.

UNIT – II

Control Statements: while loop, for loop, do while loop, nested Control statements, break and continue statements.

Arrays: One-Dimensional numeric and character arrays and Two-Dimensional numeric and character arrays.

Programming Exercises for Unit - II:

To print the sum of the digits of a given number and to display the image of a given number.To find whether a given number is prime, printing Fibonacci sequence and to find prime factors of a given number.To print graphic patterns of symbols and numbers and computation of statistical parameters of a given list of numbers.To find the length of a string, compare strings, reverse a string, copy a string and to find whether the given string is palindrome or not. Transpose of a matrix, product and sum of matrices and sorting of names using arrays.

UNIT – III

Functions: Function definition, parameter passing mechanisms and simple recursion.

Scope & extent: Scope rules and storage classes.

Pointers and Dynamic Memory Allocation: Pointer variables, pointer arithmetic, dynamic memory allocation, array of pointers, command line arguments, passing pointer variables as parameters to functions.

Programming Exercises for Unit - III:
Functions - Insertion sort, Linear search. Recursive functions to find factorial &GCD(Greatest Common Divisor), string operations using pointers and pointer arithmetic and dynamic memory allocation. Swapping two variable values. Sorting a list of names using array of pointers and command line arguments.

UNIT – IV

Structures: Structures, array of structures, pointers to structures, unions and difference between structure and union.
Files: File handling functions for input and output.

Programming Exercises for Unit - IV:
Operations on complex numbers, matrix operations with the matrix and the size of the matrix as a structure, sorting a list of student records on register number using array of pointers and to read an input file of marks and generate a result file.

TEXT BOOK:
1. Byron Gottfried, "Programming with C", Schaum's Outline series.

REFERENCE BOOKS:

1. Kernighan BW and Dennis Ritchie M, "C programming language", 2nd ed, Prentice Hall.
2. Yashavant P. Kanetkar, "Let us C", BPB Publications.
3. E.Balagurusamy, "Programming in ANSI C", 4th ed, Tata Mcgraw-Hill.
4. Herbert Schildt, "C: The Complete Reference", 4th edition, Tata Mcgraw-Hill.

CE161/PHCY L01

PHYSICS& CHEMISTRY LABORATORY – II
(Common to all branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

(A Selected list of Experiments from the following)

PHYSICS LAB-II

1. Determine the rigidity modulus of the given material of the wire usingTorsionalpendulum.
2. Determination of room temperature using platinum resistant thermometer.
3. Draw the load characteristic curves of a solar cell.
4. Determination of Hall coefficient of a semiconductor.
5. Determination of velocity of ultrasonic wave in a given liquid usingultrasonicinterferometer.
6. Draw the characteristic curves of a G.M. counter and calculate the bestoperatingvoltage.
7. Determination of voltage and frequency of an A.C. signal using C.R.O.
8. Draw the I/V characteristic curves of a P-N junction diode.
9. Determination of Forbidden energy gap of Si &Ge.
10. Determination of wavelength of laser source using Diode laser.

CHEMISTRY LAB – II

1. **PRODUCTION OF BIODIESEL**: The teacher has to perform the transesterfication reaction of FATTY ACID and the Biodiesel thus produced can be used for analysis.
2. Estimation of properties of oil:
    a. Acid Number
    b. Viscosity
    c. Saponification value
    d. Aniline point
    e. Flash and Fire points
    f. Pour and Cloud point.

3. **PREPARATION OF:**
    a. PHENOL –FORMALDEHYDE RESIN
    b. ASPIRIN
    c. Phenylbenzoate
    d. Soap
4. **SOIL ANALYSIS**: pH, Determination of Zinc, Iron and Copper.
5. **Kinetics:** To determine the rate constant of hydrolysis of methyl acetate catalyzed by an acid and also the energy of activation. (or) To study the kinetics of reaction between $K_2S_2O_8$ and KI.

6. **Demonstration Experiments (Any two of the following) :**
    a. Determination of dissociation constant of weak acid-by pH metry
    b. Preparation of Thiokol rubber
    c. Adsorption on Charcoal
    d. Heat of reaction
7. **FOOD ANALYSIS:** Determination Saturated and Unsaturated Fatty Acids, pH,etc.

TEXT BOOKS:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. Vogels Text Book of Quantitative Chemical Analysis 6th Edition (2002).

REFERENCE BOOKS:

1. Text Book of engineering chemistry by R. N. Goyal and HarrmendraGoel.
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications, 5th edition 2004

CE162/EN L01

ENGLISH LANGUAGE LAB
(Common to all branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

OBJECTIVES

This course enables the students to expedite the process of improving communication in both formal and in formal situation. A special attention has been paid to the needs of competitive and current demands.

Introduction to communication: Difference between communication and communication skills, Types of communication, Barriers to communication.
Introduction to skills: Listening skills, writing skills, Reading skills, and Speaking skills.
Pronunciation drills: Phonetics, British English and American English.
Conversational skills: Dialogue, Telephonic Interaction.
Professional writings & skills: Resumes, Reports, Business letters and Interview skills.
Practical: Extempore Debates, Group discussion, and Oral presentation.

RECOMMENDED SOFTWARES:

Digital Language Lab - Networking Software, HiClass – Software.

English Language – Listening, Speaking Reading, Writing Skills: A lania series – English Mastery, Levels A, B (Set of 2 CDs), English Discoveries (Set 0f 12 CDs).

English Grammar / Pronunciation: Live Action English Interactive, Speech Solutions

Dictionaries: Cambridge Advanced Learner's, Oxford Genie & Advanced

Writing: Easy writer, Creative writing

Professional English: Telephonic English, English in mind

English for ETS: Barron's, TOEFL Mastery, IELTS, GRE

CE163/CS L01

COMPUTER PROGRAMMING LAB
(Common to all Branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

LIST OF PROGRAMS

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement).

Domestic Customer:	
Consumption Units	**Rate of Charges(Rs.)**
0 – 200	0.50 per unit
201 – 400	100 plus 0.65 per unit
401 – 600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Commercial Customer:	
Consumption Units	**Rate of Charges(Rs.)**
0 – 50	0.50 per unit
100 – 200	50 plus 0.6 per unit
201 – 300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the following (using loops):
   a) $1 + x^2/2! + x^4 / 4! + \ldots$upto ten terms
   b) $x + x^3/3! + x^5/5! + \ldots$ upto 7 digit accuracy
3. Write a C program to check whether the given number is
   a) Prime or not.
   b) Perfect or Abundant or Deficient.
4. Write a C program to display statistical parameters (using one – dimensional array).
   a) Mean
   b) Mode
   c) Median
   d) Variance.

NOTE: Use functions for each subtask in the following programs

5. Write a C program to read a list of numbers and perform the following operations
   a) Print the list.
   b) Delete duplicates from the list.
   c) Reverse the list.
6. Write a C program to read a list of numbers and search for a given number using Binary search algorithm and if found display its index otherwise display the message "Element not found in the List".
7. Write a C program to read two matrices and compute their sum and product.
8. A menu driven program with options (using array of character pointers).
   a) To insert a student name
   b) To delete a name
   c) To print the names

9. Write a C program to read list of student names and perform the following operations
    a) To print the list of names.
    b) To sort them in ascending order.
    c) To print the list after sorting.
10. Write a C program that consists of recursive functions to
    a) Find factorial of a given number
    b) Solve towers of Hanoi with three towers (A, B & C) and three disks initially on tower A.
11. A Bookshop maintains the inventory of books that are being sold at the shop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book the sales person inputs the title and the author and the system searches the list and displays whether it is available or not. If it is not an appropriate message is displayed, if it is then the system displays the book details and request for the number of copies required ,if the requested copies are available the total cost of the requested copies is displayed otherwise the message "required copies not in stock" is displayed. Write a program for the above in structures with suitable functions.
12. Write a C program to read a data file of student's records with fields(Regno, Name, M1,M2,M3,M4,M5) and write the successful students data (percentage > 40%) to a data file.

CODE: CE 211/ MA 03

MATHEMATICS -III

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Fourier integrals: From Fourier series to the Fourier integral, Application of the Fourier integral, Fourier Cosine and Sine integral, Evaluation of integrals, Fourier cosine and sine Transforms: Fourier Cosine Transforms, Fourier Sine Transforms, Linearity, Transforms of Derivatives, Fourier Transform: Complex form of the Fourier integral, Fourier Transform and its inverse, Linearity. Fourier Transform of Derivatives, Convolution.

UNIT – II

Partial differential equations: Basic concepts, Modeling-Vibrating string, Wave Equation Separation of Variables Use of Fourier series, D'Alembert's Solution of the Wave Equation, Heat Equation-Solution Fourier series, Steady-State Two-Dimensional Heat Flow

UNIT – III

Numerical Methods in general: Introduction, Solution of Equations by Iteration, newton's Method for Solving Equations f(x) = 0, Convergence of Newton's method, Interpolation: Lagrange interpolation, Newton's divided difference interpolation, Equal spacing: Newton's forward Difference formula, Newton's Backward Difference formula, Inverse interpolation, Numerical integration and Differentiation: Trapezoidal Rule, Error Bounds and Estimate for the Trapezoidal Rule, Simpson's Rule of integration, Error of Simpson's rule.

UNIT – IV

Numerical methods in linear algebra: Linear Systems: Gauss Elimination, LU Factorization, Gauss-Seidel iteration Method, Method of least Squares, Methods of First order Differential Equations: Euler's method, Runge-Kutta methods, Methods for Elliptic Partial Differential Equations: Laplace equation, Poisson equation

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

Text book:

1. "Advanced Engineering Mathematics", Erwin Kreyszig, 8th edition, John Wiley & Sons.

Reference books:

1. "Advanced Engineering Mathematics", Peter V. O'Neil, Thomsons Brooks/Cole.

CODE: CE 212

BUILDING MATERIALS, PLANNING & CONSTRUCTION

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Stones

Qualities of a good building stone, Common building stones of India.

2. Bricks

General; Composition of good brick earth; Harmful ingredients in brick earth; Manufacture of bricks by clamp burning and kiln (only Hoffmans kiln) burning, Qualities of good bricks; Tests for bricks; Classification of bricks; Size and weight of bricks

3. Lime

General; Some definitions; Sources of lime; Constituents of limestones; Classification of limes; Properties of fat lime and hydraulic lime;

4. Timber

Definition; Structure of a tree; Qualities of good timber; Decay of timber; Preservation of timber; Advantages of timber construction; Uses of timber;

UNIT –II

5. Stone & Brick Masonry

Technical terms; Types of bonds in brickwork and their suitability. Classification of stone masonry

6. Walls

Classification of walls.

7. Floors

Technical terms; Types of ground floors

8. Roofs

Technical terms; Classification of roofs; Steel sloping roofs; Roof covering materials; Types of flat roofs;

UNIT –III

9. Staircases

Technical terms; Types of stair-cases, design considerations.

10. Dampness And Damp Proofing

Causes of dampness; Methods of preventing dampness; Damp proofing materials and their classification; Methods of providing DPC under different situations.

11. Acoustics Of Buildings

Important Technical terms; Factors to be considered in Acoustics of building; Sound absorbing materials; Sound insulation.

12. Scaffolding, Shoring, Under Pinning And Form Work

Types of scaffolding; Types of shoring; Methods of underpinning; Types of formwork; Centering.

UNIT –IV

13. An Approach To Planning

Site planning; Space requirement–Establishing areas for different units, Furniture requirements, Roominess, Flexibility, Sanitation, Lighting, Ventilation, Space for equipment for air–conditioning, Space for machinery etc.; Flow diagram and line plan–Grouping, Circulation, Orientation, Aspect and prospect, Privacy, Elegance and economy; Climatic considerations; Architectural composition–Unity, Mass composition, Contrast, Proportion, Scale, Accentuation and rhythm, Materials for the exterior and Expression; Colour.

14. Building Rules And Bye–Laws

Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index.

15. Building Elements

Conventional signs; Guidelines for staircase planning; Guidelines for selecting doors and windows; Terms used in the construction of door and window; Specifications for the drawing of door and window

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Engineering Materials by S. C. Rangwala; Charotar Publishing House, Anad.
2. Building construction by B. C. Punmia et all; Laxmi Publications, New Delhi.
3. Planning and Designing Buildings by Yashwant S. Sane, Allies Book Stall.

REFERENCE

1. Building Drawing by M.G. Shah, C.M. Kale and S.Y. Patki, Tata McGrqw-Hill, New Delhi.

CODE: CE 213

SURVEYING – I

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **Surveying & Measurements**

Definitions; Classification; Principles of Surveying; Plan and map; Basic Measurements; Instruments and Basic methods; Scales used for Maps and plans. Phases of survey work and Duties of a surveyor; Precision in surveying work;

2. **Errors**

Reliability of measurements – Accuracy, Precision, Significant figures, Rounding of numbers; Sources and types of errors; Probability in Survey measurements; Normal distribution; Propagation of error; Measures of precision; weights of measurements;

UNIT – II

3. **Measurement of horizontal distance**

Methods of distance measurements; Equipment for distance measurement; Procedures for distance measurement – Ranging, Chaining/taping a line; Setting out right angles; Errors in chaining and taping, and their corrections;

4. **Measurement of angles and directions**

Bearings, Azimuths, Deflection angles, angles to the right, and included angles; Instruments used to measure angles and directions; Types of compasses - Prismatic compass; Magnetic Dip and Declination; Local attraction; Errors in compass survey; Types of Theodolites - Vernier Theodolite; Basic definitions; Fundamental lines and desired relations; Temporary and permanent adjustments; Field operations - Measurement of - a horizontal angle: Repetition and Reiteration methods, a vertical angle, bearings; Lining-in, Balancing-in, Double sight, Random line method of running a line, Prolonging a straight line and location of intersection of two straight lines, to lay off a horizontal angle and Traversing; Sources of errors in Theodolite survey.

UNIT – III

5. **Chain and Compass Surveying**

Basic definitions; chain survey of an area – Principle, selection of scale of the map, Selection of stations, Booking the survey; Accuracy of measurements; Office work; Problems encountered in chain survey; Chain and Compass Traversing (Free or Loose needle method); Field work; Plotting of a compass traverse; Errors in Compass surveying; Limits of accuracy.

6. **Traversing – Uses of traversing surveying**

Types of traverses – Open and closed traverse, based on method of horizontal angles measurement and instruments employed; Traverse procedure - Selection of traverse stations; Marking of stations, linear and angular (both bearings and angles) measurements; Compatibility of linear and angular measurements; Sources of errors in traversing; Checks in traversing; Traverse Computations – Gale's traverse table; Methods of adjustments; Omitted measurements

UNIT – IV

7. **Simple Leveling**

Basic definitions; Curvature and Refraction; Different methods of leveling; Levels –Dumpy level, Tilting level, Auto level; Sensitivity of a Level tube; Leveling staff; Level field book; Booking and reducing levels; Classification of direct differential leveling methods –Fly leveling, Check leveling, Profile leveling and Cross sectioning, Reciprocal leveling and Precise leveling; Sources of errors in leveling; Degree of Precision; Difficulties in leveling.

8. **Contouring**

Methods of representing Relief; Contouring; contour interval; Characteristics of contours; Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours; Location of a contour gradient; Uses of contour maps;

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK:

1. Surveying Vol. 1 & II by Dr. K. R. Arora; Standard Book House;

REFERENCES

1. Plane Surveying by AM Chandra, New Age International (P) Ltd.
2. Fundamentals of Surveying by S K Roy, Prentice - Hall of India Private Ltd.
3. Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications.

CODE: CE214

SOLID MECHANICS – I

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

1. Stress

Introduction; Method of sections; Definition of stress; Normal stresses in axially loaded bars; Stresses on inclined sections in axially loaded bars; Shear stresses ; Analysis for normal and shear stresses; allowable stress and factor of safety.

2. Strain

Introduction; Normal strain; Stress-strain relationships; Hooke's law; Poisson's ratio; Thermal strain and deformation; Deformation of axially loaded bars; statically indeterminate axially loaded bars; Stress-strain relationship for shear

3. Generalized Hooke's law and Pressure vessels

Generalized Hooke's law for isotropic materials; Relationship between Modulus of elasticity and Modulus of rigidity; Dilatation and Bulk modulus; Thin-walled pressure vessels – Cylindrical and spherical vessels

UNIT-II

4. Internal forces in beams

Introduction; Diagrammatic conventions for supports and loads; Calculation of beam reactions; Application of method of sections; Shear force in beams; Bending moment in beams; Shear force and bending moment diagrams; Differential equations of equilibrium for a beam element

UNIT-III

5. Normal stresses in beams

Introduction; Basic assumptions; The elastic flexure formula ; application of flexure formula; Unsymmetric bending – Bending about both principal axes of a beam with symmetric cross section.

UNIT-IV

6. Shear stresses in beams

Introduction; Shear flow; The shear stress formula for beams; Shear stress in beam flanges; Shear centre

7. Torsion

Introduction; Application of the method of sections; Torsion of circular elastic bars – Basic assumptions, the torsion formula, Design of circular bars in torsion for strength, Angle of twist of circular bars

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Engineering mechanics of solids by E.P.Popov, Prentice Hall of India, 2005.

REFERENCE

1. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd., 2005.
2. Strength of materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd., 1998.
3. Strength of materials by R. K. Bansal, Lakshmi Publications (P) Ltd., 2007

CODE: CE 215

FLUID MECHANICS

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **Properties of Fluids**

Properties of fluids: specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion

2. Fluid Statics

Variation of static pressure; Absolute and gauge pressure; Pressure measurement by mechanical gauges and manometers; Pressure on plane surfaces and curved surfaces.

3. Buoyancy

Buoyancy; Stability of submerged bodies and floating bodies; Metacentre and metacentric height.

UNIT – II

4. Fluid Kinematics

Methods of describing fluid motion; Classification of flows; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective accelaration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet; Vortex flow – free vortex and forced vortex flow.

