

ACHARYA NAGARJUNA UNIVERSITY
BACHELOR OF CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION

(Effective from 2011-2012) I B.Tech.

(Common to all Branches, except Chemical Engg. and Bio-Technology)

Sl. No.	Course Details		Scheme of Instruction		Scheme of Examination			Credits
	Code No.	Subject Name	Periods per week		Maximum Marks		Total Marks	
			L/T	D/P	Int.	Ext.		
1.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 101	Mathematics-I	3	--	30	70	100	4
2.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 102	Mathematics-II	3	--	30	70	100	4
3.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 103	Engineering Physics	3	--	30	70	100	4
4.	CE/CSE/ECE/EEE/ EI/IT/ME – 104	Engineering Chemistry	3	--	30	70	100	4
5.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 105	Professional Communication Skills	3	--	30	70	100	4
6.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 106	C Programming and Numerical Methods	3	--	30	70	100	4
7.	CE/CSE/ECE/EEE/ EI/IT/ME – 107	Engineering Mechanics	3+1	--	30	70	100	4
8.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 108	Engineering Graphics*	3+3	--	30	70	100	4

9.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 151	Physics Lab	--	3	30	70	100	2
10.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 152	Chemistry Lab	--	3	30	70	100	2
11.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 153	Workshop Practice	--	3	30	70	100	2
12.	BT/CE/ChE/CSE/EC E/EEE/EI/IT/ME – 154	Computer Programming Lab	--	3	30	70	100	2
	TOTAL		24+4	12	360	840	1200	40

L/T : Lecture / Tutorial

D/P : Drawing / Practical

II B.Tech. – I Semester

Code	Name Of Subject	L	T	P	Maximum Marks			Credits
					Int.	Ext.	Total	
CE211	Mathematics - III	4	-		30	70	100	4
CE212	Building Materials, Planning & Construction.	4	-		30	70	100	4
CE213	Surveying – I	4	1		30	70	100	4
CE214	Solid Mechanics-I	4	1		30	70	100	4
CE215	Fluid Mechanics	4	1		30	70	100	4
CE216	Engineering Geology	4	-		30	70	100	4
CE251	Engineering Geology Laboratory	-	-	3	30	70	100	2
CE252	Surveying Field Work - I	-	-	3	30	70	100	2
CE253	Building Drawing	-	-	3	30	70	100	2
	Total	24	3	9	270	630	900	30

L – Lecture ; T – Tutorial: P – Practical

II B.Tech. – II Semester

Code	Name Of Subject	L	T	P	Maximum Marks			Credits
					Int.	Ext.	Total	
CE221	Concrete Technology	4	-		30	70	100	4
CE222	Environmental Studies	4	-		30	70	100	4
CE223	Surveying– II	4	1		30	70	100	4
CE224	Solid Mechanics-II	4	1		30	70	100	4
CE225	Hydraulics & Hydraulic Machines	4	1		30	70	100	4
CE226	Elements of Electrical and Mechanical Engineering	4	-		30	70	100	4
CE261	Hydraulics & Hydraulic Machines Laboratory	-	-	3	30	70	100	2
CE262	Material Testing Laboratory	-	-	3	30	70	100	2
CE263	Communication Skills Laboratory	-	-	3	30	70	100	2

	Total	24	3	9	270	630	900	30
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L – Lecture ; T – Tutorial : P – Practical

III B.Tech. – I Semester

Code	Name Of Subject	L	T	P	Maximum Marks			Credits
					Int.	Ext.	Total	
CE311	Environmental Engineering - I	4	-		30	70	100	4
CE312	Structural Analysis - I	4	1		30	70	100	4
CE313	Water Resources Engineering - I	4	1		30	70	100	4
CE314	Design of Concrete Structures-I	4	1		30	70	100	4
CE315	Design of Steel Structures-I	4	1		30	70	100	4
CE316	Geo-Technical Engineering -I	4	-		30	70	100	4
CE351	Environmental Engineering Laboratory	-	-	3	30	70	100	2
CE352	Geo-Technical Engineering Laboratory	-	-	3	30	70	100	2
CE353	Computer Programming Laboratory	-	-	3	30	70	100	2
	Total	24	4	9	270	630	900	30

L – Lecture ; T – Tutorial : P – Practical

III B.Tech. – II Semester

Code	Name Of Subject	L	T	P	Maximum Marks			Credits
					Int.	Ext.	Total	

CE321	Environmental Engineering - II	4	-		30	70	100	4
CE322	Structural Analysis - II	4	1		30	70	100	4
CE323	Water Resources Engineering - II	4	1		30	70	100	4
CE324	Design of Concrete Structures-II	4	1		30	70	100	4
CE325	Design of Steel Structures-II	4	1		30	70	100	4
CE326	Geo-Technical Engineering –II	4	-		30	70	100	4
CE327	Elective - I	4	-		30	70	100	4
CE361	Surveying Field Work - II	-	-	3	30	70	100	2
CE362	Computer Aided Analysis and Design	-	-	3	30	70	100	2
	Total	28	4	6	270	630	900	32

L – Lecture ; T – Tutorial : P – Practical

Elective - I

1. Pre-stressed Concrete
2. Water Resources Systems Analysis
3. Earthquake Resistant Design of Structures
4. Ground water development and Management

IV B.Tech. – I Semester

Code	Name Of Subject	L	T	P	Maximum Marks			Credits
					Int.	Ext.	Total	
CE411	Transportation Engineering - I	4	-	-	30	70	100	4
CE412	Structural Analysis - III	4	1	-	30	70	100	4
CE413	Remote Sensing and GIS	4		-	30	70	100	4
CE414	Estimation & Quantity Surveying	4	-	-	30	70	100	4
CE415	Open Elective	4	-	-	30	70	100	4
CE416	Elective -II	4		-	30	70	100	4
CE451	Mini-Project	-	-	2	100	-	100	2
CE452	Computer Aided Detailing of Structures	-	-	3	30	70	100	2
CE453	Transportation Engineering Laboratory	-	-	3	30	70	100	2
	Total	24	1	8	340	560	900	30