5. Fluid Dynamics

Euler's equation of motion; Bernoulli's equation; Energy correction factor; Momentum principle; Applications of momentum equation- Force exerted on a pipe bend.

6. Flow Measurement In Pipes

Discharge through venturi meter; Discharge through orifice meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube.

UNIT – III

7. Flow Through Orifices And Mouthpieces

Flow through orifices; Determination of coefficients for an orifice; Flow through large rectangular orifice; Flow through submerged orifice; Classification of mouthpieces; Flow through external and internal cylindrical mouthpiece.

8. Flow Over Notches & Weirs

Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Broad crested weir.

9. Boundary Layer Theory

Boundary layer – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL.

UNIT – IV

10. Analysis Of Pipe Flow

Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, Hydraulic power transmission through a pipe; Siphon; Water hammer.

11. Laminar Flow

Reynold's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe (Hazen poiseuille equation).

12. Turbulent Flow In Pipes

Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow, Variation of friction factor with Reynolds number- Moody's chart.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Hydraulics and Fluid Mechanics by P. N. Modi & S. N. Seth; Standard book house; New Delhi.

REFERENCE BOOKS

1. Fluid Mechanics by A. K Jain, Khanna Publishers

2. Fluid Mechanics and Hydraulic Machines by R. K. Bansal; Laxmi Publications; New Delhi.

3. Fluid Mechanics by Streeter and wyile, Mcgrawhill Publications

4. Fluid Mechanics by S K Som & G Biswas (TMH)

5. Fluid Mechanics by John F. Douglas, Janusz M Gasiorek, John A. Swaffield, Pearson Education Publishers

6. Fluid Mechanics, Hydraulics& Hydraulic Machines by K R Arora, Standard Publishers

CODE: CE 216

ENGINEERING GEOLOGY

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **General Geology**:

Importance of Geology from Civil Engineering point of View. Branches of Geology. Weathering: Mechanical and Chemical Weathering. Soils: Soil formation, Soil profile, Types of Indian Soils. Land Forms produced by, Running water, Wind, Glaciers, Sea waves & currents and Groundwater.

UNIT – II

2. Mineralogy & Petrology:

Mineralogy: Physical Properties and Uses of Minerals. Study of Important Rock Forming Nineral s: Quartz, Feldspars, Pyroxenes, Amphiboles, Micas and Clays. Petrology: Rock Cycle. Rocks - Origin, Classification, Structure, Texture and Mineralogical composition. Types of Rocks-Ingenious Rocks: Granite, Syenite, Dolerite, Gabbro, Diorite, Basalt. Sedimentary Rocks: Breccia, Conglomerate, Sandstone, Shale, Limestone. Metamorphic Rocks: Gneiss, Khondalite, Schist, Slate, Marble, Quartzite, Charnockite. Engineering Properties of Rocks. Influence of Geologic Origin and History on the Engineering Characteristics of Soils and Rocks.

UNIT – III

3. Structural Geology & Geophysical Methods:

Structural Geology: Elements of Structural Geology - Strike and Dip. Classification of Folds, Faults and Joints. Geophysical Methods: Principles of Electrical, Seismic, Gravity methods and GeoRADAR and their Applications to Civil Engineering Problems.

UNIT – IV

4. **Geological Exploration & Environmental Hazards:**

Geological Formations; Preparation of Hazard Maps; Role of Engineering Geologist in Planning, Design and Construction Stages in Civil Engineering Works. Geological Investigations for Dams & Reservoirs, Bridges, Multi-storied Structures, Highways, Air fields, Railway lines, Tunnels and Coastal Structures (Seawalls, Groins and Bulkheads) & Earth Retaining Structures (Sheet piling, Contiguous piling, Diaphragm walls and Reinforced earth). Environmental Geology: Earthquakes; Tsunamis; Volcanoes; Mass wasting: Landfills; Groundwater Contamination; Seawater Incursion.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

Text books:

1. Engineering and general geology by Parbin Singh – Katson Publishing House

2. Engineering Geology by N.Chennakesavulu, Mc-Millan, India Ltd. 2005

3. Geology and the Environment by Bernard Pipkin and Dee Trent, published by Wadsworth (2nd Ed), 1997, ISBN 0-314-09239-0

4. Physical Geology (Exploring the Earth) by James Monroe and Reed Wicander, published by Wadsworth (3rd Ed), 1998, ISBN0-534-53775-8

5. Physical Geology by Carla Montgomery, published by W. C. Brown (2nd Ed), 1987, ISBN 0-697-06261-9

6. The Dynamic Earth by Brian Skinner and Stephen Porter, published by John Wiley (4th Ed), 2000,

7. Principles of Engineering Geology by KVGK Gokhale. B.S.Publications-2005

8. Rahn, Engineering Geology: An environmental approach, 1996

9. Understanding Earth by Frank Press and Raymond Siever, published by W.H. Freeman (2nd Ed), 1998, ISBN 0-7167-2836-2

CODE : CE251 **LABORATORY**

ENGINEERING GEOLOGY LABORATORY

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

1 Study of Survey of India Topographical Maps

2. Study of Satellite Imageries

3. Study of Minerals by their Physical Properties

4. Identification and Textural Study of Rocks

5. Joint Data Analysis

6. Determination of Porosity in Rocks

7. Determination of Compressive Strength of Rocks

8. Determination of Slake and Durability of Rocks

9. Study of Structural Problems

10..Study of Geological Maps and their Cross-section

11.Electrical Resistivity Method

12. Seismic Hammer Sounding Method

13. Study of Structural Models

14. Study of Tunnel Models

CODE : CE252 **LABORATORY**

SURVEYING FIELD WORK - I

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

I) Chain & Compass Survey

1. Measurement of area – Cross staff survey
2. Traversing by compass and graphical adjustment.
3. Plotting of an area using Chain/Compass).

II) Simple Leveling

4. Measurement of elevation difference between two points using any leveling Instrument (Fly Leveling)
5. Elevation difference between two points by Reciprocal leveling method.
6. Profile Leveling – Plotting of Profile.
7. Contouring of a small area by method of Blocks/Tacheometric Survey.

III) Plane Table Survey

8. Determination of the distance between two inaccessible points.
9. Plotting of a building by plane table Traversing
10. Resection methods.

IV) Theodolite

11. Measurement of horizontal and vertical angles.
12. Determination of distance between two inaccessible points

CODE : CE253 **LABORATORY**

BUILDING DRAWING

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

(On drawing sheet using drafting tools on A1 sheet)

1. Conventional signs
2. Plan, Section and Elevation of a single storied residential building -2No

UNIT – II

(Using CAD software)

1. Learning Basic commands of CAD software
2. Drawing conventional signs
3. Drawing basic building components like door, windows, foundations, Pitched roof like king post truss – 4No
4. Using Blocks and W blocking
5. Using layers in drawing

UNIT - III

(Using CAD software)

6. Drawing Plan of a single storied residential building -2No
7. Drawing Plan of a Two storied residential building using layers
8. Generating Plan, section and Elevation of a single storied residential building
9. Generating Plan, section and Elevation of a Two storied residential building

CODE: CE 221

PROFESSIONAL ETHICS AND HUMAN VALUES

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Human Values

Morals, Values And Ethics – Integrity – Work Ethics – 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

2. Engineering Ethics

Senses Of Engineering Ethics – Variety Of Moral Issued – Types Of Inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's Theory – Gillian's Theory – Consensus And Controversy – Professions And Professionalism- Professional Ideals And Virtues - Theories About Right Action – Self-Interest – Customs And Religion – Uses Of Ethical Theories.

UNIT – III

3. Engineering As Social Experimentation

Engineering As Experimentation – Engineers As Responsible Experimenters – Codes Of Ethics – Balanced Outlook On Law .

4. Safety, Responsibilities And Rights

Safety And Risk – Assessment Of Safety And Risk – Risk Benefit Analysis And Reducing Risk.

Collegiality And Loyalty – Respect For Authority – Collective Bargaining – Confidentiality – Conflicts Of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT – IV

5. Global Issues

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.,

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Mike martin and Ronald Schinzinger, "Ethics in Engineering" McGraw-Hill, New York 1996
2. Govindarajan M, Natarajan S, Senthil Kumar V.S., "Engineering Ethics", PHI, New Delhi, 2004

REFERENCE BOOKS

1. Charles D,Fleddermann, "Engineering Ethics", Pearson / PHI, 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, New Delhi, 2003.
4. Edmund G.Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers" Oxford University Press, Oxford, 2001.

CODE: CE 222

CONCRETE TECHNOLOGY

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

1. Cement

General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, heat liberation from a setting cement, structure of hydrated cement, water requirements for hydration.

2. Types Of Cements

Ordinary Portland cement, Rapid hardening cement, Sulphate resisting cement, Slag cement, Quick setting cement, Super sulphated cement, Portland pozzolana cement, air entraining cement, coloured cement, expansive cement,High alumina cement.

3. Testing, Handling And Uses Of Cement

Fineness of cement using sieve test and air-permeability method, Normal consistency and setting times using vicat apparatus, soundness test using Le-chatlier apparatus, Grades of cement as per IS specifications, physical and chemical requirements of OPC for different grades of cement, storage of cement in sheds and silos, Transportation of cement, Safety while handling cement, Uses of cement.

4. Aggregates

Classification, source, size and shape texture and influence of texture on strength, specific gravity of aggregates, moisture in aggregates, bulking of fine aggregate, methods used for determination of moisture content of aggregates, grading of aggregates, sieve analysis, standard grading curve, grading limits of fine aggregates as per IS ; gap grading.

UNIT-II

5. Water

Quality of water for mixing concrete, Tolerable concentrations of some impurities in mixing water, permissible limit for solids as per IS456-2000, use of sea water for mixing concrete.

6. Admixtures And Construction Chemicals

General, plasticizers and super plasticizers – Dosage, mixing procedure, equipment, effect of super plasticizes on the properties of hardened concrete, Retardors, accelerators.

Air-entraining admixtures, factors affecting amount of air-entrainment, effect of air-entrainment on the properties of concrete, fly ash, effect of fly ash on fresh and hardened concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on compressive strength of concrete, construction chemicals for curing, construction chemicals for water proofing.

7. Fresh Concrete

Workability, factors affecting workability, slump test, Kelly ball test, V-B test, compaction factor test, segregation, bleeding, volume batching and weigh batching, hand mixing, machine mixing, mixing time, compaction of concrete, hand compaction, compaction by vibration, internal vibrator, form work vibrator, table vibrator, platform vibrator, surface vibrator.

UNIT-III

8. Hardened Concrete

General; water-cement ratio; gel/space ratio; gain of strength with age; maturity concept of concrete; effect of maximum size of aggregate on strength.

9. Test On Hardened Concrete

Compression test; moulds and compacting; curing; failure of compression specimen; effect of height/diameter ration strength; flexural strength of concrete; tensile strength of concrete; non-destructive testing methods

10. Elasticity, Creep And Shrinkage

Elastic properties of aggregate, Factor's affecting modulus of elasticity, poisson's ratio, creep and factors affecting creep, shrinkage and factors affecting shrinkage.

11. Durability Of Concrete

Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

UNIT-IV

12. Introduction To Special Concretes And Concreting Methods

a) Fibre reinforced concrete; Fibres used, factors effecting properties, aspect ratio of fibres, orientation of fibres, workability, mixing, applications, current development in FRC.
b) No-fines concrete: mix proportion, drying shrinkage, Thermal conductivity, applications.
c) Ferrocement: Casting techniques, hand plastering, semi-mechanized process, Centrifuging, guniting, applications.
d) Light-weight concrete: Natural and artificial light-weight aggregates, properties of common light-weight concretes.
e) High performance concrete.

13. Proportioning Of Concrete Mixes

Concept of mix design, variables in proportioning ,different methods of mix design, nominal mix and design mix, Indian standard method of mix design.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Concrete technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi

REFERENCE BOOKS

1. Properties of concrete by A.M.Neville, Longman Publishers
2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill Publishing company Ltd., New Delhi

CODE: CE 223

SURVEYING – II

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – 1

1. **Computation of Areas and Volumes**

Introduction; Simpson's rule; Boundaries with offsets at irregular intervals; Meridian methods; Coordinate method; Planimeter – Area of Zero circle. Area of cross sections – two level section only; Trapezoidal rule; Prismoidal formula; Volume from spot levels; volume from contour plan; Capacity of a reservoir

2. **Modern Systems in Surveying**

Electronic theodolite; Electronic Total Station; Digital Level; Global Positioning System; Geographical Information System; Electronic Distance Measurements - Basic concepts, Basic principle of Electronic Distance Measurement, Computing the distance from the phase differences, Instrumental errors in EDM.

UNIT – II

3. **Trigonometric Leveling**

Introduction; Plane trigonometric leveling methods - When base of the vertical or inclined object accessible and when base of the object is not accessible; Axis signal correction; Difference in elevation by single observation and reciprocal observations.

4. **Tacheometric Surveying**

Advantages of tachometric surveying; Basic systems of tachometric measurements; Principle of stadia measurements, Determination of constants K and C; Inclined sight with staff vertical; Inclined sight with staff normal to the line of sight.

UNIT – III

5. **Triangulation**

Principles of triangulation; Uses of triangulation survey; Classification of triangulation; Signals and towers, Satellite station; Base line & Extension of the base line.

6. **Construction Surveying**

Horizontal Control - Reference grid; Vertical Control; Control stations; Positioning of a structure; setting out a building – reference pillars and Batter boards; setting out a culvert; Grade

stakes; Boning rods or travelers; Sight rails; Slope rails; Profile boards or batter boards; Setting out grades for sewers and pipe lines; setting out slopes in embankment and cutting;

UNIT – IV

7. **Curves Ranging**

Circular curves - Basic definitions; Designation of a curve; Relationship between radius and degree of curve; Elements of a simple circular curve; Location of the tangent points; selection of peg interval; Methods of setting out; Problems in setting out curves;

8. **Map Projections**

Introduction; Scale Factor; Geometry of the sphere and cone; Areas; Surface areas of solids; Types of Map Projections; Map projection to a plane; Gnomonic Projection; Stereographic Projection; Orthographic Projection; Conical Projection; Albers Equal-area Projection; Polyconic Projection; Conformal Projection; Lambert Projection; Mercator Projection; Transverse Mercator Projection; Universal Transverse Mercator Projection; The choice of projection.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Surveying Vol I & II by K R Arora, Standard Book house.

REFERENCE TEXT BOOKS

1. Fundamentals of Surveying by S K Roy, Prentice- Hall of India Private Ltd.
2. Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications.
3. Higher Surveying by AM Chandra, New Age International (P) Ltd.

CODE: CE224

SOLID MECHANICS – II

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

1. Compound stresses

Introduction; Superposition and its limitation; Superposition of normal stresses; Eccentrically loaded short columns; Core or kernel of a section; Superposition of shear stresses; Stresses in closely coiled helical springs; Deflection of closely coiled helical springs

UNIT -II

2. Analysis of Plane-Stress

Introduction; The basic problem; Equations for transformation of plane-stress; Principal planes and Principal stresses ; Maximum shear stresses ; Mohr's circle of stress ; Construction of Mohr's circle

3. Work and Strain Energy

Introduction; Elastic strain energy for uni-axial stress; elastic strain energy in pure bending; Strain energy of beams in shear; Strain energy of circular shafts in torsion; Work and strain energy method; Determination of displacements by work and strain energy method

UNIT-III

4. Failure Theories

Introduction; maximum normal stress theory; maximum shearing stress theory; maximum strain energy theory; maximum distortion energy theory; comparison of theories.

5. Buckling of columns

Introduction; Examples of instability; Criteria for stable equilibrium; Euler load for column with pinned ends; Euler loads for columns with different end restraints; Limitations of the Euler's formulae; Generalized Euler buckling load formulae; Eccentric loads and the secant formula

UNIT –IV

6. Deflection of statically determinate beams

Introduction; strain-curvature and Moment-Curvature relation; Governing differential equation for deflection of elastic beams; Alternative differential equations of elastic beams; solution of beam deflection problem by Direct integration; Introduction to moment area method; Derivation of

Moment area theorems; conjugate-beam method; slope and deflection of beams using moment area method and conjugate-beam method.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Engineering mechanics of solids by E.P.Popov, Prentice Hall of India, 2005.

REFERENCES

1. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd., 2005.
2. Strength of materials by S. S. Bhavikatti, Vikas Publishing House Pvt. Ltd., 1998.
3. Strength of materials by R. K. Bansal, Lakshmi Publications (P) Ltd., 2007

CODE: CE 225

HYDRAULICS& HYDRAULIC MACHINES

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – 1

1. Open Channel Flow-Uniform Flow

Introduction, Classification of flows, Types of channels; Chezy, Manning's, Bazin, Kutter's Equations; Hydraulically efficient channel sections - Rectangular, Trapezoidal and Circular channels; Velocity distribution; Energy and momentum correction factors.

2. Open Channel Flow- Non – Uniform Flow

Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; Different slope conditions; Channel transitions- Reduction in width of channels, hump; Momentum principle applied to open channel flow; Specific force; Specific force curve. Surges in open channels.

UNIT - II

3. Open Channel Flow- Gradually Varied Flow

Dynamic equation; Surface Profiles; Computation of surface profiles by single step & multi step methods; Back water Curves and Draw down curves; Examples of various types of water surface profiles; Control section.

4. Open Channel Flow- Rapidly Varied Flow

Hydraulic jump; Elements and characteristics of hydraulic jump; Types of hydraulic jumps; Location and applications of hydraulic jump; Energy loss in a hydraulic jump.

UNIT – III

5. Momentum Principles

Action of jets on stationary and moving flat plates and curved vanes; Angular momentum principle; Torque and head transferred in rotodynamic machines.