L – Lecture ; T – Tutorial : P – Practical

CE 415 Open Elective : 1. Finite Element Method 2. Artificial Intelligence

CE 416 Elective - II :

1. Design and Drawing of Hydraulic Structures
2. Bridge Engineering
3. Repair and Rehabilitation of Structures
4. Ground Improvement Techniques

IV B.Tech. – II Semester

Code	Name Of Subject	L	T	P	Maximum Marks			Credits
					Int.	Ext.	Total	
CE421	Transportation Engineering - II	4	-	-	30	70	100	4
CE422	Construction Engg. & Management	4	-	-	30	70	100	4
CE423	Professional Ethics and Human Values	3		-	30	70	100	4
CE424	Elective – III	4		-	30	70	100	4
CE461	Quantity Estimation & Project Management	-	-	3	30	70	100	2
CE462	Project Work	-	-	6	50	150	200	10
	Total	15	0	9	200	500	700	28

L – Lecture ; T – Tutorial : P – Practical

Elective - III

1. Advanced Reinforced Concrete Design
- 2.. Pavement Analysis and Design
3. Advanced Environmental Engineering
4. Advanced foundation Engineering

ACHARYA NAGARJUNA UNIVERSITY: NAGARJUNA NAGAR

**REVISED REGULATIONS FOR
FOUR - YEAR B.TECH. DEGREE COURSE
(CREDIT BASED SYSTEM)**

(Effective for the batch of students admitted into first year B.Tech. from the academic year 2011-2012).

1.0. MINIMUM QUALIFICATIONS FOR ADMISSION:

A candidate seeking admission into First Year of B.Tech. Degree Course should have passed either Intermediate examination conducted by the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics, and Chemistry as optional subjects (or any equivalent examination recognized by the Acharya Nagarjuna University) or Diploma in Engineering in the relevant branch conducted by the State Board of Technical Education & Training of Andhra Pradesh (or equivalent Diploma recognized by Acharya Nagarjuna University).

The selection is based on the rank secured by the candidate at the EAMCET / ECET (FDH) examination conducted by A.P. State Council of Higher Education.

The candidate shall also satisfy any other eligibility requirements stipulated by the University and / or the Government of Andhra Pradesh from time to time.

2.0. BRANCHES OF STUDY:

2.1. The B.Tech. Course is offered in the following branches of study at one or more of the affiliated colleges:

- 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

2.2 The first year of study is common to all branches of Engineering except for Chemical Engineering and Biotechnology.

2.3 **In addition to the core electives, an open elective (non departmental elective) is to be offered in the first semester of fourth year by all branches of B.Tech. courses.**

3.0. DURATION OF THE COURSE AND MEDIUM OF INSTRUCTION:

3.1 The duration of the course is four academic years consisting of two semesters in each academic year where as annual pattern is followed for first year. The medium of instruction and examination is English.

3.2 **The duration of the course for the students (Diploma Holders) admitted under lateral entry into II B.Tech. is three academic years consisting of two semesters in each academic year. The medium of instruction and examination is English.**

4.0. MINIMUM INSTRUCTION DAYS:

The first year shall consist of a minimum number of 180 instruction days and each semester of 2nd, 3rd and 4th years shall consist of 90 days of instruction excluding the days allotted for tests, examinations and preparation holidays.

5.0 EVALUATION:

The performance of the students in each year/ semester shall be evaluated subject wise

5.1. The distribution of marks between sessional work (based on internal assessment) and University Examination will be as follows:

Nature of the subject	Sessional Marks	University Exam. marks
Theory subjects	30	70
Design / Drawing	30	70
Practicals	30	70
Mini-Project	100	-
Project Work	50	150 (Viva-voce)

5.2. In the First Year, there shall be three Mid Term Examinations and three Assignment Tests in theory subjects, conducted at approximate equal intervals in the academic year. Assignment questions shall be given at least one week in advance and the students shall answer the question(s) specified by the concerned teacher just before the commencement of the Assignment Test. A maximum of 18 Sessional marks (75% approx) shall be awarded based on the best two performances out of the three Mid Term Exams and a maximum of 7 (25% approx) marks for the best two Assignment Tests out of the three Assignment Tests conducted.

For Drawing subject (Engineering Graphics), 7 marks shall be awarded based on day-to-day class work and the remaining 18 marks based on the best two performances in the three Mid Term Exams. No separate Assignment Tests will be held for this subject.

The remaining 5 marks out of the 30 marks earmarked for the internal sessional marks are allotted for attendance in the respective theory and drawing subjects in a graded manner as indicated in **clause 7.2** from I year to IV year.

In each of the Semesters of 2nd, 3rd and 4th years, there shall be two Mid Term examinations and two Assignment Tests in every theory subject. The Sessional marks for the midterm examinations shall be awarded giving a weightage of 14 marks out of 18 marks (75% approx) to that midterm examination in which the student scores more marks and the remaining 4 marks (25% approx.) for other midterm examination in which the student scores less marks. Similarly a weightage of 5 marks (75% approx) out of 7 marks earmarked for assignment tests shall be given for the assignment in which the student scores more marks and remaining 2 marks (25% approx) shall be given for the assignment test in which the student scores less marks.

For Drawing subjects, there shall be only two Mid Term examinations in each semester with no Assignment Tests. In case of such subjects a maximum of seven marks shall be given for day-to-day class work and the remaining maximum 18 marks shall be awarded to the Mid Term examinations taking into account the performance of both the Mid Term examinations giving weightage of 14 marks for the Mid Term Examination in which the student scores more marks and the remaining 4 marks for the other midterm examination. A weightage of 5 marks will be given in the total sessional marks of 30 for attendance in all theory and drawing subjects as indicated in **clause 7.2**.

- 5.3.** The evaluation for Laboratory class work consists of weightage of **20** marks for day to day laboratory work including record work and 10 marks for internal laboratory examination including Viva-voce examination.

In the case of Project work, the sessional marks shall be awarded based on the weekly progress and based on the performance in a minimum of two Seminars and the Project Report submitted at the end of the semester. The allotment of sessional marks for Seminars and for day-to-day class work shall be **20 and 30**.

NOTE : A student who is absent for any Assignment / Mid Term Exam, for any reason whatsoever, shall be deemed to have scored zero marks in that Test / Exam and no make-up test / Exam shall be conducted.

- 5.4.** A student who could not secure a minimum of 50% aggregate sessional marks is not eligible to appear for the year-end / semester-end University examination and shall have to repeat that year/ semester.

6.0. LABORATORY / PRACTICAL CLASSES:

In any year/semester, a minimum of 90 percent experiments / exercises specified in the syllabi for laboratory course shall be conducted by the students, who shall complete these in all respects and get the Record certified by the concerned Head of the Department for the student to be eligible to face the University Examination in that Practical subject.

7.0. ATTENDANCE REGULATIONS:

- 7.1** Regular course of study means a minimum average attendance of 75% in all the subjects computed by totaling the number of hours / periods of lectures, design and / or drawing, practicals and project work as the case may be, held in every subject as the denominator and the total number of hours / periods actually attended by the student in all the subjects, as the numerator.

7.2 A Weightage in sessional marks upto a maximum of 5 marks out of 30 marks in each theory subject shall be given for those students who put in a minimum of 75% attendance in the respective theory 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

7.3 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 *clause 7.1* above and provided the principal is satisfied with the genuineness of the reasons and the conduct of the student.

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

8.0 DETENTION:

A student, who fails to satisfy either the minimum attendance requirements as stipulated in *Clause-7*, or the requirement of minimum aggregate sessional marks as stipulated in *Clause 5*, shall be detained. Such a student shall have to repeat the same year / semester as the case may be subsequently and satisfy the above requirements afresh to become eligible to appear for the year-end / semester-end University examination.

9.0. UNIVERSITY EXAMINATION:

9.1. For each theory, design and/or drawing subject, there shall be a comprehensive University Examination of three hours duration at the end of First year / each Semester of 2nd, 3rd and 4th years, 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.

9.2. For each Practical subject, the University examination shall be conducted by one internal and one external examiner appointed by the Principal of the concerned college and the University respectively, the duration being that approved in the detailed Schemes of Instruction & Examination.

9.3 Viva-voce Examination in Project Work shall be conducted by one internal examiner and one external examiner to be appointed by the University.

10.0 AWARD OF CREDITS

Credits are awarded for each Theory/Practical Subjects. Each theory subject is awarded 4 credits and each practical subject is awarded 2 credits. Project work is awarded 10 credits. However for some important theory subjects more than 4 credits may be awarded by individual boards. The total number of credits for all the four years put together should be in the range of 218-224 for any branch.

10.1 AWARD OF GRADES

S.No.	Range of Marks	Grade	Grade Points
1	$\geq 85\%$	S	10.0
2	75%-84%	A	9.0
3	65%-74%	B	8.0
4	55%-64%	C	7.0
5	45%-54%	D	6.0
6	40%-44%	E	5.0
7	$\leq 39\%$	F(Fail)	0.0
8	The grade 'W' represents withdrawal/absent (subsequently changed into pass or E to S or F grade in the same semester)	W	0.0

10.2 A Student securing 'F' grade in any subject there by securing 0 grade points has to reappear and secure at least 'E' grade at the subsequent examinations in that subject.

10.3 After 1st year/each semester, Grade sheet will be issued which will contain the following details:

- **The list of subjects for the 1st year/each semester and corresponding credits and Grades obtained**
- **The Grade Point Average(GPA) for the 1st year/ each semester and**
- **The Cumulative Grade Point Average(CGPA) of all subjects put together up to that semester from first year onwards**

GPA is calculated based on the following formula:

Sum of [No.Credits X Grade Points]

Sum of Credits

CGPA will be calculated in a similar manner, considering all the subjects enrolled from first year onwards.

11.0 CONDITIONS FOR PROMOTION

- 11.1.** A student shall be eligible for promotion to II B.Tech. Course if he / she satisfies the minimum requirements of attendance and sessional marks as stipulated in Clauses 5 and 7, irrespective of the number of backlog subjects in I B.Tech.
- 11.2.** A student shall be eligible for promotion to III B.Tech. Course if he / she **secures a minimum of 70% of the total number of credits from one regular and one supplementary examinations of I B.Tech.**, (including practical subject) in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in *Clauses 5 and 7* in II/IV B.Tech.
- 11.3.** A student shall be eligible for promotion to IV B.Tech. course if he/she **secures a minimum of 70% of the total number of credits from two regular & two supplementary examinations of I B.Tech. and two regular & one supplementary examinations of II B.Tech. 1st semester and one regular & one supplementary examinations of II B.Tech. 2nd semester** (including practical subjects) in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in *Clauses 5 and 7* in III B.Tech.