6. Hydraulic Turbines

Classification; Impulse; Reaction; Radial, Axial, mixed and tangential flow turbines; Pelton, Francis and Kaplan turbines; Runner profiles; Velocity triangles; Head and efficiency; Draft tube theory; Similarity laws; Concept of specific speed and unit quantities; Selection of Turbines; Operational characteristics; Governing of turbines.

UNIT – 4

7. Centrifugal Pumps

Manometric head; Losses and efficiencies; Work done; Working Principle; Priming; Velocity triangles; Performance and characteristic curves; Multistage and double suction pumps; Cavitation effects; Similarity Considerations.

8. Dimensional Analysis And Similitude

Dimensional homogenity; Rayleigh's method; Buckingham – Pi theorem; Geometric, Kinematic and dynamic similarities; Reynold's, Froude, Euler, Mach and Weber numbers; Model laws Partially submerged objects; Scale effect; Distorted models.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Hydraulics & Fluid Mechanics by P. N. Modi & S. N. Seth; Standard Book house, New Delhi

REFERENCE BOOKS

1. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi
2. Open channel flow by K. Subramanya, TMH Publishers
3. Fluid Mechanics & Hydraulic Machines by Dr. R. K. Bansal; Laxmi Publications, New Delhi.

CODE: CE 226

ENVIRONMENTAL ENGINEERING – I

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

1. Introduction To Water Supply Engineering

Need for protected water supplies; Objectives of water supply systems; Water borne diseases; Role of Environmental Engineers.

2. Quantity Of Water

Estimating requirements; Design period; Per capita consumption; Factors affecting per capita consumption; Fire demand; Fluctuations in demand; Prediction of population.

3. Sources & Intake Works

Classification of sources of water supply; Choice of source; Suitability with regard to quality and quantity; Lake, river, reservoir and canal intakes.

UNIT - II

4. Transportation And Pumping Of Water

Types of conduits; Capacity and design; Materials for pipes, Laying and Jointing of pipes; Leakages; Classification of pumps; Efficiency and choice of pumps.

5. Quality Of Water

Impurities in water; Routine water analysis - physical, chemical and bacteriological tests; BIS Standards for drinking water.

6. **Purification Of Water**

Methods of purification of water; Sequence of treatment.

7. Plain Sedimentation And Coagulation

Theory of sedimentation; Stoke's law; Sedimentation tanks; Design aspects; Principle of coagulation; Chemicals used for coagulation; Units of coagulation plant; Optimum dose of coagulant.

UNIT - III

9. Filtration of Water

Theory of filtration; Filter materials; Slow sand and rapid sand filters; Construction operation and design; Under drainage system design in rapid sand filters; Troubles in rapid sand filters; Pressure filters.

9. Disinfection Of Water

Different methods of disinfection; Chlorination; Types of chlorination

10. Miscellaneous Treatment Methods

Water softening; Methods of removing temporary hardness; Methods of removing permanent hardness; Removal of colour, odour and taste from water; Defluoridation.

UNIT – IV

11. Distribution System

General requirements; Classification; Methods of supply; Available pressure in the distribution system; Layouts of distribution networks; Distribution reservoirs; Functions; Types; Capacity of balancing tank; Analysis of distribution system; Methods of analysis.

12. Pipe Appurtenances

Appurtenances in the distribution system; Service connection, Sluice valves; Check valve; Air valve; Drain valve; Hydrants; Meters.

*Field visit to water treatment facility covering all treatment units

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Elements of public health engineering by K. N. Duggal; S. Chand & Company Ltd., New Delhi.
2. Environmental Engineering Vol. I - Water supply engineering by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS

1. Water Supply and Sanitary Engineering Vol. 1 by Gurucharan Singh; Standard Publishers Distributors, Delhi.
2. Water Supply and Sanitary Engineering by G.S. Birde; Dhanpat rai and sons, Delhi.
3. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.

CODE : CE261 **LABORATORY**

ENVIRONMENTAL ENGINEERING LABORATORY

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

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

CODE : CE262 **LABORATORY**

HYDRAULICS & HYDRAULIC MACHINES LABORATORY

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

1. Verification of Bernoulli's theorem.
2. Venturimeter : Determination of Coefficient of discharge.
3. Orificemeter : Determination of Coefficient of discharge.
4. Orifices : Determination of Coefficient of discharge by steady and unsteady flow methods.
5. Mouthpieces : Determination of Coefficient of discharge by steady and unsteady flow methods.
6. Characterization of laminar and turbulent flows by Reynold's apparatus.
7. Determination of friction factor of Pipes.
8. Determination of loss of head in pipes due to bends, sudden contractions and sudden expansion.
9. Determination of Coefficient of discharge for rectangular and V – notches.
10. Determination of Manning's and Chezy's coefficients in open channel.
11. Measurement of force due to impact of jets on vanes of different types.
12. Performance studies on Pelton turbine.
13. Performance studies on Francis turbine/Kaplan turbine.
14. Performance studies on single stage centrifugal pump.
15. Performance studies on Reciprocating pump.

CODE : CE263 **LABORATORY**

MATERIAL TESTING LABORATORY

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

1. To study the stress-strain characteristics of HYSD bars by UTM.
2. To find young's modulus of the given material (steel or wood) by conducting bending test on simply supported beam.
3. To find modulus of rigidity by conducting torsion test on solid circular shaft.
4. To find the hardness of the given material by Brinnel's or Vickers hardness tester.
5. To find impact resistance of the given material by conducting Charpy test on Impact testing machine.
6. To determine the ultimate shear strength of steel rod in single and double shear.
7. To determine the modulus of rigidity of the spring.
8. Normal consistency and fineness of cement.
9. Initial setting and final setting time of cement.
10. Specific gravity and soundness of cement.
11. Compressive strength of Cement.
12. Slump cone test to determine workability of concrete.
13. Compaction factor or Vee-Bee consistometer test to determine the workability of concrete.
14. To determine the compressive strength and split tensile strength of concrete.
15. Specific gravity of fine and coarse aggregates.
16. Bulking of fine aggregate.
17. To determine the fineness modulus of fine aggregate and coarse aggregate.
18. Non-destructive testing on concrete (for demonstration) and concrete mix design (IS method-For demonstration).

CODE: CE 311

STRUCTURAL ANALYSIS – I

Lectures	:	4 Periods/Week, Tutorial:1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **Displacements Of Determinate Structures Using Energy Methods**

Maxwell's reciprocal theorem; Maxwell – Betti's generalised reciprocal theorem; Castigliano's theorems; Application of Castigliano's theorem for calculating deflection of beams, frames and trusses; Virtual work method for deflections.

UNIT – II

2. **Influence Lines For Statically Determinate Structures**

Moving loads and influence lines; Influence lines for beam reactions; Influence lines for shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence lines for simple trusses.

UNIT – III

3. **Propped Cantilevers**

Analysis of propped cantilever by method of consistent deformations.

4. **Fixed Beams**

Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of support; Effect of rotation of a support; Bending moment diagram for fixed beams.

5. **Clapeyron's Theorem Of Three Moments**

Analysis of continuous beam by Clapeyron's theorem of three moments.

UNIT – IV

6. **Strain Energy Method**

Strain energy method for analysis of continuous beams and rigid joined plane frames up to second degree redundancy.

7. **Redundant Pin Jointed Frames**

Analysis of pin jointed frames (one degree redundancy); Forces in indeterminate pin jointed frames due to temperature variation and lack of fit; Composite structure.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Analysis of Structures vols. 1 & 2 by Vazirani & Ratwani; Khanna Publishers; Delhi.

REFERENCES

1. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
2. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House
3. Structural analysis by R. C. Hibbeler, Pearson Education.
4. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill

CODE: CE 312

WATER RESOURCES ENGINEERING-I

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Hydrology

Hydrologic cycle; Precipitation types; Rain gauges; Computation of average rain fall over a basin; Abstraction from rainfall-evaporation, factors affecting evaporation, measurement of evaporation-Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices; Run off; Factors affecting run off; Computation of run-off; Design Flood, Estimation of maximum rate of run-off, Flood frequency analysis by Gumbel's method

2. Hydrographs

Hydrograph analysis; Unit hydrograph; Construction of UH for an isolated storm, Application of UH to the construction of a flood hydrograph resulting from rainfall of unit duration; Application of UH to construction of a flood hydrograph resulting from two or more periods of rainfall; Construction of unit hydrograph of different unit duration from a unit hydrograph of some given unit duration by superposition method and S-curve method.

UNIT – II

3. Ground Water – Well Irrigation

Introduction; Aquifer; Aquiclude; Aquifuge; Specific yield; Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; Well hydraulics; Steady radial flow to a well–Dupuit's theory for confined and unconfined aquifers; Tube wells - Open wells; Yield of an open well–Constant level pumping test, Recuperation test.

4. Irrigation Channels – Silt Theories & Design Procedure

Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Lacey's regime theory; Kennedy's method of channel design; Use of Garret's diagram in channel design; Lacey's theory applied to channel design; Use of Lacey's regime diagrams; Drawbacks in Kennedy's theory; Defects in Lacey's theory; Comparison of Kennedy's theory and Lacey's theory

UNIT – III

5. Reservoir Planning

Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of

safe yield from a reservoir of a given capacity; Sediment flow in streams; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Multipurpose reservoir flood routing; Methods of flood routing-Graphical Method (Inflow – storage discharge curves method), Trial and error method; Channel routing by Muskingum method.

6. Diversion Head Works

Component parts of a Diversion Head work; Weirs and barrages- Types of weirs; Causes of failure of weirs and their remedies; Design of weirs on permeable foundations–Bligh's creep theory, Khosla's theory; Silt control at head works;

UNIT - IV

7. Stream Gauging

Necessity; Selection of gauging sites; Discharge measurement- Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, ultrasonic method; Measurement of depth – Sounding rod, Echo-sounder; Measurement of velocity; Floats – Surface floats, Sub–surface float or Double float, Velocity rod or Rod float; Pitot tube; Current meter; Measurement of stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

8. Water Logging And Canal Lining

Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS:

1. Irrigation and water power Engineering by Dr. B.C. Punmia & Dr. Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOK:

1. Irrigation, Water Resources & Water Power Engineering by Dr. P.N. Modi; Standard Book House, New Delhi.
2. Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers, New Delhi
3. Engineering Hydrology by K. Subramanya, TMH Publishers

4. Engineering Hydrology by P. Jayarami Reddy, Laxmi Publications

CODE: CE 313

DESIGN OF CONCRETE STRUCTURES-I

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **Introduction**

Objectives of structural design – stability, strength and serviceability; Design codes and handbooks; Design philosophies – working stress method, ultimate load method and limit states method.

2. **Design For Flexure (Working State Method)**

Assumptions; Permissible stresses in concrete and steel; Balanced design; Transformed area method; Analysis and design for flexure of singly reinforced, doubly reinforced and flanged sections.

UNIT-II

3. **Design For Flexure (Limit State Method)**

Assumptions; Limit states; Partial safety factors; Modes of failure; Maximum depth of neutral axis; Analysis and design for flexure of singly reinforced, doubly reinforced and flanged sections; Comparison of limit state method with working stress method.

UNIT-III

4. **Shear And Development Length**

Shear in a homogeneous beam; Shear in R.C. beams; Diagonal tension and diagonal compression; Design for shear by working stress method and limit state method; Development length; Pull out test; Anchorage bond; Flexural bond, Check for development length by working stress method and limit state method

5. **Deflection And Cracking**

Span/Effective depth ratio; Calculation of short-term deflection and long term deflection; Cracking; Bar spacing controls.

UNIT-IV

6. **Design By Limit State Method**

Singly reinforced, doubly reinforced and flanged beams; simply supported One-way slab, Dog – legged staircase.

UNIT-V

7. **Design By Working Stress Method**

Rectangular Water Tanks: Introduction, under ground rectangular water tanks, rectangular water tanks resting on ground.

NOTE

Two questions of 12 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

1. For Working Stress Method: Reinforced concrete by H. J. Shah, charotar publishing house
2. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros., Roorkee

REFERENCES

1. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hill
2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah; Pune Vidyarthi Griha Prakashan, Pune.

CODE: CE 314

DESIGN OF STEEL STRUCTURES – I
(Using Limit State Method)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **Introduction**

Types of steels; Constructional steels; Mechanical properties; Design concepts; Fatigue behavior; Brittle fracture; Corrosion; Hot rolled sections; Cold-formed or light gauge sections;

2. **Simple Connections**

Advantages of welding; Welds; Types of welded joints; Weld specifications; Allowable stresses; Bolts; Black bolts; Failure modes of a joint; Pitch requirements of bolts; Allowable stresses; Efficiency of joint; High strength bolts; Riveting; Rivet value; Allowable stresses for rivets; Lap and butt joints, Truss joint connections;

UNIT – II

3. **Tension Members**

Introduction; Types of sections; Net area; Net effective area for angles and Tees; Design of tension members;

4. **Compression Members**

Introduction; Angle Struts; Effective length of a column; Allowable stresses; Types of sections; Built-up columns(using welding); Column splice (using welding) ,

UNIT – III

5. **Beams**

Introduction; Laterally supported beams; Built-up beams (using welding); lateral buckling of beams; Design of laterally supported beams; Secondary design considerations; Grillage beams;

UNIT – IV

6. **Laterally unsupported Beams**

Design of laterally unsupported beams; Encased beams; composite beam design; shear connectors;

UNIT – V

7. **Eccentric Connections**

Simple beam end connections – Framed connection, Seat connections; Bracket connections; Moment connections;

NOTE

Two questions of 12 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

1. Design of Steel Structures by Limit state method as per IS800-2007 by S.S.Bhavakatti, IK International Publishing Housing Pvt.Ltd.
2. Design of Steel structures by N.Subramanian, Oxford University press,2009
3. Limit state design of steel structures by S.K.Duggal, Tata McGrawhill,Publishing company Ltd.

Codes

1. IS 800-2007

CODE: CE 315

GEOTECHNICAL ENGINEERING – I

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – 1

1. **Introduction**

Soil formation and soil types; Regional soil deposits of India

2. **Basic Definitions And Relations**

Phase diagrams; Simple definitions; some important relationships;

Index Properties; Grain size distribution; Atterberg Limits; Significance of other Soil Aggregate properties

UNIT – II

3. Soil Classification

Clay Mineralogy: Introduction to soil classification; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system

4. Permeability

Capillary rise; Darcy's law and its Validity; Determination of coefficient of permeability - constant and Variable head methods, indirect methods, Factors affecting permeability; Permeability of stratified soil deposits. ;

UNIT – III

5. Seepage through Soils

Principle of effective stress; physical meaning of effective stress; Types of head, seepage forces and quicksand condition

6. Compaction of Soils

Introduction; Laboratory tests; Factors affecting compaction; Structure and engineering behavior of Compacted cohesive soils; Compaction in the field; Compaction specifications and field control.

UNIT – IV

7. Compressibility of Soil And Consolidation

Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of

Settlement; extrapolation of field consolidation curve; Settlement analysis.

8. Shear Strength Of Soils

Introduction; Stress at a point- Mohr Circle of stress; Mohr–coulomb Failure Criterion; Measurement of Shear Strength; Shear strength of Clayey soils; Shear Strength of Sands; Drainage conditions and Strength parameters.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers

REFERENCES

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Co.
2. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications
3. A Text book of Soil Mechanics and Foundation Engineering – K.R.Arora, Standard Publishers & Distributors, New Delhi
4. A Text book of Soil Mechanics and Foundation Engineering – P.Purushotthama Raj, Pearson Education
5. Introduction to Soil Mechanics- Braja M Das

CODE: CE 316

ENVIRONMENTAL ENGINEERING – II

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – 1

1. **Introduction To Sanitary Engineering**

Sanitation; Conservancy and water carriage system; Sewerage systems; Relative merits.

2. **Sanitary Sewage And Storm Sewage**

Quantity of sanitary sewage; Factors affecting sanitary sewage; Determination of quantity of sanitary sewage; Factors affecting storm water sewage; Determination of quantity of storm water sewage.

3. **Sewers, Sewer Appurtenances, Sewage Pumping**

Types of sewers; Design of sewers; Construction; Testing; Maintenance of sewers; Sewer appurtenances – Man holes, Drop man holes, Lamp holes, Flushing tanks, Inverted syphons; Street inlets; Catch basins; Storm water regulators; Sewage pumping; Types of pumps.

UNIT – II

4. **Quality And Characteristics Of Sewage**

Characteristics of sewage; Decomposition of sewage; Carbon, nitrogen and sulphur cycles of decomposition; BOD; COD; Physical and chemical analysis of sewage.

5. **Primary Treatment Of Sewage**

Screens; Grit chamber; Grease traps; Skimming tanks; Sedimentation tanks.

6. **Septic Tank**

Septic tank design; Septic tank effluent disposal, soak pits, leaching cess pools;

7. House Plumbing

House drainage - Sanitary fittings, Traps; Plumbing system of drainage – Single stack, One pipe and Two pipe systems; Principles governing design of building drainage.

UNIT – III

8. **Secondary Treatment Of Sewage:**

Trickling filters; Principles of action; Filter types; Recirculation; Fina settling tanks; Operational problems and remedies;

9. Activated sludge process

Principle of action; Activated sludge process vs Trickling filter process;

Features of operation; Organic loading parameters; Methods of aeration; Diffused air system; Mechanical aeration; Combined system; Sludge bulking; Sludge volume index.

UNIT – IV

10. Sludge Treatement And Disposal

Characteristics of sewage sludge; Anaerobic sludge digestion process; Stages of sludge digestion; Factors affecting sludge digestion; Sludge digestion tank; High rate digestion; Sludge thickening; Sludge conditioning; Methods of dewatering the sludge; Methods of sludge disposal.