- 11.4. A student (Diploma Holder) admitted under lateral entry into II B.Tech. shall be eligible for promotion to IV B.Tech. course if he/she secures a minimum of 70% of the total number of credits from two regular & one supplementary examinations of II B.Tech. 1st semester and one regular & one supplementary examinations of II B.Tech. 2nd semester (including practical subjects) in addition to satisfying the minimum requirements of attendance and sessional marks stipulated in *Clauses 5 and 7* in III B.Tech.**

12.0 ELIGIBILITY FOR AWARD OF B.TECH. DEGREE

The B.Tech. Degree shall be conferred on a candidate who has satisfied the following requirements.

- 12.1** The candidate must have satisfied the conditions for pass in all the subjects of all the years as stipulated in *clause 10*.

12.2. Maximum Time Limit for completion of B.Tech Degree

A Student, who fails to fulfill all the academic requirements for the award of the degree within eight academic years from the year of admission, shall forfeit his/her seat in B.Tech. Course.

- 12.3** A student (Diploma Holder) admitted under lateral entry into II B.Tech., who fails to fulfill all the academic requirements for the award of the degree within six academic years from the year of admission, shall forfeit his/her seat in B.Tech. course.

13.0 AWARD OF CLASS

A candidate who becomes eligible for the award of B.Tech. Degree as stipulated in *Clause 12* shall be placed in one of the following Classes.

S.No.	Class	CGPA
1	First Class With Distinction	8.0 or more
2	First Class	6.5 or more but less than 8.0
3	Second Class	5.0 or more but less than 6.5
4	Pass Class	4.5 or more but less than 5.0

14.0. IMPROVEMENT OF CLASS

- 14.1.** A candidate, after becoming eligible for the award of the Degree, may reappear for the University Examination in any of the theory subjects 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 Sessional Examination or for University Examinations in Practical subjects (including Project Viva-voce) for the purpose of improvement.

- 14.2.** A single **Grade sheet** shall be issued to the candidate after incorporating the **Credits and Grades** secured in subsequent improvements.
- 14.3.** A consolidated **Grade Sheet** shall be issued to the candidate indicating the **CGPA of all the four years put together** along with the Provisional Certificate.

15. AWARD OF RANK

The rank shall be awarded based on the following:

- 15.1.** Ranks shall be awarded in each branch of study for the top ten percent of the students appearing for the Regular University Examinations or the top ten students whichever is lower.
- 15.2.** Only such candidates who pass the Final year examination at the end of the fourth academic year after admission as regular final year students along with the others in their batch and become eligible for the award of the Degree shall be eligible for the award of rank. The University Rank will be awarded only to those candidates who complete their degree within four academic years.
- 15.3.** For the purpose of awarding rank in each branch, **the CGPA calculated based on the Grades** secured at the first attempt only shall be considered.
- 15.4.** Award of prizes, scholarships, or any other Honors shall be based on the rank secured by a candidate, consistent with the desire of the Donor, wherever applicable.

16.0 SUPPLEMENTARY EXAMINATIONS

In addition to the Regular University Examinations held at the end of 1st year / each semester, Supplementary University Examinations will be conducted during the academic year. Such of the candidates taking the Regular / Supplementary University examinations as Supplementary candidates may have to take more than one University Examination per day.

17.0 TRANSITORY REGULATIONS

- 17.1. Candidates who studied the four-year B.Tech. Degree Course under Revised Regulations (RR)/ **Credit based Regulations(CR)** but who got detained in any year for want of attendance / minimum aggregate sessional marks may join the appropriate year / semester in the Semester system applicable for the batch and be governed by the Regulations of that batch from then on.
- 17.2. University Examinations according to **RR / CR** shall be conducted in subjects of each year five times after the conduct of the last set of regular examinations under those Regulations.
- 17.3. Candidates who have gone through the entire course of four academic years and have satisfied the attendance and minimum aggregate sessional marks **in 1st year/each semester under RR/CR**, but who are yet to pass some subjects even after the five chances stated in *Clause 17.2*, shall appear for the equivalent subjects in the Semester system, specified by the University / Board of Studies concerned.

18.0 AMENDMENTS TO REGULATIONS

The University may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and / or Syllabi.

CE 101 MATHEMATICS – I

Lectures: 3 Periods/ week
University Exam. : 3 hrs

Sessional Marks: 30
University Exam. Marks: 70

Credits : 4

UNIT-I

Differential Calculus:

Rolle's Theorem (without proof), Lagrange's Mean value theorem (without proof), Taylor's theorem (without proof), Maclaurin's series, Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT-II

Multiple Integrals:

Double integrals, Change of order of integration, Double integrals in polar coordinates, Area enclosed by plane curves, Triple integrals, Volume of solids, Change of variables.

Ordinary differential equations (first order): Introduction, Linear and Bernoulli's equations, Exact equations, equations reducible to exact equations, Orthogonal trajectories, Newton's law of cooling, Heat flow, Rate of Decay of Radio-Active Materials

UNIT-III

Ordinary differential equations (higher order):

Linear Differential equations: Definition, Theorem, Operator D, Rules for finding the complementary function, Inverse operator, Rules for finding the particular integral, Working procedure to solve the equation, Linear dependence of solutions, Method of variation of parameters, Equations reducible to linear equations, Cauchy's homogeneous linear equation, Legendre's linear equation, Simultaneous linear equations with constant coefficients.

UNIT-IV

Fourier Series: Introduction and Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Even and Odd functions, Half range series Typical wave forms and Parseval's formulae, Complex form of the Fourier series Practical harmonic analysis.

Text Book: [1]. Higher Engineering Mathematics by B.S. Grewal,
Khanna publishers, 40th edition.

Reference Books: [1]. Advanced Engineering Mathematics by kreyszig.
[2]. Engineering Mathematics by Babu Ram

CE 102 MATHEMATICS - II

Lectures: 3 Periods/ week
University Exam. : 3 hrs

Sessional Marks: 30
University Exam. Marks: 70
Credits : 4

UNIT-I

Matrices:

Rank of a matrix, vectors, Consistency of linear system of equations, Linear transformations, Characteristic equations, Properties of eigen values, Cayley- Hamilton theorem (without proof), Reduction to diagonal form reduction of Quadratic forms to canonical form, Nature of a quadratic form, Complex matrices.

UNIT-II

Beta Gamma functions, error function.

Statistics: Method of least squares, Correlation, co-efficient of correlation (direct method only), lines of regression.

Vector Calculus:

Scalar and vector point functions, Del applied to scalar point functions. Gradient

UNIT-III

Vector Calculus:

Del applied to vector point functions, Physical interpretation of divergence, Del applied twice to point functions, Del applied to products of point functions, Integration of vectors, Line integral, Surfaces, Green's theorem in the plane (without proof), Stoke's theorem (without proof), Volume integral, Gauss divergence Theorem (without proof), Cylindrical Coordinates, Spherical polar coordinates.

UNIT-IV

Laplace Transforms : Introduction, Transforms of elementary functions, Properties of Laplace Transforms, existence conditions, Transforms of derivatives, Integrals, multiplication by t^n , division by t , Evaluation of integrals by Laplace Transforms, Inverse transforms, convolution theorem, Application to Differential equations with constant coefficients, transforms of unit step function, unit impulse function, periodic function.

Text Book: [1] Higher Engineering Mathematics by B.S.Grewal

Khanna publishers, 40^h edition.

Reference Books:

[1] Engineering Mathematics by Babu Ram

[2] Advanced Engineering Mathematics by Erwin Keyszing John willy
and sons.

CE 103 ENGINEERING PHYSICS

Lectures: 3 Periods/ week

Sessional Marks: 30

University Exam. : 3 hrs

University Exam. Marks: 70

Credits : 4

UNIT-I

Ultrasonics

Production of Ultrasonics by Piezo electric oscillator method, Detection by Acoustic grating method, Applications - Pulse echo technique, ultrasonic imaging and some general applications.

Applied Optics

Interference: Stokes principle (Phase change on reflection), Interference in thin films due to reflected light (Cosine law), (uses of air films in wedge method and Newton's rings experiments - qualitative treatments only) Michelson's interferometer: Principle, construction working and applications (Determination of wavelength of monochromatic source & for resolution of two closely lying wavelengths).

Lasers: Laser characteristics, Spontaneous and Stimulated emissions, Basic requirements of a laser, Population inversion – Solid state laser (Ruby laser), Gas (He-Ne) laser, Semiconductor (GaAs) laser, Applications of lasers.

Holography: Principle, recording, reproduction and applications.

Fiber optics: Structure of optical fiber, Types of optical fibers, Numerical aperture, Fiber optics in communications and advantages.

UNIT –II

Electromagnetism

Gauss's law in electricity (statement & proof), Coulomb's law from Gauss law, Circulating charges and Cyclotron principle & working, Hall effect and its uses, Gauss law for magnetism, Faraday's law of electromagnetic induction, Lenz's law, induced electric fields, Inductance, energy stored in a magnetic field, Displacement current, Maxwell's equations (qualitative treatment), electromagnetic wave equation and Velocity, Electromagnetic oscillations(qualitative treatment),

Electron Theory of Solids

Failure of classical free electron theory, quantum free electron theory, Fermi-Dirac (analytical) distribution function and its temperature dependence, Fermi energy.

UNIT-III

Principles of Quantum Mechanics

Dual nature of light, Matter waves & properties, de Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle and applications (non-existence of electron in nucleus, finite width of spectral lines). One dimensional time independent Schrodinger's wave equation, Physical significance of the wave function, Particle in a box (one dimensional).

Band theory of Solids

Bloch theorem, Kronig-Penny model (Qualitative treatment), Origin of energy band formation in solids, effective mass of electron, concept of hole.

Dielectric and Magnetic Materials

Electric dipole moment, polarization, dielectric constant, polarizability, types of polarizations, internal fields (qualitative), Clausius-Mossotti equation, Frequency dependence of polarization, Ferroelectrics and their applications.

Origin of magnetic moment of an atom, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve, soft and hard magnetic materials, Ferrites and their applications.

UNIT -IV

Advanced Materials of Physics

Optoelectronic devices: Qualitative treatments of Photo diode, LED and LCD; Solar cell and its characteristics. Electro-optic and Magneto-optic effects (Kerr and Faraday effects).

Superconductivity: First experiment, critical parameters (T_c , H_c , I_c), Meissner effect, types of superconductors, BCS Theory (in brief) and Applications of superconductors.

NanoTechnology : Introduction to nano materials, nano scale, surface to volume ratio, fabrication of nanomaterials, sol-gel and chemical vapour deposition methods, Carbon nano tubes-preparation and properties (thermal, electrical and mechanical - in brief), some applications of nanomaterials.

TEXT BOOKS

Engineering Physics – M.R.Srinivasan, New Age International.

Physics Part I and II – Halliday and Resnick, John Wiley & sons (Asia).

REFERENCE BOOKS

Concepts of Modern Physics – Arthur Beiser (TMG)

Engineering Physics – Gaur & Gupta , Dhanpati Rai Publications, New Delhi.