11. Sewage Disposal

Objects; Methods; Disposal by dilution; Disposal by irrigation; Sewage sickness; Reuse of treated sewage; Ground water recharge.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Elements of public health engineering by K. N. Duggal; S. Chand & Company Ltd., New Delhi.
2. Environmental Engineering vol. II – Sewage disposal and air pollution engineering by S. K. Garg; Khanna Publishers, Delhi.
3. Environmental pollution control engineering by C. S. Rao; Wiley Eastern Limited, New Delhi.

REFERENCE BOOKS

1. Wastewater Engineering Treatment, Disposal & Reuse by Met Calf & Eddy; Tata Mc. Graw – Hill publishing Co. Ltd., New Delhi.
2. Water & Wastewater Technology by Mark J. Hammer; John Wiley & Sons.
3. Manual on Sewerage & Sewage treatment; CPH and EEO, Ministry of Works and Housing; Govt. of India; New Delhi.

CODE : CE351 **LABORATORY**

SOFT SKILLS LABORATORY
(Common to All Branches)

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

UNIT - I

1. Introduction to Communication

1.1 Elements of Communication;1.2 Theories of Communication; 1.3 Barriers to Communication; 1.4 Successful Commuzion; 1.5 Types of Communication

UNIT - II

2. Introduction to Skills

2.1 Listening Skills; 2.2 Speaking Skills; 2.3 Reading Skills; 2.4 Writing Skills; 2.5 Study Skills; 2.6 People Skills; 2.7 Soft Skills; 2.8 Linguistic Skills; 2.9 Communication Skills

UNIT – III

3. Accent Training

3.1 Phonetics; 3.2 Intonation 3.3 British English; 3.4 American English; 3.5 Indian English; 3.6 International English

UNIT – IV

4. Career English

4.1 Resumes 4.2 Letters 4.3 Reports 4.4 Technical Write-up 4.5 Writing with a purpose

UNIT - V

5. Conversational English

5.1 Conversational Styles 5.2 Face-to-Face Interaction 5.3 Telephonic Interaction 5.4 Group Interaction 5.5 Body Language

UNIT –VI

6. Performance

6.1 Elocution; 6.2 Debates; 6.3 Group Discussion; 6.4 Presentation; 6.5 Brainstorming; 6.6 Interpretation; 6.7 Extempore

Course Credits		**Internals**
Lab Observation Book & Attendance	:	05
Theory (Viva)	:	10
Practical	:	10
Total	:	**25**

RECOMMENDED SOFTWARES

Digital Language Lab Networking Software

1. HiClass-SW
2. Renet

English Language - Listening, Speaking, Reading, Writing Skills:

1. Alania Series - English Mastery

   Levels A, B (Set of 2 CDs)

2. English Discoveries (Set of 12CDs)

3. Rosetta Stone English Suite (Levels 1,2& 3)

English Grammar

1. New English Grammar in Use

   Cambridge

2. Live Action English Interactive

3. Tense Buster 2001

4. Tense Buster 5 levels

5. New Churchill House Grammar

Pronunciation

1. Euro Talk: Phonetics

2. Multimedia Pronunciation Power

3. Pronunciation Power 1 & 2

Vocabulary

1. Word Flash
2. 1000 key English Words
3. VOCA
4. V Tutor
5. Error Terror
6. Word Invaders
7. Crossword Challenge
8. Beat the Clock

Dictionaries

1. Cambridge Advanced Learner's
2. Oxford Genie & Advanced
3. Webster's New World & Miriam
4. American Heritage
5. Reader's Digest

Encyclopedias

1. Encarta
2. Britannica
3. DK

Teacher-ware

1. Author Plus Tool Kit
2. Exercise Generator
3. Media Master
4. Power Glide

Study Skill

1. Cambridge Study Skills
2. Read Up, Speed Up

Writing

1. Easy Writer
2. Creative Writing
3. Newspaper Editor
4. Report Writer

Professional English

1. Telephonic in English
2. Business Roles
3. Mind Game 5 levels
4. Business Goals
5. Globe Arena
6. Business Territory
7. Issues in English 1&2

English For ETS

From leading brands like Cambridge, Longman, REA, ARCO, VISU, Power prep, KAPLAN, Princeton, Barron's,

Cliff s, etc.

TOEFL Mastery

IELTS

GRE

GMAT

CODE : CE352 **LABORATORY**

GEOTECHNICAL ENGINEERING LABORATORY

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of water content by oven drying method.
2. Determination of specific gravity by
   (a) Density bottle method
   (b) Pycnometer method.
3. Gradation analysis
   a) Mechanical Sieve analysis
   b) Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
6. Determination of field unit weight by
   a) Core cutter method.
   b) Sand replacement method.
7. Determination of permeability by
   a) Constant head permeameter.
   b) Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. IS - Light compaction test
12. IS - Heavy compaction test
13. Triaxial shear test.
14. Consolidation test.

CODE : CE353 **LABORATORY**

COMPUTER APPLICATIONS IN CIVIL ENGINEERING LABORATORY

Lectures	:	3 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to write and execute programmes to solve the following problems.
Programmes shall be in C or C^{++} language or MATLAB/JAVA. *or* MS-Office Softwares

UNIT -I

(Write any SIX programmes) *8 lab classes*

1. Design of Reinforced Beam for flexure by limit state method.
2. Design of T- Beam for flexure by limit state method.
3. Design of Reinforced beam for Shear by limit state method.
4. Design of R.C.C. section subjected to Bending moment, Shear force and Torsional moment.
5. Design of simply supported one-way slab.
6. Design of steel tension member
7. Design of steel compression member
8. Design of slab base for a steel column
9. Design of laterally supported steel beam
10. Design of beam to column framed connection using bolts

UNIT -II

(Write any THREE programmes) *3 lab classes*

11. Classification of soil by Indian standard classification system.
12. Stresses due to applied loads both Boussinesq and Westerguard analysis

a) Concentrated loadb) circular loaded area c) Rectangular loaded area

13. Determination of permeability coefficient by constant head and falling permeability tests.

14. Determination of index properties of soil.

UNIT - III

(Write any THREE programmes) *3 lab classes*

15. Design of an open channel

16. Analysis of water distribution networks (Hardy cross method).

17. Determination of the height of the building when base is accessible.

18. Determination of included angles from the given bearing and check for local attraction.

CODE: CE321

STRUCTURAL ANALYSIS – II

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Slope Deflection Method

Slope - deflection equations; Principles of the method; Applications of the method to the analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with sidesway.

UNIT – II

2. Moment Distribution Method

Principles of the method; Application of the method to analysis of continuous beams and portal frames (Single bay, single storey with vertical legs only) without and with side sway.

UNIT – III

3. Multi Storey Frames (Approximate Methods)

Substitute frame method for gravity loads; Portal method and cantilever method for lateral loads.

4. Kani's Method

Principles of the method; Application to continuous beams and portal frames (single bay, single storey with vertical legs only) without and with side-sway.

UNIT – IV

5. Arches

Eddy's Theorem; Analysis of three hinged and two hinged Parabolic and Circular arches for Static and moving loads.

6. Cables

Analysis of cables under uniformly distributed and concentrated loads; Shape of the cable under self weight; Effect of temperature changes in suspension cables; Anchor cables.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Analysis of Structures vols. 1 & 2 by Vazirani & Ratwani; Khanna Publishers; Delhi.

REFERENCES

1. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
2. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House
3. Structural analysis by R. C. Hibbeler, Pearson Education.
4. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill

CODE: CE322

WATER RESOURCE ENGINEERING-II

Lectures	:	4Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

1. Introduction to Irrigation

Definition; Necessity; Scope of irrigation science; Benefits of irrigation; Ill-effects of irrigation; Types of irrigation.

2. Methods Of Irrigation

Methods of applying water to crops; Uncontrolled or wild flooding; Free flooding; Contour laterals; Border strip method; Check flooding; Basin flooding; Zig zag method; Furrow method; Contour Farming; Sub-surface irrigation; Sprinkler irrigation; Drip irrigation.

3. Water Requirement Of Crops

Functions of irrigation water; Classes and availability of soil water; Saturation capacity; Field capacity; Wilting point; Available moisture and readily available moisture; Moisture equivalent; Soil – moisture deficiency; Limiting soil moisture conditions; Depth and frequency of irrigation; Duty and Delta; Base period; Relation between Duty and Delta; Factors affecting duty; Methods of improving duty; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; Consumptive use of water (Evapo – Transpiration); Direct measurement of consumptive use; Irrigation efficiencies – Water conveyance efficiency, Water application efficiency, Water distribution efficiency and Consumptive use efficiency; Determination of irrigation requirements of crops; crop rotation, Assessment of Irrigation water

UNIT – II

4. Canal outlets and regulation works:

Types of outlets; Non–modular outlets; Semi-module outlets; Rigid modules; Canal falls; Necessity and location of falls; Development of falls; Classification of falls; Canal regulators; Off-take alignment; Head regulators and cross-regulators; Canal escape (Designs not included).

5. Cross Drainage Works

Introduction; Types of cross - drainage works; Selection of suitable type of cross - drainage work; Classification of Aqueducts and Syphon Aqueducts; Selection of a suitable type.

6**. Dams In General**

Introduction; Classification; Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams; Physical factors governing selection of type of dam and selection ofsite for a dam.

UNIT – III

7. Gravity Dams

Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure and criteria for stability requirements; Stability analysis; Elementary Profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam; High and low gravity dams; Design of gravity dams–single step method; Galleries; Joints; Keys and water seals; Stability analysis of non–overflow section of Gravity dam.

UNIT – IV

8**. Earth Dams**

Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection.

9**.Spillways**

Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal and slopping aprons; Spillway crest gates-Types and description only.

10**. Water Power Engineering**

Introduction; Hydropower - Advantages & disadvantages; Estimation of hydro-power; Flow duration curve; Power duration curve; Load curve; Load factor; Capacity factor; Utilization factor; Diversity factor; Load duration curve; Firm Power; Secondary power; Types of hydel schemes; Forebay; Intake structures; Penstocks; Surge tank; Tail race; Turbines; Selection of suitable type of turbine.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered.
Twelve questions of one mark each will be given from entire syllabus which is a compulsory question

TEXT BOOKS:

1. Irrigation and water power Engineering by Dr. B.C. Punmia & Dr. Pande B.B. Lal; Laxmi Publications Pvt. Ltd., New Delhi.

2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOK:

1. Irrigation, Water Resources & Water Power Engineering by Dr. P.N. Modi; Standard Book House, New Delhi.
2. Irrigation, water power and water resources Engineering by K R Arora, Standard Publishers, New Delhi
3. Engineering Hydrology by K. Subramanya, TMH Publishers
4. Engineering Hydrology by P. Jayarami Reddy, Laxmi Publications

CODE: CE 323

DESIGN OF CONCRETE STRUCTURES-II

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1**. Columns (Working Stress Method)**

General requirements; Short columns; Long columns; Design of axially loaded Columns; Design of axially loaded circular columns with helical reinforcement; Eccentrically loaded columns; Uncracked section; Cracked section for uniaxial Bending.

2**. Continuous Slab (Limit State Method)**

Design of continuous one-way slab

3. **Continuous Beam (Limit State Method)**

Design of continuous beam

UNIT-II

4. **Two Way Slabs (Limit State Method)**

Design and detailing of two way slabs

5. **Flat Slabs (Limit State Method)**

Design and detailing of flat slabs by direct design method.

UNIT-III

6**. COLUMNS (LIMIT STATE METHOD)**

Assumptions; Design of axially loaded columns; Design of axially loaded Circular columns with helical reinforcement; Interaction diagrams; Design of short Columns and slender columns of rectangular section in the following cases

(a) Axial compression and uni-axial bending.
(b) Axial compression and bi-axial bending (Using SP-16 Charts)

UNIT-IV

7**. Retaining Walls (Limit State Method)**

Types of retaining walls, Forces on retaining walls; Stability requirements;

Design and detailing of cantilever type retaining wall.

UNIT-V

8**. Foundations (Limit State Method)**

Design and detailing of

(a) Isolated column footings,
(b) Combined footings
(c) Pile and pile cap design

NOTE

Two questions of 12 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

A. For Working Stress Method: Reinforced concrete by H. J. Shah, charotar publishing house

B. For Limit State Method: Reinforced Concrete (limit state design) by Ashok K. Jain; Nem Chand & Bros., Roorkee

REFERENCES

1. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hill
2. Limit state theory & Design of reinforced concrete by Dr. S. R. Karve and Dr.V.L.Shah; Pune Vidyarthi Griha Prakashan, Pune.

CODE: CE 324

DESIGN OF STEEL STRUCTURES – II
(Using Limit State Method)

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **Gantry Girder**

Introduction; Loads on Gantry girders; Fatigue effects; Design of gantry girder;

UNIT – II

2. **Plate Girders**

Introduction; Design of flanges and web; Stiffeners and their connections; Splices

UNIT – III

3. **Roof Trusses**

Type of trusses for different spans; Components of a roof trusses; Live loads and wind loads on trusses as per I.S Codes; Design of Purlins including tubular sections; Design Connections using welding / bolting;

UNIT – IV

4. **Steel Water Tank**

IS Code specifications; Design of rectangular tank using pressed steel plates; Design of staging for a rectangular tank;

UNIT – V

5. **Beam – Columns**

Behavior of beam columns; interaction formulae; design of beam – columns;

6. **Column bases**

Slab base; Gusseted base; Eccentric bases;

NOTE:

Two questions of 12 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOKS

1. Design of Steel Structures by Limit state method as per IS800-2007 by S.S.Bhavakatti, IK International Publishing Housing Pvt.Ltd.
2. Design of Steel structures by N.Subramanian, Oxford University press,2009
3. Limit state design of steel structures by S.K.Duggal, Tata McGrawhill,Publishing company Ltd.

CODES

1. IS 800-2007

CODE: CE 325

GEOTECHNICAL ENGINEERING – II

Lectures	:	4 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **Sub–Soil Investigation And Sampling**

Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field tests vis-à-vis Laboratory tests; Plate load test; Penetrometer tests; Geophysical methods; Borehole logs; Site investigation report;

2. **Lateral Earth Pressure & Retaining Walls**

Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Design considerations for retaining walls;

UNIT - II

3. **Stability Of Slopes**

Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes-forms of slip surface; Total stress and Effective stress methods of analysis; $\phi u=0$ Analysis (Total Stress Analysis) ; c-ϕ Analysis- Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number;

4. **Vertical Stresses below Applied Loads**

Introduction; Boussinesq's equation; vertical stress distribution diagrams; vertical stress beneath loaded areas; Newark's influence chart; Approximate stress distribution methods for loaded areas; Westergaard's equation

UNIT -III

5. **Bearing Capacity Of Shallow Foundation**

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation. Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations – Terzaghi's Bearing Capacity theory; Skempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity;

6. **Settlement Analysis**

Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlemtent –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods;

UNIT – IV

7. Pile Foundations

Introduction; Uses of Piles; Types of Piles;Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction;

8**. Well Foundations**

Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells;

9**. Foundations In Expansive Soils**

Identification of expansive soil; Field conditions that favour swelling; consequences of swelling; Different alternative foundation practices in swelling soils; Construction practice of UR piles in swelling soils

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers

REFERENCES

1. Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan, Pune
2. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
3. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
4. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.
5. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore
6. Geotechnical Engineering, - Codutu, Pearson Education

CODE: CE 326 /A **ELECTIVE – I**

REMOTE SENSING AND GIS

Lectures	:	4 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Introductions to remote sensing; Applications and importance of remote sensing
2. Indian Remote sensing satellites: Characteristics of IRS1A, IRS1B, IRS1C, IRS1D, IRS P5 , IRS P6,CARTOSAT-1 and CARTOSAT-2

3. Remote Sensing – I: Basic concepts and fundamentals of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units, over view of Indian Remote sensing satellites and sensors.

UNIT – II

4. Remote Sensing – II: Energy resources, energy interactions with earth surface features and atmosphere, resolution, visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

5. Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

UNIT – III

6. Types of data representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS - Advantages and disadvantages. File management, Spatial data – Layer based GIS, Feature based GIS mapping.

7. GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – IV

8. Introduction to GPS: Available GPS net works, Limitations and applications of GPS; GPS receivers.

9. Applications of GIS; Application areas and user segments; Guide lines for preparation of GIS; Applications of GIS for land use and housing management; Assessment of physical transformation in an urban area.

10. Water Resources Applications: Land use/Land cover in water resources, Surface water mapping and inventory, , Watershed management for sustainable development . Reservoir sedimentation, Ground Water Targeting, Identification of sites for artificial Recharge structures.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS:

1. Remote Sensing and its applications by LRA Narayana University Press 1999.

2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael

A. Mc Donnell, Oxford Publishers 2004.

3. Remote Sensing and image interpretation by Thomos M . Lillesand, Ralph.W.Keifer and

Jonathan.W.Chipman

REFERENCE BOOKS :

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.

2. Remote Sensing and Geographical Information systems by M.Anji Reddy , B.S.Publications.

3. GIS by Kang – tsung chang, TMH Publications & Co.,

4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.

5. Fundamental of GIS by Mechanical designs John Wiley & Sons.

CODE: CE 326 /B **ELECTIVE – I**

REPAIR AND REHABILITATION OF STRUCTURES

Lectures	:	4 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

Introduction

Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures.

Cracks in R.C. buildings

Various cracks in R.C. buildings, causes and effects

Maintenance

Maintenance importance of maintenance, routine and preventive maintenance.

Damages to masonry structures

Various damages to masonry structures and causes

UNIT-II

Repair materials

Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials

Special mortars and concretes

Polymer Concrete and Mortar, Quick setting compounds

Grouting materials

Gas forming grouts, Salfoalumate grouts, Polymer grouts, Acrylate and Urethane grouts.

Bonding agents

Latex emulsions, Epoxy bonding agents.

Protective coatings

Protective coatings for Concrete and Steel

FRP sheets

UNIT-III

Damage diagnosis and assessment

Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test

Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement

Substrate preparation

Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning

UNIT-IV

Crack repair

Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks.

Corrosion of embedded steel in concrete

Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns)

Jacketing

Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing.

Strengthening

Strengthening, Beam shear strengthening, Flexural strengthening

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. "Repair and protection of concrete structures" by Noel P.Mailvaganam, CRC press London.
2. "Concrete repair and maintenance Illustrated" by Peter.H.Emmons, Galgotia publishers.
3. "Earthquake resistant design of structures" by Pankaj agarwal, Manish shrikande, PHI.

REFERANCES

1. "Failures and repair of concrete structures" by S.Champion, John wiley and sons.
2. "Diagnosis and treatment of structures in distress" by R.N.Raikar Published by R & D centre of structural designers and consultants pvt.ltd, Mumbai.
3. "Handbook on repair and rehabilitation of RCC buildings", CPWD, Government of India.
4. "Handbook on seismic retrofit of buildings", CPWD, Indian buildings congress, IIT Madras, Narosa Publishing House.

CODE: CE 326 /C **ELECTIVE – I**

ENVIRONMENTAL GEOTECHNICS

Lectures	:	4 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

CLAY MINERALOGY AND SOIL STRUCTURE

Clay mineralogy and soil structure: Gravitational and surface forces-inter sheet and inter layer bonding in the clay minerals- Basic structural units of clay minerals- isomorphous substitution – kaolinite mineral- montmorillonite mineral- illite mineral- electric charges on clay minerals – base exchange capacity- diffused double layer- adsorbed water- soil structure- methods for the identification of minerals (introduction only).

UNIT-II

CHARACTERISTICS AND CLASSIFICATION OF WASTES

Wastes and Contaminants (introduction only): sources of wastes-types of wastes- composition of different wastes- characteristics and classification of hazardous wastes- generation rates- Soil water environment interaction relating to geotechnical problems-Effect of pollution on soil water behaviour-Case studies of foundation failures by ground contamination.

UNIT-III

HYDROLOGY OF CONTAMINANTS

Transport phenomena in saturated and partially saturated porous media-contaminant migration and contaminant hydrology-Hydrological design for ground water pollution control-Ground water pollution downstream for landfillsBearing capacity of compacted fills-foundation for waste fill ground-pollution of aquifers by mining and liquid wastes-protection of acquifers

UNIT-IV

SITE SELECTRION AND METHODS OF DISPOSAL

Disposal and containment technics: Criteria for selection of sites for waste disposal-hydrological aspects of selection of waste disposal sites- disposal facilities- subsurface disposal technics- Passive contaminant systems-Leachate contamination

UNIT-V

REMEDIAL MEASURES

Containment control systems- liners and covers for waste disposal- rigid liners- flexible liners. Ground modification technics in waste management – waste modification- ground modification-mechanical modification-hydraulic modification- chemical modification.

REFERENCES

1.Mitchell, J (1976), " Fundamentals of soil behaviour", John Wiley and sons, New York

2.Lambe, T. W & Whitman, R. V (1979), " Soil Mechanics ", John Wiley and Sons, New York.

3. Gopal Ranjan & A.S.R Rao (1991), " Basic and Applied Soil Mechanics, Wiley Eastern Ltd., New Delhi.

4. Wilson, M. J (1987), " A Hand book of Determinative methods in Clay Mineralogy", Chapman and Hall, New York.

5. Robert M. Koerner (1984), "Construction and Geotechnical methods in Foundation Engineering", McGraw Hill Book Co., New York.

6. Yong R. N. (1992), " Principles of contaminant Transport in Soils, "Elsevier, New York. Ramanatha Iyer T. S (2000), "Soil Engineering Related to Environment", LBS centre.

7. Daniel,B.E., " Geotechnical Practice for Waste disposal ", Chapman and Hall, London, 1993.8. Lagrega, M.D., Buckingham, P.L and Evans, J.B., " Hazardous Waste Management ", McGraw Hill, Inc., Singapore, 1994

CODE : CE361

SURVEYING FIELD WORK - II

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

1. **Theodolite**
   1. Traversing and adjustment of traverse
   2. Determination of Horizontal and Vertical distances by stadia methods
   3. Determination of Elevations and Heights
2. **Total Station**
   4. Study of Instrument – Determination of Distances, Directions and Elevations
   5. Determination of Boundaries of a Field and computation of area.
   6. Determination of Heights of objects.
3. **Setting Out**
   7. Setting of simple circular curve using tape and chain.
   8. Setting of simple circular curve using tape or/and theodolite
   9. Setting of a simple circular curve using Total Station.
   10. Setting out for Building.

Survey Camp is to be conducted for a minimum period of seven days to train in one of the following areas:

i. Preparation of a contour Plan/ Map.
ii. Earth work Computations for a high way / canal projects
iii. Marking of a Sewer line/ Water supply line.
iv. Any type of Execution works.

NOTE

50% Weight- age of total marks of this laboratory is to be given for total survey camp work including for Report submission by each batch.

CODE : CE362 **LABORATORY**

COMPUTER AIDED ANALYSIS AND DESIGN IN CIVIL ENGINEERING

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to analyze and design the following structures using software package like STAAD Pro/STRUDS/GTSTRUDL/STRAP etc.

UNIT – I

(At least SIX of the following) *4 lab classes*

1. Analysis and design of simply supported continuous beam.
2. Analysis and design of fixed end supported continuous beam.
3. Analysis of single storey unsymmetrical portal frame
4. Analysis and design of plane frame subjected to gravity loading.
5. Analysis and design of plane frame subjected to gravity loads and lateral load (wind load)
6. Analysis and design of plane roof truss (DL+LL).
7. Analysis and design of plane roof truss (DL+WL).

UNIT - II

(At least FIVE of the following) *4 lab classes*

1. Design of one-way slab.
2. Design of two way slab
4. Design of Cantilever Retaining wall.
5. Design of Counterfort Retaining wall
6. Design of Isolated footing.
7. Design of Pile foundation.

UNIT -III

(At least one of the following) *4 lab classes*

1. Analysis and design of two-storied R.C.C.Framed building.
2. Analysis and design of Industrial steel building.

CODE : CE363 **LABORATORY**

Design Practice Lab

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Design & Drawing the following

UNIT – I

1. Irrigation canal.
2. Canal drop – Notch type.
3. Canal regulator.
4. Vertical drop weir on permeable foundations.

UNIT – II

5. Direct sluice.
6. Surplus weir of a tank.
7. Syphon Aqueduct (Type – III Aqueduct).
8. Profile of a Ogee spillway.

NOTE

Two questions of 30 marks each will be given from each unit out of which one is to be answered.

TEXT BOOKS

1. Design of Minor Irrigation and Canal Structures by C. Satyanarayana Murthy; Wiley Eastern Ltd., New Delhi.
2. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr.Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.

CODE: CE 411

TRANSPORTATION ENGINEERING – I

Lectures	:	4 Periods/Week, Tutorial: 0	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – 1

1**. Highway Development And Planning**

Brief Introduction; necessity of highway planning surveys preparation of master plan highway planning in India. Factors controlling alignment; Engineering surveys, Drawing & report.

UNIT – II

2**. Highway Geometric Design**

Highway cross section elements; Sight distance; Design of horizontal alignment; Design of vertical alignment.

3. **Highway materials**

Sub grade soils- CBR tests; Stone aggregates; Bitumen materials; Paving mixes.

UNIT – III

4**. Design Of Highway Pavements**

Design factors; Design of flexible pavements – IRC method, IRC recommendations; Design of Rigid pavements - Westergard's stress equation for wheel loads and temperatures stress; IRC recommendations.

5**. Highway construction and maintenance:**

Construction of water bound macadam roads; Bituminous pavements and cement concrete pavements; Construction of joints in cement concrete pavements; Maintenance of highways- Water bound macadam roads, Bituminous pavements, Cement concrete pavements.

UNIT – IV

6. **PAVEMENT EVALUATION AND STRENGTHENING**

Method of pavement evaluation - Distress in flexible pavements - Distress in rigid pavements - Structural evaluation of flexible and rigid pavements - Evaluation by deflection measurements.

7. Highway Draingage

Importance of highway drainage; Requirements; Surface drainage; Sub–surface drainage; Road construction in water logged areas and black cotton soils.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Highway Engineering by S. K. Khanna & C. E. G. Justo; Nemchand & Brothers, Roorkee.

REFERENCE BOOKS

1. Principles of Transportation Engineering by Partha Chakroborty & Animesh Das, Prentice Hall of India, New Delhi.
2. Principles of Transportation Engineering and highway engineering by G. Venkatappa Rao, Tata Mc Graw-hill publishing company limited New Delhi.

CODE: CE 412

STRUCTURAL ANALYSIS – III

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. **Curved Beams**

Analysis for internal forces – circular beams supported on equally spaced columns – semicircular beams on three equally spaced supports.

2. **Influence Lines For Indeterminate Structures**

Muller - Breslau Principle with applications to continuous beams and framed structures to obtain the general shape of the influence lines; Influence lines for reactions, shear force at a point and bending moment at a section of a)Beam with fixed ends b) 2 - span continuous beam.

UNIT – II

3. **Plastic Behavior of Structures**

Idealized stress - strain curve for mild steel; Ultimate load carrying capacity of members carrying axial forces; Moment - Curvature relationship for flexural members; Evaluation of fully plastic moment; Shape factor; Collapse load factor; Upper and lower bound theorems; Collapse load analysis of indeterminate beams and single bay, single storied portal frames.

UNIT – III

4. **Flexibility And Stiffness Matrices**

Flexibility and stiffness; Flexibility matrix; Stiffness matrix; Relationship between flexibility matrix and stiffness matrix.

5. **Flexibility Method (Matrix Approach)**

Analysis of continuous beams and rigid jointed plane frames (Single bay, single storey with vertical legs only) by flexibility method with matrix approach.

UNIT – IV

6. **Stiffness Method (Matrix Approach)**

Analysis of continuous beams, rigid jointed plane frames (Single bay, single storey with vertical legs only) and pin jointed plane frames by stiffness method with matrix approach.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. For units 1 & 2: Structural Analysis, Vol. II by V. N. Vazirani & M. M. Ratwani; Khanna Publishers, Delhi.
2. For units 3 & 4 : Structural Analysis – A matrix approach by G. S. Pandit & S. P. Gupta; Tata Mc. Graw – Hill Publishing Co. Ltd., New Delhi.
3. For Unit 2: Limit Analysis of Structures by Manicka & Selvam

REFERENCE

1. Matrix analysis of framed structures by Weaver & Gere
2. Structural Analysis by Negi & Jangid

CODE: CE 413

ESTIMATION AND QUANTITY SURVEYING

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Procedure Of Estimating

Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

2. Methods of building estimates

Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.

3. Estimate Of Buildings

Estimate of residential building; Estimate of a building from line plan.

UNIT – II

4. Estimate of rcc works

Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T–beam slab and RCC column with foundation.

5. Road Estimating

Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads.

6. Canal estimate

Earthwork in canals–different cases; Estimate of earthwork in irrigation channels.

UNIT – III

7. Specifications

Purpose and method of writing specifications; General specifications. Detailed Specifications for Brick

work; R.C.C; Plastering; Mosaic Flooring; R.R.Stone Masonary.

8. Analysis Of Rates

Task or out – turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work:

i) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring vi) White washing.

UNIT – IV

9. PWD Accounts And Procedure Of Works

Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

10. Valuation

Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for estimating cost depreciation; Valuation of building.

11. Miscellaneous Topics

Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Estimating & Costing in Civil Engineering by B.N. Dutta; U. B. S. Publishers & Distributors, New Delhi.
2. Valuation of Real properties by S. C. Rangwala; Charotar Publishing House, Anand.

CODE: CE 414

PRESTRESSED CONCRETE

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Introduction

Basic concepts of prestressing; Historical development; Need for High strength steel and High strength concrete; Advantages of prestressed concrete.

2. Materials For Prestressed Concrete

High strength concrete; High tensile steel.

3. Prestressing Systems

Tensioning devices; Hoyer's long line system of pretensioning; Post tensioning systems; Detailed study of Freyssinet system , Lee-McCall System and Gifford – Udall system;

4. Analysis Of Prestress And Bending Stresses

Basic assumptions; Analysis of prestress; Resultant stresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing; Stresses in tendons; Cracking moment.

UNIT – II

5. Losses Of Prestress

Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

6. Deflections Of Prestressed Concrete Members

Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members

UNIT – III

7. Elastic Design Of Prestressed Concrete Sections For Flexure

Permissible compressive stresses in concrete as per IS 1343; Design of rectangular and I – sections of TYPE 1, TYPE 2 (Elastic Design only).

UNIT – IV

8. Shear Resistance

Shear and Principal Stresses; Ultimate shear resistance of prestressed concrete members; Design of shear reinforcement.

9. Transfer Of Prestress In Pre–Tensioned Members & Flexural Bond Stresses

Transmission of prestressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses in pre –tensioned and post – tensioned grouted beams.

10. Anchorage Zone Stresses In Post-Tensioned Members

Stress distribution in end block; Investigations on anchorage zone stresses by Guyons method (forces evenly distributed case) and IS code method; Anchorage zone reinforcements; Design of anchorage and end block.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

Prestressed Concrete by N. Krishna Raju; Tata Mc Graw - Hill Publishing Company Limited, New Delhi.

REFERENCE BOOKS

1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns; John Wiley & Sons.

2. Prestressed Concrete by P.Dayaratnam. Oxford & IBH

3. Prestressed Concrete by N.Raja Gopalan. PHI

CODE: CE 415 /(A) **ELECTIVE – II**

WATER RESOURCES SYSTEMS ANALYSIS

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT 1

1. Concept Of System And System Analysis

Introduction, Definition of a system, Types of systems, Systems approach to water resources planning and Management

2. Optimization

Definition, role of optimization models, objective function and constraints, Types of optimization techniques

UNIT II

3. Linear Programming –I

General formulation of Linear Programming models, Graphical Method, Simplex method. Application of Linear Programming in Water Resources.

UNIT III

4. Linear Programming –II

Revised Simplex method, The Dual problem, Sensitivity Analysis, Post optimality Analysis

5. Dynamic Programming

Introduction; Characteristics of a DP problem; Belman's principle of optimality; Forward and Backward recursive dynamic programming, Application of DP to water resources problems.

UNIT IV

6. Simulation

Definition, Concepts of a simulation model, steps in simulation, Application of simulation techniques in water Resources.

7. Water Resources Management

Planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, Conjuctive use of surface and sub surface water resources.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Water Resources Systems: S Vedula and PP Majumdar, McGraw Hill Publishers

REFERENCE BOOKS

1. Optimal design of water distribution networks : PP Bahve, Narosa Publishing House Engineering Optimization by SS Rao.

CODE: CE 415 /(B) **ELECTIVE – II**

ADVANCED FOUNDATION ENGINEERING

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

1. **Bearing Capacity Of Shallow Foundations Subjected To Special Loading And Ground Conditions**:

Effect of eccentric loading, inclined load, inclination of base of foundation, sloping ground; Bearing Capacity of stratified soils; Meyerhof analysis, Vesic's analysis and Hansen's analysis.

2. **Settlement Analysis**:

Contact pressure, sources of settlement, uniform settlement, differential settlement, construction practices to avoid differential settlement, immediate settlement in sands and clays- Terzaghi and Janbu's methods for clays , Schmertmann and Hartman method for cohesionless soils; consolidation settlement.

UNIT-II

3. Three Dimensional Consolidation

3D Consolidation equation; Solution; Vertical sand drain analysis and design

4. Cantilever Sheet Piles And Anchored Bulkheads & Braced Cuts And Coffer Dams

Earth pressure diagram, determination of depth of embedment in sands and clays; Types of bracing system, types of coffer dams

UNIT-III

5. Machine Foundations

Introduction; Terminology, Design criteria for machine foundation; single degree freedom system, free and forced vibration; Methods of analysis of block foundation; Dynamic subsoil investigation; Damping; Design and construction of foundation for reciprocating and impact type machines; Active and Passive isolation

6 . Caissons And Well Foundations

Types of caissons, different shapes of well, components of well, functions of wells, sinking of wells, lateral stability by Terzaghi analysis

UNIT-IV

7. Foundations In Expansive Soils

Problems associated with expansive soils, Swelling potential, percent swell, swell pressure-factors affecting, methods of measurement of swell pressure ; Prediction of heave, factors affecting

heave, methods of prediction of heave; IS Classification of expansive soils, Under- reamed pile foundations, Sand cushion method, CNS layer method, granular pile-anchor technique, lime stabilization of expansive soils, Moisture control in expansive clays- Horizontal and vertical moisture barriers, sub-surface drainage and surface drainage, pre-wetting and ponding.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore

2. Hand book of Machine foundations – Srnivasulu and Vaidyanathan.

REFERENCES

1. Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
2. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao, Wiley Eastern Limited, New Delhi.
3. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
4. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.
5. Soil dynamics and machine foundations – Swami Saran

CODE: CE 415 /(C) **ELECTIVE – II**

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

1) Elements of structural dynamics

Sources of vibrations; Types of vibrations; Degrees of freedom; Spring action and damping; Free vibration of undamped system having single degree of freedom; Free vibration of viscous damped system having single degree of freedom; Forced vibration of a viscous damped single degree freedom system subjected to harmonic excitation; Earthquake excitation (Base excitation) of a single degree freedom system.

UNIT-II

2) Elements of Earth Quake Ground motion

Earthquake size- Intensity and magnitude; Seismic Zoning-Introduction; Strong Motion Earthquakes - Introduction; Response spectrum (elastic); Local site effect (Effect of type of soil).

3) Elements of Geotechnical Earthquake Engineering

Liquefaction – Definition and types, Effect of liquefaction on built environment, Evaluation of liquefaction susceptibility, Liquefaction hazard mitigation

Seismic slope stability – Introduction, Pseudo-static analysis, Sliding block methods

UNIT III

4) Analysis of single storey and single bay RCC Plane Frame (Columns vertical) : (As per IS:1893(part-I)-2002)

Calculation of lateral force due to earthquake using equivalent static method ; Analysis for different load combinations; Design forces and moments in beam and columns.