Modern Engineering Physics – A.S.Vasudeva, S.Chand & Co., New Delhi

Materials science – M.Vijaya and G.Rangarajan, TMH, New Delhi

CE 104: ENGINEERING CHEMISTRY

Lectures: 3 Periods/ week
University Exam. : 3 hrs

Sessional Marks: 30
University Exam. Marks: 70
Credits : 4

UNIT-I

WATER TECHNOLOGY: Various impurities of Water, WHO guidelines, Hardness units and determination by EDTA method (simple problems), water treatment for drinking purpose-sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Water treatment for industrial purpose: Boiler troubles, scales, sludges, caustic Embrittlement, boiler corrosion, priming and foaming- causes and prevention, Internal conditioning -Phosphate, Calgon and carbonate treatment, External conditioning-Lime Soda process (simple problems), softening by ion exchange process, Desalination of brackish water by electro dialysis and reverse osmosis.

GREEN CHEMISTRY: Introduction, Principles and applications.

UNIT-II

POLYMERS:

Monomer functionality, degree of polymerization, Tacticity, classification of polymerization-addition, condensation and co-polymerization, mechanism of free radical polymerization.

Plastics- Thermoplastic and thermosetting resins, preparation, properties and uses of Bakelite, polyesters, Teflon and PVC. Compounding of plastics.

Conducting polymers: Polyacetylene, mechanism of conduction, examples and applications.

Rubber- Processing of latex, Drawbacks of natural rubber- Vulcanization, Synthetic rubbers- Buna-S and Buna-N, polyurethane rubber and silicone rubber.

NANOMATERIALS: Introduction to nanochemistry, preparation of nanomaterials-carbon nanotubes and fullerenes and their engineering applications.

UNIT-III

Phase Rule: Statement and explanation of the terms involved, one component water system, condensed phase rule- construction of phase diagram by thermal analysis, simple eutectic system (Pb-Ag system only).

Electrochemical Energy Systems: Types of electrochemical energy systems, electrochemistry of primary batteries (Lachlanche or dry cell), Secondary cells (Lead Acid cell, Ni-Cd cell), Lithium batteries (Li-MnO₂, Lithium organic electrolyte) and their advantages.

Corrosion and its control: Introduction, electrochemical theory of corrosion, dry corrosion, corrosion due to differential aeration, Types of corrosion-galvanic corrosion (galvanic series), Pitting, Stress and microbiological corrosion, Factors affecting corrosion-oxidizers, pH, over voltage and temperature.

Protection methods: Cathodic protection, (Impressed current and sacrificial anode) anodic protection, corrosion inhibitors- types and mechanism of inhibition, metallic coatings-Galvanisation.

UNIT-IV

Fuels: Classification of fuels, calorific value-units and determination (Bomb calorimeter). Coal- Ranking and analysis, carbonization of coal (using Beehive oven)

Petroleum based: Fractional distillation, cracking, reforming, composition and uses of petrol, diesel, CNG and LPG.

Composites: Introduction, Constituents of Composites, Types –Fibre reinforced, Particulate and layered composites and their applications.

Lubricants: Classification –liquid lubricants-Viscosity index, Flash point, Fire point, Cloud point, Pour point, oiliness. Solid lubricants –Graphite and Molybdenum sulphide, Additives.

Liquid crystals: Structure of liquid crystal forming compounds, Classification and applications.

Text Book :

1. Engineering Chemistry, P.C. Jain and Monika Jain, Dhanpat Rai and Co., New Delhi

Reference Books :

1. A Text Book of Engineering Chemistry, S.S. Dara, 10th Edition, S.Chand and Co.
2. Principles of Polymer Science, P.Bahadur and N.V. Sastry, Narora Publishing House
3. A Text Book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai and Co.

CE 105 PROFESSIONAL COMMUNICATION SKILLS

Lectures: 3 Periods/week

Sessional Marks: 30

University Exam: 3 Hrs.

University Examination Marks: 70

Credits:4

COURSE OBJECTIVE:

The course aims to inculcate a sense of professionalism among the students while emphasizing on the basic aspects of the language learning such as grammar and vocabulary building. It also aspires to train the students to meet the global challenges.

UNIT-1: SPEECH BUILDING

This arena refreshes the students in the usage of grammar and basics of communication in English. It also helps them start building up their vocabulary.

Speaking about oneself

Sentence and its types

Positive, Negative and Interrogative Sentences, Speaking in formal and informal contexts,

Asking for opinion, Asking for information, Requesting and Seeking permission;

Emphasising a point

A list of 100 Basic Words

One word substitutes

UNIT- II: BASIC LANGUAGE SKILLS

The emphasis is on Grammar and development of written and oral communication skills among students and equips them with the skills to overcome the cut throat competition in formal and informal situations in the present world.

Parts of speech

Tenses

Letter writing (Personal and Business)

Situational Dialogues

A list of 100 Basic Words

UNIT- III: ADVANCED LANGUAGE SKILLS

To develop two specific skills i.e. speaking and writing, using correct and good vocabulary to improve the communicative competence of learners in their discipline with glamour.

Antonyms

Paragraph Writing

Technical terms

Reading Comprehension

Correction of Sentences

UNIT- IV: COMMUNICATION SKILLS

Communication skills aim at making students familiar with various aspects of corporate world and the importance of verbal communication. It also provides intensive instruction in the practice of professional writing.

Essay writing

Corporate Information

Idioms

E-mail etiquette

Prescribed Textbook:

Communication Skills for Engineers, K.R. Lakminarayana and T. Murugavel, Scitech Publications. ISBN: 9788183711548.

Reference Books:

Communication Skills for Professionals, Nira Konar, PHI Publication.

Competitive English for Professional Courses, J.K.Gangal, S.Chand Publication.

English for Technical Communication: Volume 1&2 by K.R. Lakminarayana , Scitech Publications.

Effective Technical Communication, M.Ashraf Rizvi,Tata Mc Graw Hill.

Advanced Technical Communication, Kavita Tyagi, Padma Misra, PHI Publication.

Word Power Made Handy, Dr. Shalini Verma,S.Chand Publication.