UNIT-IV

5) Design of single storey and single bay RCC plane frames (Columns vertical)

(As per IS:456-2000 and IS13920-1993)

Design of column; Design of beam; Design of footing ; Detailing of entire frame

6) Masonry Structures

House types and damages, cause and location of damage, Understanding the knowledge hidden in your existing houses, Making houses earthquake resistant, Earthquake resistant features, Retrofitting-some examples, Technology choice, summary of earthquake resistant features, improving housing designs.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1)Elements of Earthquake Engineering by Jai Krishna, A.R.Chandrasekaran and Brijesh Chandra, Second Edition(1994), South Asian Publishers, New Delhi. (For Chapters 1 and 2)

2) Geotechnical Engineering - S.K.Gulati & Manoj Datta, Tata McGraw-Hill Publishing Company Ltd. (For Chapter 3)

3)Earthquake Resistant Design of Structures by Pankaj Agarwal, Manish Shrikhande , First edition(2006), Prentice Hall of India Private Ltd., New Delhi . (for Chapters 1,2,4 and 5)

4) Earthquakes and Buildings – A.S.Arya, A.Revi, Pawan Jain (For Chapter-6)

CODES

IS:1893(part-I)-2002 -

IS13920-1993 -

IS:456-2000 -

SP16

REFERENCE BOOK

1) Dynamics of Structures by A.K.Chopra, Second edition (2001), Prentice Hall India Private Ltd

CODE: CE 415/(D) **ELECTIVE – II**

STRUCTURAL DYNAMICS

Lectures	:	4 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT -1

1. INTRODUCTION:

Comparison between static and dynamic analysis; Degrees of freedom; Undamped system; Newton's law of motion; 'D' Alembert's principle; Solution of the differential equation of motion.

2. FREE VIBATION OF SINGLE DEGREE - OF - FREEDOM SYSTEM:

Equation of motion for single degree - of - freedom system; Free un damped vibration of the SDOF system; Damped single degree - of - freedom system -Viscous damping, Equation of motion, Critically damped system, Over damped system. Under damped system and Logarithmic decrement.

UNIT – II

3. RESPONSE OF SDOF SYSTEM TO HARMONIC LOADING:

Undamped harmonic excitation; Damped harmonic excitation; Evaluation of damping at resonance; Response to support motion; Force transmitted to the foundation.

4. RESPONSE OF' SDOF SYSTEM TO GENERAL DYNAMIC LOADING:

Impulsive loading and Duhamel's integral; Numerical evaluation of Duhamel's integral — undamped system; Numerical evaluation of Duhamel's integral -Damped system.

UNIT-III

5. GENERALIZED COORDINATES AND RAYLEIGH'S METHOD:

Principle of virtual work; Generalized SDOF system - Rigid body; Generalized SDOF system - Distributed elasticity; Rayleigh's method; Improved Rayleigh's method.

UNIT-IV

6. STRUCTURES MODELED AS SHEAR BUILDINGS:

Stiffness equations for the shear building; Flexibility equations for the shear building; Free vibration of a shear building (Single bay two Storeyed) - Natural frequencies and normal modes.

7. FORCED MOTION OF SHEAR BUILDINGS (Two Storeyed):

Modal superposition method; Response of a shear building to base motion; Harmonic forced excitation.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK:

Structural Dynamics by Marin Paz.; CBS Publishers & Distributors, Delhi.

REFERKINCE BOOK:

Dynamic of Structures by Rav W.Clough & Joseph Penzien; McGraw-Hill,

CE 416 / BT 100 **OPEN ELECTIVE**

INTELLECTUAL PROPERTY RIGHTS, PATENT LAWS &ETHICAL ISSUES

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Intellectual Property Rights:

Introduction, forms of Intellectual property, international & regional agreements/ treaties in IPR; IPR related Legislations in India; IPR and Agricultural Technology- implications in India and other developing countries; GATT, TRIPS, and WIPO;

Other IPR issues:

Trade Secrets, Copy Rights, Trade Marks and their legal implications; Farmer's Rights, Plant Breeder's rights; Traditional knowledge and their commercial exploitation and protection.

UNIT – II

Patents and Patent processing:

Introduction, Essential requirements, Patent application, Procedures and granting, Patent search, PCT, UPOV, Patents in Biotechnology and controversies involved.

UNIT – III

Regulatory Affairs:

Regulatory affairs: Indian contest- requirements and guidelines of GMP, understanding of Drugs and cosmetic act 1940 and rules 1945 with reference schedule M, U & Y. Related quality systems- objectives and guidelines of USFDA, WHO &ICH, Introduction to ISO series.

Documentation and Protocols:

Documentation: Types related to pharmaceuticals industry, protocols, harmonizing formulation development for global fillings, NDA, ANDA, CTD, Dealing with post approval changes- SUPAC, handling and maintenance including electronic documentation.

UNIT – IV

Ethics:

Research and ethical issues; Ethical issues in use of animals in research and testing; ethical issues in research involving human participants; Protecting Genetic Privacy; Gene testing – Pros & Cons. Human Cloning & Human Dignity – an ethical enquiry; Ethical, Legal and Social Issues (ELSI) concerning recent advancements in key areas of biotechnology- pre-natal diagnostics.

TEXT BOOKS:

1. Good manufacturing practices for pharmaceuticals, S.H.Willing
2. Protection of Industrial property Rights, P.Das&Gokul Das
3. Intellectual property rights on Biotechnology, Singh K, BCIL, New Delhi
4. Biotechnologies in developing countries present and future, Sasson A, UNESCO Publications.
5. Bioethics and Biosafety- M.K.Sateesh, I.K. International, New Delhi.
6.

BIOINFORMATICS ALGORITHMS

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION:

Algorithms and Complexity- Biological algorithms versus computer algorithms – The change problem –Correct versus Incorrect Algorithms – Recursive Algorithms – Iterative versus Recursive Algorithms – Big-O Notations– Algorithm Design Techniques.

GREEDY ALGORITHMS:

Molecular Biology Primer – Exhaustive Search – Mapping Algorithms – Motif-Search Trees – Finding Motifs –Finding a Median String – Greedy Algorithm – Genome Rearrangements – Sorting by Reversals – Approximation Algorithms – A Greedy Approach to Motif Finding.

UNIT – II

DYNAMIC PROGRAMMING ALGORITHMS:

DNA Sequence comparison – Manhattan Tourist Problem – Edit Distance and Alignments – Longest Commons Sub sequences – Global Sequence Alignment – Scoring Alignment – Local Sequence Alignment – Alignment with Gap Penalties – Multiple Alignment-Gene Predictions – Approaches to Gene Prediction – Spiced Alignment – Divide and Conquer Algorithms.

UNIT – III

GRAPH ALGORITHMS:

Graphs – Graphs and Genetics – DNA Sequencing – Shortest Superstring Problem – DNA arrays as alternative sequencing techniques – Sequencing by Hybridization – Path Problems – Fragment assembly in DNA Sequencing – Protein Sequencing and Identification – The Peptide Sequencing Problem – Spectrum Graphs – Spectral Convolution and Alignment – Combinatorial Patter matching.

UNIT – IV

CLUSTERING AND TREES:

Clustering and trees – Gene expression analysis – Hierarchical clustering-k-means clustering – Clustering and corrupted Cliques – Evolutionary Trees – Distance-based tree reconstruction – Reconstruction trees from additive matrices – Evolutionary trees and hierarchical clustering – Character-based tree reconstruction – Small and large Parsimony Problem – Hidden Markov Models-Randomized Algorithms.

TEXT BOOKS:

1. Neil C. Jones and Pavel A. Pevzner, *An Introduction to Bioinformatics Algorithms*, MIT Press, FirstIndian Reprint 2005.

2. Gary Benson Roderic page (Eds), *Algorithms in Bioinformatics*, Springer International Edition, FirstIndian Reprint 2004.

REFERENCE BOOKS

1. Gusfields G, Algorithms on strings, trees and sequences- Computer Science and ComputationalBiology, Cambridge University Press 1997.
2. Steffen Schulze-Kremer, Molecular Bioinformatics: Algorithms and Applications, Walter de Gruyter, 1996.

INDUSTRIAL POLLUTION & CONTROL

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Man & Environment, Types of Pollution, Pollution control aspects, Industrial emissions-Liquids, Gases, Environmental Legislation, Water quality management in India, Air (Prevention & Control of Pollution) Act.

UNIT – II

Removal of BOD, Biological oxidation, Anaerobic treatment, Removal of Chromium, Removal of Mercury, Removal of Ammonia, Urea, Treatment of Phenallic effluents.

UNIT – III

Removal of Particulate matter, Removal of Sulfur Oxides, Removal of Oxides of Nitrogen, Removal of Organic vapors from Effluent.

UNIT – IV

Pollution control in Chemical Industries, General considerations, pollution control aspects of Fertilizer industries, Pollution control in Petroleum Refineries and Petrochemical units, Pollution control in Pulp and Paper Industries.

TEXT BOOK:

1. Pollution control in Process Industries, S.P .Mahajan, Tata McGraw Hill Publishing Company Ltd, New Delhi

REFERENCE BOOKS:

1. Environmental Pollution Control Engineering, C.S.Rao, Wiley Eastern Ltd., New Age International Ltd.,
2. Air pollution, M.N.Rao, H.V.N.Rao, Tata McGrawhill.
3. Water Pollution control, W.Wesley Eckenfelder Jr.Industrial, Tata McGrawHill.

CE 416 / Che200 **OPEN ELECTIVE**

ENERGY ENGINEERING

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Conventional energy resources, the present scenario, scope for future development.

Coal: Origin, occurrence and reserves, classification, ranking, analysis and testing, coal carbonization, manufacture of coke, coal gasification, coal liquefaction.

UNIT – II

Petroleum: Origin, occurrence and reserves, composition, classification, characteristics, exploration and production.

Petroleum Refining: Refinery processes, petroleum products, testing and analysis of petroleum products.

UNIT – III

Non conventional energy sources: Solar energy, solar radiation, principles of heating and cooling, photo voltaic cells.

Bio gas products, bio-mass, wind energy, hydrogen energy, geothermal and ocean thermal energy, fuel cells.

UNIT – IV

Energy storage, mechanical energy storage, water storage, solar pond, phase change storage, chemical storage.

Energy Conservation: Conservation methods in process industries, Theoretical analysis, practical limitations, equipment for energy saving / recovery.

TEXT BOOKS:

1. Conventional Energy technology, S.B.Pandy, Tata McGraw Hill
2. Fuel Science, Harker and Allen, Oliver & Boyd.
3. Energy conversion, Culp, Mc Graw Hill.

CE 416 / CE 100 **OPEN ELECTIVE**

AIR POLLUTION AND CONTROL

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Air Pollution – Definitions, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT – II

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams.

UNIT – III

Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for PlumeDispersion.

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV

General Methods of Control of NOx and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS:

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company.

2. Air pollution by Wark and Warner.- Harper & Row, New York.

REFERENCE BOOKS:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.

CE 416 / CE 200 **OPEN ELECTIVE**

REMOTE SENSING AND GIS

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Concepts and Foundations of Remote Sensing: Introduction, Energy sources and radiation principles, Energy interactions in the atmosphere, Energy interactions with Earth surface features, an ideal remote sensing system, characteristics of remote sensing systems, application of remote sensing .

UNIT – II

Visual Image Interpretation: Introduction, Fundamentals of visual image interpretation, basic visual image interpretation equipment, land use and land cover mapping, geologic and soil mapping, agricultural applications, forestry applications, water resources applications, urban and regional planning applications.

UNIT – III

Digital Image Processing: Introduction, Image rectification and restoration, Image enhancement, contrast manipulation, spatial feature manipulation, Image Classification, Supervised classification, the classification stage, the training stage, Un-supervised classification, Classification accuracy assessment.

UNIT – IV

Geo-graphical Information Systems (GIS):Introduction, spatial information system: an overview, conceptual model of spatial information, concept of databases, digitizing, editing, and structuring map data, data quality and sources of errors in GIS, spatial data analysis (vector based), spatial data analysis (raster based), Fundamental concepts of GPS, Types of GPS, GPS satellite, Application of GPS in resource surveys, mapping and navigation.

TEXT BOOKS:

1. Lillisand.T.M, Keifer.R.W, and Chipman.J.WRemote sensind Image interpretation, 2004, John Wlley and Sons.
2. Chrisman, N.R. (1997), Exploring Geographic Information systems, John Willey and sons
3. Remote Sensing and its applications by LRA Narayana University Press 1999.
4. Principals of Geo physical Information Systems - Peter A Burragh and Rachael A. Me Donnell, Oxford Publishers 2004.

REFERENCE BOOKS:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001,
3. B.S.Publications.GIS by Kang - tsung chang, TMH Publications & Co.
4. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
5. Fundamental of GIS by Mechanical designs John Wiley & Sons.

CE 416 / EE 100 **OPEN ELECTIVE**

OPTIMIZATION TECHNIQUES

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Linear Programming:

Introduction and formulation of models – Convexity - simplex method - Bid method - two phase method – degeneracy – non existent and unbounded solutions - duality in L.P. - dual simplex method - sensitivity analysis - revised simplex method - transportation and assignment problems.

UNIT – II

Non-linear Programming:

Classical optimization methods - equality and inequality constraints - Lagrange multipliers and Kuhn-Tucker conditions - quadratic forms - quadratic programming and Bessel's method.

UNIT – III

Search Methods:

One dimensional optimization - sequential search - Fibonacci search - multi dimensional search method - Univariate search - gradient methods - steepest descent / ascent methods - conjugate gradient method -Fletcher – Reeves method - penalty function approach.

UNIT – IV

Dynamic Programming:

Principle of optimality recursive relation - solution of linear programming problem - simple examples

TEXT BOOKS:

1. Engineering Optimization: Theory and Practice by S.S. Rao, 3rd Ed., New Age International, 1998
2. Optimization Methods in Operations Research and Systems Analysis by K.V. Mittal and C. Mohan, 3rd Ed, New Age International, 1996.

REFERENCE BOOKS:

1. Non-linear Programming by P.L. Mangassarian.
2. Operations Research by S.D. Sharma.
3. Operations Research: An introduction by H.A. Taha, 6th Edition, PHI.
4. Linear Programming by G. Hadley.

CE 416 / EE 200 **OPEN ELECTIVE**

NON-CONVENTIONAL ENERGY SOURCES

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Principle of Renewable Energy:

Comparison of renewable and conventional energy sources - Ultimate energy sources - natural energy currents on earth - primary supply to end use - Spaghetti & Pie diagrams - energy planning - energy efficiency and management.

UNIT – II

Solar Radiation:

Extra terrestrial solar radiation - terrestrial solar radiation - solar thermal conversion - solar thermal central receiver systems - photovoltaic energy conversion - solar cells – 4 models.

UNIT – III

Wind energy:

Planetary and local winds - vertical axis and horizontal axis wind mills - principles of wind power - maximum power - actual power - wind turbine operation - electrical generator.

UNIT – IV

Energy from Oceans:

Ocean temperature differences - principles of OTEC plant operations - wave energy - devices for energy extraction – tides - simple single pool tidal system.

Geothermal energy:

Origin and types - Bio fuels – classification - direct combustion for heat and electricity generator - anaerotic digestion for biogas - biogas digester - power generation.

TEXT BOOKS:

1. Renewable Energy Sources by John Twidell & Toney Weir : E&F.N. Spon.

REFERENCE BOOKS:

1. Power plant technology by EL-Wakil, Mc Graw-Hill.
2. Non-Conventional Energy Sources by G.D.Rai, Khanna Pub.

CONSUMER ELECTRONICS

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Microphones, Headphones and Headsets, Loud Speakers, Disc Recording and Reproduction , Amplifying Systems Equalizers and Mixers, Electronic Music Synthesizers.

UNIT – II

Commercial Sound, Theatre Sound System, Audio Systems , Color TV standards and Systems, Remote Controls, Video Systems.

UNIT – III

Electronic Gadgets and Home Appliances:

Telecommunication Systems, Switching Systems, Modulation Techniques, Carrier Systems, Fibre Optics

UNIT – IV

Data Services, Mobile Systems, Facsimile fax, Xerography

TEXT BOOK:

1. Consumer Electronics by S.P.Bali, Pearson Education, ISBN: 9788131717592.

REFERENCE BOOKS:

1. Consumer Electronics for Engineers by Philip Herbert Hoff, Cambridge University Press (July 28, 1998), **ISBN-10:** 0521582075
2. Digital Consumer Electronics Handbook by RonadlK.Jurgen, (Editor) by McGraw Hill Professional Publishing, 1997. **ISBN-10:** 0070341435.

CE 416 / EC 200 **OPEN ELECTIVE**

EMBEDDED SYSTEMS

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction to embedded systems, design challenges, processor technology, ICtechnology, design technology, tradeoffs, single purpose processor, RT levelcombinational logic, sequential logic (RT level) custom single purpose processordesign, optimizing custom single purpose processors.General purpose processors: basic architecture, pipelining, programmers view,development environment, ASIPS, microcontrollers and digital signal processors

UNIT – II

State machine and concurrent process models: models vs. languages, FSMD, usingstate machines, PSMM, concurrent process model, concurrent processes,communication and synchronization among processes, data flow model and realtimesystems.Need for communication interfaces, RS232/UART, RS422/RS485, USB, Infrared, IEEE 802.11, and Bluetooth.

UNIT – III

Embedded system and RTOS concepts: Architecture of kernel, tasks and taskscheduler, interrupt service routines, semaphores, mutex. Mail boxes, messagequeues, event registers, pipes and signals.