CE 106 C PROGRAMMING AND NUMERICAL METHODS

Lectures: 3 Periods/ week

Sessional Marks: 30

University Exam. : 3 hrs

University Exam. Marks: 70

Credits: 4

UNIT-1

Computer Basics: The Computer System, Generations of Computer, Classification of Computer, Block diagram of digital Computer, Inside the Computer-Processor, Memory, External Ports, PCI Card, Formatting Hard disk, Understanding BIOS, BIOS Commands, Networking Basics, Internet Basics, Basics of S/W-OS fundamentals, Algorithm, Flowchart, Programming Paradigms.

C-Basics: C-character set, Data types, Constants, Expressions, Structure of C program, Operators and their precedence & associativity, Basic input and output statements, Control Structures, Simple programs in C using all the operators and control structures.

UNIT-II

Functions: Concept of a function, passing the parameters, automatic variables, scope and extent of variables, storage classes, recursion, iteration vs recursion, types of recursion, Simple recursive and non recursive programs, Towers of Hanoi problem.

Arrays: Single and multidimensional Arrays, Character array as a string, string functions, Programs using arrays and string manipulation.

UNIT-III

Pointers: Pointers declarations, Pointer expressions, Pointer parameters to functions. Pointers, Pointers and array, Pointer arithmetic.

Structures: Declaring and using structures, operations on structures, structures and arrays, user defined data types, pointers to structures.

Files: Introduction, file structure, file handling functions, file types, file error handling, Programs using file functions.

UNIT-IV

Numerical Methods: Types of Errors, General formula, numerical method for finding roots of an algebraic equation of one variable, successive bisection method, false position method,

Newton Raphson method, secant method. Guass elimination method, Guass siedal method, Lagrange interpolation.

General Quadrature formula, Simpsons rule, Euler's method, general method for deriving differentiation formula, differentiation of Lagrange's polynomial, differentiation of Newton polynomial, Taylors Series, Ranga Kutta Method.

Text Books:

C Programming and Numerical Methods - Ajay Mithal - Pearson
Computer Oriented Numerical Methods -V.Raja Raman - PHI

References :

Programming with C-Gottfried-Schaums Outline Series-TMH
C Programming- Behrouz A forouzan – CENGAGE Learning
Computer Programming – Kanthane –Pearson Education
Elementary Numerical Methods - C.D. Conte
Introduction to Numerical Methods - S.S.Sastry

CE 107 ENGINEERING MECHANICS

Lectures / Tutorials : 3 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits:4

UNIT – I

Concurrent Forces In A Plane

Principles of static's; composition and resolution of forces; equilibrium of concurrent forces in a plane; method of projections; Method of moments.

Parallel Forces In A Plane

Couple; general case of parallel forces in a plane; center of parallel forces and centre of gravity ; Centroids of composite plane figures and curves; Centre of gravity of three-dimensional bodies.

UNIT – II

General Case Of Forces In A Plane

Composition of forces in a plane ; Equilibrium of forces in a plane ; Plane trusses – method of joints , Method of sections

Friction

Static and kinetic friction, Laws of friction; Applications of static friction.

Principle Of Virtual Work

Equilibrium of Ideal systems

UNIT – III

Rectilinear Translation

Kinematics of rectilinear motion ; Principles of dynamics ; Differential equation of rectilinear motion ; Motion of a particle acted upon by a constant force ; D'Alemberts principle ; Momentum and impulse ; Work and energy ; Ideal systems – conservation of energy ; direct central impact

Moments Of Inertia Of Plane Figures

Moment of inertia of a plane figure with respect to an axis in its plane ; Moment of Inertia with respect to an axis perpendicular to the plane of the figure ; Parallel axis theorem.

UNIT – IV

Curvilinear Translation

Kinematics of curvilinear motion ; Differential equations of curvilinear motion ; D'Alembert's principle in curvilinear motion ; Work and Energy.

Moments Of Inertia Of Material Bodies

Moment of inertia of a rigid body ; Moment of inertia of a lamina ; Moments of inertia of three-dimensional bodies.

Rotation Of A Rigid Body About A Fixed Axis

Kinematics of rotation ; Equation of motion for a rigid body rotating about a fixed axis; Work and energy

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

Engineering mechanics by S. Timoshenko , D. H. Young and J. Rao ,
Tata McGraw Hill Publishing Company Ltd.

REFERENCE BOOKS

1. Engineering mechanics by J. L. Meriam and L. Kraige , John Wiley & Sons
2. Vector mechanics for engineers by Beer and Johnston, Tata McGraw-Hill Publishing Company Ltd.
3. Engineering Mechanics by Hibbler and Gupta , Pearson Education

CE 108 ENGINEERING GRAPHICS

Lectures : 3+3 Periods / week Sessional Marks : 30
University Exam. : 3 hrs. University Exam. Marks : 70

Credits : 4

(To be taught & examined in First angle projection)

UNIT I

GENERAL: Use of Drawing instruments, Lettering .-Single stroke letters, Dimensioning- Representation of various type lines. Geometrical Constructions. Representative fraction.

CURVES : Curves used in Engineering practice - conic sections - general construction and special methods for ellipse, parabola and hyperbola. cycloidal curves - cycloid, epicycloid and hypocycloid; involute of circle and Archimedian spiral.

UNIT II

METHOD OF PROJECTIONS: Principles of projection - First angle and third angle projection of points. Projection of straight lines. Traces of lines.

PROJECTIONS OF PLANES : Projections of planes, projections on auxiliary planes.

UNIT III

PROJECTIONS OF SOLIDS : Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

SECTIONS OF SOLIDS: Sections of Cubes, Prisms, Pyramids, cylinders and Cones.true shapes of sections. (Limited to the Section Planes perpendicular to one of the Principal Planes).