UNIT – IV

Embedded system and RTOS concepts: Timers, memory management, priorityinversion problem, embedded OS and real time OS, RT Linux, and Handheld OS.Design technology: Introduction, automation, synthesis, parallel evolution ofcompilation and synthesis, logic synthesis, RT synthesis, behavioral synthesis,system synthesis, HW / SW co- design, verification, and co-simulation.

TEXT BOOKS:

1. Frank Vahid, Tony D Givargis, Embedded system design – A unified HW/ SW Introduction, John Wily & sons, 2002.
2. KVKK Prasad, Embedded and real time systems, Dreemtech Press, 2005.

REFERENCE BOOKS:

1. Raj Kamal, Embedded system architecture, programming and design, TMH edition.
2. Mohammad Ali Mazidi, Janice G., The 8051 microcontroller and embedded systems, Pearson edition.
3. Jonathan W Valvano, Embedded Microcomputer Systems, Brooks/cole, Thompson Learning.
4. David E. Simon, An Embedded Software Primer, Pearson edition.

CE 416 / EI 100 **OPEN ELECTIVE**

VIRTUAL INSTRUMENTATION USING LABVIEW

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

REVIEW OF VIRTUAL INSTRUMENTATION:

Historical perspective, Need of VI, Advantages of VI, Define VI, block diagram & architecture of VI, data flow techniques, graphical programming in data flow, comparison with conventional programming.

PROGRAMMING TECHNIQUES:

VIS and sub-VIS, loops & charts, arrays, dusters, graphs, case & sequence structures, formula modes, local and global variable, string & file input. Graphical programming in data flow, comparison with conventional programming.

UNIT – II

DATA ACQUISITION BASICS:

ADC, DAC, DIO, Counters & timers, PC Hardware structure, timing, interrupts, DMA, Software and Hardware Installation. GPIB/IEEE 488 concepts, and embedded system buses - PCI, EISA, CPCI, and USB & VXI. A

UNIT – III

COMMON INSTRUMENT INTERFACES:

Current loop, RS 232C/RS 485, GPIB, System basics, interface basics: USB, PCMCIA, VXI, SCXI, PXI etc,networking basics for office & industrial application VISA & IVI, image acquisition & processing, MotionControl. ADC, DAC, DIO, DMM, waveform generator.

UNIT – IV

USE OF ANALYSIS TOOLS AND APPLICATION OF VI:

Fourier transforms, Power spectrum, Correlation methods, windowing & flittering. Application in ProcessControl projects, Major equipments- Oscilloscope, Digital Multimeter, Pentium Computers, temperature data acquisition system, motion control employing stepper motor.

TEXT BOOKS:

1. Gary Johnson, LABVIEW Graphical Programming , 2nd Edition, McGraw Hill, 1997.
2. Lisa K. Wells and Jeffrey Travis, LABVIEW for Everyone , PHI, 1997.
3. Skolkoff, Basic concepts of LABVIEW 4 , PHI, 1998.

REFERENCE BOOKS:

1. S. Gupta, J.P. Gupta, *PC Interfacing for Data Acquisition and Process Control*, ISA, 2nd Edition, 1994.
2. Technical Manuals for *DAS Modules of Advantech* and National Instruments.
3. L.T. Amy, *Automation System for Control and Data Acquisition*, ISA, 1992.

CE 416 / EI 200 **OPEN ELECTIVE**

SENSORS AND TRANSDUCERS

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction:

Definition related to measurements /instrumentation, static and dynamic characteristics of instruments, classification of transducers.

UNIT – II

Displacement Measurement:

Variable resistance devices, variable inductance devices, variable capacitance devices, digital displacement transducers.

Strain measurement:

Stress-strain relations, resistance strain guages, types of strain gauges, strain gauge measurement techniques, static measurements ,dynamic measurements. Calibration of strain gauge, strain gauge load cell, force and torque measurements using strain gauge.

UNIT – III

Pressure measurement:

Diaphragm, Bellows, Bourdon tubes, Resistive inductive and capacitive transducers, piezo-electric transducers.

Low pressure measurement:

McLeod gauge, Knudson gauge, Ionization gauge.

Temperature measurement: RTD, Thermocouple and thermistor.

UNIT – IV

Flow measurement:

Head type flowmeters, Rotometer, Electromagnetic flow meter.

Measurement of liquid level, viscocity, humidity and moisture.

TEXT BOOKS:

1. A.K.Ghosh,Introduction to Instrumentation and Control, PHI.
2. BC Nakra, KK Chaudhry,Instrumentation measurement and analysis, TMH, New Delhi second edition.

REFERENCE BOOKS:

1. Patranabis D,"Sensors and transducers", second edition, PHI,New Delhi 2003.
2. Ernest O Doeblin, "Measurement Systems Application and Design", TMH.

WEB TECHNOLOGY

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

(15Periods)

Introduction to XHTML, Cascading Style Sheets (CSS), JavaScript: Introduction to Scripting, Control Statements, Part 1, Control Statements, Part 2, Functions, Arrays, Objects.

UNIT – II

(16Periods)

Dynamic HTML: Object Model and Collections, Dynamic HTML: Event Model, XML, RSS (Really Simple Syndication).

UNIT – III

(15 Periods)

Building Ajax-Enabled Web Applications, Web Servers (IIS and Apache).

UNIT – IV

(18 Periods)

Servlets and Java Server Pages.

TEXT BOOK:

1. Harvey M. Deitel and Paul J. Deitel, “Internet & World Wide Web How to Program”, 4/e, Pearson Education.

REFERENCE BOOKS:

1. Jason Cranford Teague, “Visual Quick Start Guide CSS, DHTML &AJAX”, 4e, Pearson Education.
2. Tom Nerino Doli smith, “JavaScript & AJAX for the web”, Pearson Education, 2007.
3. Joshua Elchorn, “Understanding AJAX”, Prentice Hall, 2006.
4. Marty Hall, Larry Brown, “Core Servlets and Java Server Pages™: Volume 1: Core Technologies”, 2nd Edition, Prentice Hall.

CE 416 / IT 100 **OPEN ELECTIVE**

.NET TECHNOLOGIES

Lectures	:	3 Periods/Week, Tutorial: 1	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction to C# 2.0, Expressions and control structures, Strings and regular expressions, Arrays and collections, Object-oriented programming in C#, Introduction to generics, I/O and persistence, Working with XML, Events and delegates, Multithreaded programming, Reflection fundamentals

UNIT – II

Assemblies and AppDomains, COM and windows interoperability, Code access security, Cryptography and data protection, Optimizing your .NET 2.0 code, ADO.NET fundamentals, Advanced ADO.NET techniques, Working with ADO.NET data providers, Programming with SQL Server 2005.

UNIT – III

HTML, Introduction to ASP.NET 2.0 and Web forms, ASP.NET Web Controls, State management in ASP-NET 2.0, Using master pages, ASP.NET personalization and customization, Building rich, database-driven Web applications, Securing your ASP.NET applications, Exposing functionality with Web services.

UNIT – IV

Introduction to Windows Forms 2.0, The Windows Forms control library, Advanced user, interface programming, Data binding with Windows Forms 2.0, Remoting

TEXT BOOKS:

1. Microsoft Visual C# 2005 Unleashed by Kevin Hoffman, Sams (Pearson India), 2006.

REFERENCE BOOKS:

1. Core C# and .NET by Stephen C.Pary, Prentice Hall (Pearson Education), 2006.
2. C#: The complete reference by Herbert Schildt, Tata McGraw Hill, 2006 2/e.
3. Pro C# 2005 and the .NET Platform by Andrew Troelson, Apless 2005 3/e.

CE 416 / ME 100 **OPEN ELECTIVE**

ROBOTICS

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Introduction to Robotics, major components of a robot, robotic like devices, classification of robots – Classification by coordinate system and by control method, Specifications of robots, fixed versus flexible automation, economic analysis, overview of robot application.

UNIT – II

Robot end Effectors : Introduction, end effectors, interfacing, types of end effectors, grippers and tools, considerations in the selection and design of remote centered devices.

UNIT – III

Robotic sensory devices : Objective, Non-optical position sensors – potentiometers, synchros, inductocyn, optical position sensors – optic interrupters, optical encoders (absolute & incremental).

Proximity sensors: Contact type, non contact type – reflected light scanning laser sensors.

Touch & slip sensors: Touch sensors – proximity rod & photo detector sensors, slip sensors – Forced oscillation slip sensor, interrupted type slip sensors, force and torque sensors.

UNIT – IV

Transformations and Kinematics: Objectives, homogenous coordinates, basic transformation operations, forward solution – Denavit Hartenberg procedure. Simple problems involving planar manipulators, inverse or backward solution – problems involved, techniques.

Introduction to Trajectory Planning, the manipulator jacobian.

TEXT BOOKS:

1. Robotic Engineering by Richard D.Klafter.
2. Industrial Robotics by Mikell P.Groover.

REFERENCE BOOKS:

1. Introduction to Robotics – John J.Craig.
2. Robotics – K.S.Fu, Gonzalez & Lee.
3. Robotics for Enginers by Yoram Koren.
4. Robotics Technology and Flexible Automation by S.R.Deb.
5. Robotics by Saeed.B.Niku.

CE 416 / ME 200 **OPEN ELECTIVE**

POWER PLANT ENGINEERING

Lectures	:	3 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

INTRODUCTION:

Various Energy sources, types of power plants.

HYDRO ELECTRIC POWER PLANT:

Hydrology, Rainfall, Run off and their measurement, hydrograph, Flow duration curve, Mass curve and calculation of storage capacity, site selection of hydro plant, different types of hydro plants.

DIESEL AND GAS TURBINE POWER PLANTS:

Classification, main components of plant, plant layout, application and comparison with other plants.

UNIT – II

THERMAL POWER PLANT:

General layout, Fuels, Coal analysis, Coal handling, burning of coal - stoker and pulverized systems, Ash handling systems, ESP, Need for Draught, High-pressure boilers, Condensers, cooling ponds and towers (wet and dry types), Deaeration.

UNIT – III

NUCLEAR POWER PLANTS:

Nuclear Fission, Nuclear Fuels, Components of Reactor, types of Nuclear Reactors, Breeding, Fast Breeder Reactor, Radiation shields, nuclear waste disposal.

FLUCTUATING LOADS ON POWER PLANTS:

Various performance Factors (load factor, diversity factor, use factor etc.).

POWER PLANT ECONOMICS:

Fixed costs, operating costs, cost per kWh, comparison of fixed and operating costs of hydro, thermal, nuclear plants, power tariffs.

POLLUTION AND CONTROL:

Introduction, particulate and gaseous pollutants, thermal pollution and solid waste pollution, methods to control pollution - brief description.

UNIT – IV

SOLAR ENERGY:

Solar collectors, solar energy storage, solar ponds, solar energy utilization and applications.

POWER:

Basic principle, different types of wind mills, wind energy conversion systems, other applications.

GEOTHERMAL POWER:

sources, energy conversion system.

OTEC:

ocean thermal energy conversion systems, introduction to tidal power.

DIRECT ENERGY CONVERSION SYSTEMS:

Fuel cells, MHD, Solar cell.

TEXT BOOKS:

1. Power Plant Engineering - G.R. Nagpal, Khanna publ, New Delhi
2. Power Plant Engineering –P.K.Nag, TMH
3. Non Conventional Energy Sources - G.D. Rai, Khanna publ, New Delhi.

REFERENCE BOOKS:

1. Power Plant Technology - M.M. El Wakil, MGH, New York.
2. Principles of Energy Conversion - A.W.Culp, MGH, New York.

CODE : CE451

TERM PAPER
(Common to all branches)

Lectures	:	2 Periods/Week	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Description

The Term Paper is a precursor to the project work done in the 2nd semester of the final year B.Tech Programme. The paper may be of 8-10 (A4 size) in length and follows **the standard IEEE/Technical Journal Format.**

Purpose

The Term Paper helps to supplement the final year Project Work of the B.Tech students. It helps to identify their Reserch area/topic and complete the groundwork and preliminary research required for it comfortably. It trains the students to make use of Research Tools and Material available both in print and digital formats.

Procedure

The topic of Term Paper is chosen from the B.Tech curriculum. Based on the topic, a hypothesis is to be made by the team of students, under the guide. The hypothesis may be a null hypothesis also. The team students are then required to collect literature and support information for their term paper from Standard Reference Books, Journals, and Magazines - both printed and online. Each student should refer to a minimum of 5 reference sources outside their prescribed text books. The students also present their papers with the help of Power Point slides / OHP.

The Term Paper contains

- The Aim and Objective of the study
- The need for Rationale behind the study
- Identify the work already done in the field
- Hypothesis and Discussion
- Conclusion
- Appendix with support data (Illlustrations, Tables, Graphs, etc.)

Page Limit : minimum of eight pages

Last date of submission of the Draft : One week after the 1st Mid Term Exams

Last date of submitting the Term Paper : One week before commencement of 2nd Mid Term Exams

Date of Seminar : During the Lab Internal Exam.

Method of Evolution :

1. Day to day work - 10 marks
2. Seminar - I - 5 marks
3. Term Paper Report - 15 marks
4. Seminar - II - 10 marks

Total 40 marks

CODE : CE452 **LABORATORY**

COMPUTER AIDED DETAILING OF STRUCTURES

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Students are required to detail different structural elements using software packages like Auto CAD/Micro station/Rivet etc.,

UNIT – I

(At least SEVEN of the following) *4 lab classes*

1. Detailing of continuous beam with both ends fixed
2. Detailing of continuous beam with one end overhang.
3. Detailing of pile cap
4. Detailing of isolated footing.
5. Detailing of two way and one way slab.
6. Detailing of Flat slab interior panel.
7. Detailing of cantilever Retaining wall.
8. Typical detailing of R.C.C footing with steel column.

UNIT – II

(At least THREE of the following) *4 lab classes*

1. Detailing of beam to column framed connection (using bolts).
1. Detailing of beam to column moment resistant connection (using bolts).
3. Detailing of welded plate girder.
4. Detailing of welded column base

UNIT – III

(At least ONE of the following) *4 lab classes*

1. Typical detailing of different elements in Two-storied R.C.C.Framed Building

2. Typical detailing of Industrial steel building.

CODE : CE453 **LABORATORY**

TRANSPORTATION ENGINEERING LABORATORY

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

A. Tests On Aggregates

1. Aggregate Crushing value test.
2. Aggregate impact value test.
3. Los Angele's abrasion test.
4. Deval's attrition value test.
5. Shape test a) Flakiness index test b) Elongation index test c) Angularity number test. .
6. Specific gravity Test.

B. Tests On Bituminous Materials

7. Penetration test.
8. Softening point test.
9. Flash and fire point test.
10. Ductility test.
11. Viscosity test.
12. Bitumen Extractions Test.
13. Specific gravity of Bitumen.

C. Test On Bituminous Mixes

14. Marshall stability test.

D. Test On Soil Subgrade

15. California bearing ratio test.

CODE: CE 421

TRANSPORTATION ENGINEERING – II

Lectures	:	4 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT - I

1. TRAFFIC ENGINEERING

Introduction; Traffic characteristics- Road user, vehicular & travel pattern;

2. SPEED AND VOLUME STUDIES

Definition of Various speeds Design speeds on classified roads - Surveys for evaluation - average speed of vehicles - Definition of capacity - Factors affecting capacity - Measurements of traffic volumes delays in road traffic flow.

UNIT – II

3. **ROAD ACCIDENTS**
   Process of accidents - Driver and Pedestrian behaviors - road conditions - Inter section movements, mixed traffic flow - Data collection and analysis of locations, vehicles and time of occurrence.
4. **TRAFFIC CONTROL MEASURES:**
   Traffic designs, classification of usage - Road markings: Traffic operation- signal design; Types of intersections; Design of rotary intersection;

UNIT – III

RAILWAY ENGINEERING

5. INTRODUCTION

Role of railways in transportation; Comparison of railway and highway transportation; Development of railway systems with particular reference to India; Classification of railways- Permanent way – Components and their functions – Rail joints – Welding of Rails – Creep of Rails – Rail fixtures & Fastenings.

6. Track Geometric design – Points & Crossings – Track drainage –Layout of Railway stations and yards – Signals – Interlocking – Track circuiting – Track Maintenance.

UNIT – IV

7. **AIRPORTS AND HARBOURS**
   Airport Planning, components of Airport, site selection, Runway Orientation, design of runway, Geometric design and correction for gradients, airport zoning. Design factors methods for flexible and rigid pavements; LCN system of pavement design.

8. Definition of terms - harbours, ports, Docks, Tides and waves, Requirements of harbours, Classification - site investigation for satellite ports - Terminal facilities - Mooring accessories Navigational aids. Piers, Breakwaters, Wharves, Jetties, Quays, Fenders.

TEXT BOOKS

UNIT I & II: Highway Engineering by S. K. Khanna & C. E. G. Justo; Nemchand & Brothers, Roorkee.

UNIT III: Railway Engineering by S.C.Saxena and S.Arora Dhanpat Rai & sons.

UNIT IV: Airport Planning and Design by S. K. Khanna & M. G. Arora; Nemchand & Bros, Roorkee.

REFERENCE BOOKS

1. Principles of Transportation Engineering by Partha Chakroborty & Animesh Das, Prentice Hall of India, New Delhi.

2. Principles of Transportation Engineering and highway engineering by G. Venkatappa Rao, Tata Mc Graw-hill publishing company limited New Delhi.

3. Kadiyali L.R., *Traffic Engineering and Transportation Planning*, 1989

4. Railway Engineering by M.M.Agarwal; Prabha & Co, New Delhi.

5. Airport Engineering by G.V.Rao; Tata Mc Graw Hill, New Delhi.

CODE: CE 422

CONSTRUCTION MANAGEMENT

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Introduction

Construction projects; Project management; Main causes of project failure.

2. Planning And Scheduling

Steps involved in planning; Objectives; Principles; Advantages; Limitations; Stages of planning; Scheduling, Preparation of construction schedules; Methods of scheduling; Bar charts; Mile stone charts; Controlling; Job layout; Factors affecting job layout; Project work break down; Activities involved; Assessing activity duration.

UNIT – II

3. Project Management Through Networks

Objectives of network techniques; Fundamentals of network analysis; Events; Activities; Dummies; Types of networks; Choice of network type; Advantages of network techniques over conventional techniques.

4. Program Evaluation And Review Technique (PERT)

Introduction; Time estimates; Earliest expected time; Latest allowable occurrence time; Slack; Critical path; Probability of completion time for a project.

5. Critical Path Method (CPM)

Introduction; Difference between CPM and PERT; Earliest event time; Latest event time; Activity time; Float; Critical activities and critical path.

6. Cost Control

Direct cost; Indirect cost; Total project cost; Optimization of cost through networks; Steps involved in optimization of cost.

UNIT – III

7. Resource Management (Manpower)

Introduction; Resource smoothing; Resource levelling; Establishing workers productivity.

8. Resource Management (Materials)

Objectives of material management; Costs; Functions of material management department; ABC classification of materials; Inventory of materials; Material procurement; Stores management.

9. Resource Management (Machinery)

Classification of construction equipment; Earth moving equipment; Excavation equipment; Hauling equipment, Earth compaction equipment; Hoisting equipment; Concreting plant and equipment; Time and motion study; Selection of equipment– Task consideration, Cost consideration;

Factors affecting the selection; Factors affecting cost owning and operating the equipment; Equipment maintenance.

UNIT – IV

10. Quality Control

Importance of quality; Elements of quality; Organization for quality control; Quality assurance techniques; Documentation; Quality control circles; Total quality management; ISO – 9000.

11. Safety Management

Accident prevention programme; Immediate attention in case of accident; Approaches to improve safety in construction; Safety benefits to employers, employees and customers; Prevention of fires in construction industries; Fault free analysis; Safety information system; Safety budgeting.

12. Management Information System In Construction

Communication tools; Management of information with computer; Project management information system concept; Computer as a decision making tool; Decision making by data base enquiry system; Knowledge based expert system in construction.

13. Project Economics

Modern school of thoughts; Business cycle; Capital; Assets; Money; Bond; Equity; Real assets; Marginal productivity of capital; Annuity; Profit; Discounted cash flow analysis; Payback period; Return on investment; Benefit cost ratio.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Construction Engineering and Management by Dr. S. Seetharaman; Umesh Publications, Nai Sarark, Delhi.
2. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee; Khanna Publishers, Nai Sarak; Delhi.

REFERENCE BOOKS

1. Construction Management & Planning by B. Sengupta & H. Guha; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
2. Construction Planning, Equipment & Methods by Peurifoy R. L.; Mc Graw – Hill International Book Company.
3. PERT & CPM Principles and applications by L. S. Srinath; Affiliated East West Press.

CODE: CE 423 /(A) **ELECTIVE – III**

FINITE ELEMENT ANALYSIS

Lectures	:	4 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT -1

1. **BASIC PRINCIPLES OF STRUCTURAL MECHANICS:**

Equilibrium conditions; Strain. - displacement relations; Linear constitutive relations; Principle of virtual work, Energy principles; Application to finite element method,

2. **ELEMENT PROPERTIES:**

Displacement models; Relation between nodal degrees of freedom and generalized co - ordinates; Convergence requirements; Natural coordinate systems; Shape functions; Element strains and stresses; Element stiffness matrix; Static condensation.

UNIT – II

3. **ISOPARAMETRIC ELEMENTS:**

Two dimensional isoparametric elements; Computations of stiffness matrix for isoparametric elements; Convergence criteria for isoparametric element.

UNIT – III

4. **DIRECT STIFFNESS METHOD OF ANALYSIS AND SOLUTION TECHNIQUE:**

Assemblage of elements - Direct stiffness method; Gauss elimination and matrix decomposition.

UNIT – IV

5. **PLANE STRESS AND PLANE STRAIN ANALYSIS:**

Triangular elements; Rectangular elements; Isoparametric elements; Incompatible displacement models; The patch test; Reinforced concrete element; Application to plane stress analysis of a gravity dam.

NOTE:

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK:

1.Finite Element Analysis - Theory and Programming by C. S. Krishnamoorthy; Tata Me Graw - Hill Publishing Co.Ltd., New Delhi

REFERENCE BOOK:

1. Introduction to the Finite Element method - A Numerical method for engineering analysis by Desai & Abel; CBS Publishers & Distributors., Delhi

2. The finite element method in engineering by S. S.Rao, Butterworth-Heinemann, New Delhi, 1999

CODE: CE 423 /(B) **ELECTIVE – III**

BRIDGE ENGINEERING

Lectures	:	4 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

(Working stress method is to be adopted for all designs)

UNIT – 1

1. Introduction & Investigation For Bridges

Components of a Bridge; Classification; Standard Specifications; Need for Investigation; Selection of Bridge Site; Preliminary Data to be Collected; Preliminary Drawings; Determination of Design Discharge; Economical Span; Location of Piers and Abutments; Vertical clearance above HFL; Scour depth; Traffic Projection; Choice of Bridge type; Importance of Proper Investigation.

UNIT – II

2. Concrete Bridges

Various types of bridges; I. R. C. Specifications for road bridges.

3. Culverts

Design of R. C. slab culvert.

UNIT – III

4. T – Beam Bridge

Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T – beam bridge.

UNIT – IV

5. Sub Structure For Bridges

Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment; Approach slab.

UNIT – V

6. Bearings For Bridges

Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

7. Foundations For Bridges

Scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

NOTE

Two questions of 14 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOK

1. Essentials of Bridge Engineering by Dr. Johnson Victor; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

CODE: CE 423 /(C) **ELECTIVE – III**

ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

Lectures	:	4 Periods/Week, 1 Tutorial	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

Chapter 1

Basic concepts of EIA: Initial Environmental Examination; Elements of EIA; Factors affecting EIA; Impact evaluation and analysis; Preparation of Environmental Base map; Classification of Environmental parameters.

Chapter 2

EIA Methodologies; Introduction; criteria for the selection of EIA Methodology; EIA Methods: Ad-hoc methods, Matrix methods, Network method, Environmental media quality index method; Overlay methods; Cost/benefit Analysis.

UNIT – II

Chapter 3

Impact of Developmental Activities and Land Use: Introduction and Methodology for the assessment of soil and ground water; Delineation of study area; Identification of activities.

Chapter 4

Procurement of relevant soil quality; Impact prediction; Assessment of Impact significance; Identification and Incorporation of mitigation measures.

Chapter 5

EIA in surface water, Air and Biological Environment: Methodology for the assessment of Impacts on surface water environment; Air pollution sources; Generalized approach for assessment of Air pollution Impact.

UNIT – III

Chapter 6

Assessment of Impact of Development activities on vegetation and wildlife; Environmental Impact of Deforestation; Causes and effects of deforestation.

Chapter 7

Environmental Audit and Environmental legislation: Objectives of Environmental Audit; Types of Environmental Audit; audit protocol; stages of Environmental Audit; On-site activities; Evaluation of Audit data and preparation of Audit report.

UNIT – IV

Chapter 8

Post Audit activities; The Environmental Pollution Act, The Water Act; The Air (Prevention and Control of Pollution) Act; Mota Act; Wild life Act.

Chapter 9

Case Studies and preparation of Environmental Impact Assessment statement for various industries.

NOTE

Two questions of 14 marks each will be given from each unit out of which one is to be answered. Fourteen questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Environmental Impact Assessment Methodologies by Y. Anjaneyulu; B.S. Publication, Sultan Bazar, Hyderabad.

2. Environmental Science and Engineering by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers.

REFERENCE BOOKS

1. Environmental Science and Engineering by Suresh K. Dhameja, S.K. Kataria & Sons Publications, New Delhi.

2. Environmental Pollution and Control by Dr. H.S. Bhatia, Galgotia Publications Pvt. Ltd. Delhi

CODE: CE 423 /(D) **ELECTIVE – III**

GROUND IMPROVEMENT TECHNIQUES

Lectures	:	4 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-I

1. **Introduction**

Need for engineered ground improvement, classification of ground modification techniques; suitability, feasibility and desirability of ground improvement technique; objectives of improving soil.

2. **In-situ densification methods in granular soils**

Introduction, Vibration at the ground surface, impact at the ground surface, vibration at depth, impact at depth.

UNIT-II

3. **In-situ densification methods in cohesive soils**

Introduction, preloading, sand drains, sand wicks, band drains, stone and lime columns.

4. **Reinforced earth**

Principles, components of reinforced earth, governing design of reinforced earth walls, design principles of reinforced earth walls.

UNIT-III

5. Geotextiles

Introduction, types of geotextiles, functions and their applications, tests for geotextiles, geogrids and its functions.

6. **Mechanical Stabilization**

Soil aggregate mixtures, properties and proportioning techniques, soft aggregate stabilization, compaction, field compaction control.

UNIT-IV

7. Cement Stabilization

Mechanism, factors affecting and properties, use of additives, design of soil cement mixtures, construction techniques.

8. Lime and Bituminous Stabilization

Type of admixtures, mechanism, factors affecting, design of mixtures, construction methods.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOK

1. Hausmann M.R(1990) Engineering Principles of ground modification, McGraw-Hill International edition.

REFERENCES

1. Ground improvement Techniques, P.Purushothama Raju, Laxmi Publications Pvt. Ltd., New Delhi.
2. Robert M. Koerner, Designing with Geosynthatics, Prentice Hall New Jercy, USA.
3. Construction and Geotechnical methods in Foundation Engineering, R.M.Koerner, McGraw-Hill Book Company.
4. Current Practices in Geotechnical Engineering Vol.-I, Alam Singh and Joshi, International Book Traders, New Delhi.

CODE: CE 424 /(A) **ELECTIVE – IV**

ADVANCED REINFORCED CONCRETE DESIGN

Lectures	:	4 Periods/Week, 1 Tutorials	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Grid Floors

Introduction, Analysis and Design of Grid Floors

2. Raft Foundation

Introduction, Analysis and Design of Raft Foundation using grid beams

UNIT – II

3. Circular water tanks:

Introduction, Underground circular water tanks, on ground circular water tanks

4 Desing Of Concrete Corbels

UNIT – III

5. Elevated water tanks:

Introduction, Analysis & Design of INTZ Tanks including staging

UNIT – IV

6. Bunkers And Silos

Design of rectangular and circular bunkers; design of silos

UNIT – V

7. Yieldline Theory

Introduction; assumptions; analysis by virtual work method; analysis by equilibrium method; analysis and design of simply supported square, rectangular and circular slabs.

8. Introduction To Deep Beams

Parmeters influencing design; IS code provisions; design of simply supported and continuous deep beams.

NOTE:

Two questions of 14 marks each will be given from each unit, out of which one is to be answered.

TEXT BOOK

1.Advanced Reinforced Concrete Design, by N.Krishna Raju CBS publishers

REFERENCE BOOKS

1. Reinforced Concrete Volume II by H.J Shah, Charotar

2. Advanced Reinforced Concrete Design by Varghese,PHI

3. Advanced Reinforced Concrete Design (vol-II) by S. S. Bhavikatti, New age international

CODE: CE 424 /(B) **ELECTIVE – IV**

PAVEMENT ANALYSIS AND DESIGN

Lectures	:	4 Periods/Week, 1 Tutorials	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT-1

Types of pavement-factors affecting design of pavements-wheel loads-type pressure-contact pressure, Material characteristics-Environmental and other factors.

Stresses in rigid pavement- layered systems concept-one layer system- Boussinesq Two layer system –Burmister.

UNIT-II

Stress in rigid pavement-relative stiffness of slab, modulus of sub-grade reaction- stresses due to warping, stresses due to loads, stresses due to friction. Pavement design: IRC method of flexible pavement design.

UNIT-III

IRC method of rigid pavement design –joints-Dowel & Tie bar.

Highway material tests-Bitumenous material tests.

UNIT-IV

Highway construction –Gravel, WBM, Bituminous pavements types- cement concrete roads.

Failure in Rigid & Flexible pavements, Highway maintenance-Routine-periodic- special repairs.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Highway Engineering-S.K.Khanna & C.J.Justo, Nemchand & Bros.,7th Edition (2000).
2. Principles and Practices of highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal – Khanna publishers- (2003).

REFERENCE

1. Principles of Pavement Design-Yoder & Wit Zorac- John Willey & Sons.

INDIAN STANDARD CODES

1. IRC Code for Flexible pavement-IRC-37-2001.
2. IRC Code for Rigid pavement-IRC-58-2002.

CE424/(C) ELECTIVE - IV

ADVANCED ENVIRONMENTAL ENGINEERING

Lectures	:	4 Periods/Week, 1 Tutorials	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Stream Sanitation

Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification; Impact of pollutants on stream waters and usage of stream water with special reference to flora and fauna.

2. Low Cost Wastewater Treatment Systems

Introduction; Stabilization ponds (including design aspects); Aerated lagoons; Oxidation ditch; Extended aeration process.

UNIT – II

3. **Industrial Wastewater Treatment**

Introduction to Industrial Wastewater treatments.

Sugar Plant: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Dairy Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

Pulp and Paper Industry: Quantity of liquid waste; Characteristics of liquid waste; Methods of its treatment and disposal.

UNIT – III

4. New Concepts In Biological Waste Treatment

Introduction; Nitrogen removal by biological nitrification and de-nitrification; Phosphate removal from the activated sludge process; Rotating Disc Biological Contactor; Anaerobic filters; U-Tube aeration systems.

5. Sources And Classification Of Air Pollution

Stationary and mobile sources; Primary and secondary pollutants; Natural contaminants; Particulate matter; Aerosols; Gaseous pollutants.

6. Effects Of Air Pollution

Global Effects: Global warming; Ozone depletion; Acid rains; Effects of air pollutants on human health; Effects on plants; Economical effects.

UNIT – IV

7. Meteorology And Air Pollution

Atmospheric stability and temperature inversions; Maximum Mixing Depth; Wind direction and speed; Plume behaviour; Gaussian Dispersion Model; Plume rise; Wind rose.

8. Control Of Air Pollution

Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers.

9. Noise Pollution

Introduction; Levels of noise; Noise rating systems; Measurement of noise; Sources of noise and their noise levels; Acceptable noise levels; Effects of noise; Control of noise.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Wastewater Engineering, Treatment, Disposal and Reuse by Metcalf & Eddy Inc.; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
3. Air Pollution by M.N. Rao and H.V.N. Rao; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.

REFERENCES

1. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
2. Water Supply and Wastewater Disposal by G.M. Fair et all; John Wiley & Sons.
3. Sewage Disposal and Air Pollution Engineering by S.K. Garg; Khanna Publications, Delhi.
4. Sewage and Sewage Treatment by S.K. Kshirasagar; Roorkee Publishing House, Roorkee.

CODE: CE 424 (D) **ELECTIVE – IV**

GROUND WATER DEVELOPMENT AND MANAGEMENT

Lectures	:	4 Periods/Week, 1 Tutorials	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

UNIT – I

1. Introduction

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

2. Ground Water Movement

Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, Ground water flow contours their applications.

UNIT – II

3. Analysis Of Pumping Test Data

i.) Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theim's equations, Assumptions, Formation constants, yield of an open well interface and well tests.

ii) Unsteady flow towards a well – Non equilibrium equations – Theis solution – Jocob and Chow's simplifications, Leaky aquifers.

UNIT – III

4. Surface And Subsurface Investigation

Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation.

5. Artificial Recharge Of Ground Water

Concept of artificial recharge – recharge methods, relative merits. Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies.

UNIT – IV

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion.

Groundwater Basin Management: Concepts of conjunction use, Case studies.

NOTE

Two questions of 12 marks each will be given from each unit out of which one is to be answered. Twelve questions of one mark each will be given from entire syllabus which is a compulsory question.

TEXT BOOKS

1. Groundwater by H.M. Raghunath, Wiley Eastern Ltd.
2. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York

REFERENCES

1. Groundwater by Bawvr, John Wiley & sons.
2. Groundwater Syatem Planning & Managemnet – R. Willes & W.W.G. Yeh, Printice Hall.

CODE : CE461 **LABORATORY**

QUANTITY ESTIMATION & PROJECT MANAGEMENT

Lectures	:	3 Periods/Week,	Continuous Assessment	:	40
Final Exam	:	3 hours	Final Exam Marks	:	60

Note: A minimum of twelve (12No) shall be done and recorded

UNIT - I

Quantity Surveying

*(At least **SIX** of the following using softwares like MS Excel/ Qty./Road Estimate/Super Rate analysis etc.)*

1. Quantity estimation of a single storey residential building (different items).
2. Cost estimation of a single storey residential building.
3. Quantity estimation of a B.T.Road(different items).
4. Cost estimation of a B.T.Road.
5. Quantity estimation of a Canal (different items).
6. Cost estimation of a Canal.
7. Find out the labour requirement and preparing the Rate Analysis for different items of work.

   a) C.C b) R.C.C c) Brick work d) Flooring

UNIT - II

Project Management

*(Any **THREE** of the following using softwares like MS Project / Primavera etc.)*

1. Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stone chart.
2. Preparing the Project management report for a single storey residential building by using the network technique (PERT/CPM).
3. Preparing the Project management report for a B.T.Road by using the network technique (PERT/CPM).
4. Preparing the Project management report for a Canal by using the network technique (PERT/CPM).

UNIT – III

*(At least **THREE** of the following by using soft ware's like MS Excel)*

2. Quantity estimation of RCC roof slab and preparing schedule of bars
3. Quantity estimation of RCC beam and preparing schedule of bars
4. Quantity estimation of RCC Column with foundation footing and preparing schedule of bars
5. Quantity estimation of RCC retaining wall and preparing schedule of bars