UNIT IV

DEVELOPMENT OF SURFACES: Lateral development of cut sections of Cubes,Prisms,Pyramids,Cylinders and Cones.

ISOMETRIC PROJECTIONS : Isometric Projection and conversion of Orthographic Projections into isometric views. (Treatment is limited to simple objects only).

UNIT V

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

UNIT VI (For internal assesment only)

COMPUTER AIDED DRAFTING(Using any standard package): Setting up a drawing: starting , main menu (New, Open, Save, Save As etc.), Opening screen, error correction on screen, units, co-ordinate system, limits, grid, snap, ortho.

Tool bars: Draw tool bar, object snap tool bar, modify tool bar, dimension tool Bar

PRACTICE OF 2D DRAWINGS: Exercises of Orthographic views for simple solids using all commands in various tool bars.

TEXT BOOK:

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

AutoCAD 14 for Engineering Drawing Made Easy(Features AutoCAD 200) by P.Nageswara Rao

REFERENCE BOOK:

Engineering Drawing by Prof.K.L.Narayana & Prof. R.K.Kannaiah.

Engineering Graphics with AutoCAD 2002 by James D. Bethune

CE 151 PHYSICS PRACTICALS

Lectures / Tutorials : 3 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 2

Any 15 experiments from the following list of experiments

Compound pendulum –Determination of acceleration due to gravity (g)

Interference fringes - measurement of thickness of a foil / diameter of
Wire using wedge method.

Sensitive galvanometer - Determination of figure of merit

Newton's rings – Measurement of radius of curvature of plano convex lens

Lissajous' figures –Calibration of an audio oscillator

Photo cell – I-V Characteristic curves and determination of stopping potential

Diffraction grating – Measurement of wavelengths

Torsional pendulum- Determination of rigidity modulus of the wire material.

Carey- Foster's bridge: Determination of specific resistance/Temperature coefficient of
resistance.

Photo voltaic cell - Determination of **fill-factor**

Variation of magnetic field along the axis of a current carrying circular coil.

Series LCR resonance circuit - Determination of "Q" factor.

Thomson's method - determination of **e/m** of an electron.

Determination of a.c. Frequency – Sonometer.

Prism/Grating - Determination of dispersive power.

To determine the wavelength of Laser source.

Hall effect – Determination of Hall coefficient.

Determination of energy band gap.

Determination of Numerical Aperture of an optical fiber.

Determination of Amplitude and Frequency of an AC signal using a CRO.

CE 152 CHEMISTRY LABORATORY

Lectures: 3 Periods/week

Sessional Marks: 30

University Examination: 3 hours.

University Examination Marks: 70

Credits : 2

Note: Minimum of twelve experiments have to be conducted out of the list of experiments given below.

Estimation of total alkalinity of water sample

Standardization of HCl solution b. Estimation of alkalinity

Determination of purity of washing soda

Estimation of Chlorides in water sample

Standardization of AgNO₃ solution b) Estimation of Chlorides

Determination of Total Hardness of water sample:

Standardization of EDTA solution b) Determination of Total Hardness

Estimation of Magnesium

a) Standardization of EDTA solution b) Estimation of Magnesium

Estimation of Mohr's salt-permanganometry

Standardization of KMnO₄ solution b) Estimation of Mohr's salt

Estimation of Mohr's salt –Dichrometry

Standardization of K₂Cr₂O₇ solution b) Estimation of Mohr's salt

Analysis of soil sample:

Estimation of Ca and Mg b) Estimation of Organic matter

Determination of available chlorine in bleaching powder-Iodometry

Standardization of Hypo solution b) Determination of Available chlorine

Determination of Iodine in Iodized salt

Determination of Iron (Ferrous and Ferric) in an iron ore by Permanganometry

Determination of Zn using Potassium ferrocyanide

Conductometric titration of an acid vs. base

pH metric titrations of an acid vs. base

Demonstration Experiments:

Potentiometric titrations: Ferrous vs. Dichromate

16.Spectrophotometry: Estimation of Mn/Fe

CE 153 WORKSHOP PRACTICE

Lectures : 2 Periods / week Sessional Marks : 30
University Exam. : 3 hrs. University Exam. Marks : 70

Credits : 2

Minimum four experiments should be conducted from each trade

1. Carpentry

To make the following jobs with hand tools

- a) Lap joint
- b) Lap Tee joint
- c) Dove tail joint

Mortise & Tenon joint

Gross-Lap joint

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

The following joints to be welded.

Lap joint

Tee joint

Edge joint

Butt joint

Corner joint

3. Sheet metal operations with hand tools.

- a) Preparation of edges like Saw edge, wired edge, lap seam, grooved seam
- b) Funnel
- c) Rectangular Tray
- d) Pipe joint
- e) Electronic Component joining Techniques like use of crimping tool, soldering of

electronic components, strain guage, thermo couples, use of computer networking tools..

4. House wiring

- a) One lamp by one switch
- b) Two lamps by one switch
- c) Wiring of Tube light
- d) Stair case wiring
- e) Go-down wiring

CE 154 FUNDAMENTALS OF H/W & S/W AND C-PROGRAMMING LAB

Lectures : 3 Periods / week Sessional Marks : 30
University Exam. : 3 hrs. University Exam. Marks : 70

Credits : 2

CYCLE-I Basics of Hardware and Software Exercises:

Explore Mother Board components and Layouts, identifying external ports and interfacing, identifying PCI cards and interfacing.
Partitioning and formatting Hard disks.
Install and Uninstall system and application software.
Understand BIOS configuration.
Connect computers in a network.
Assemble a Computer and troubleshoot a Computer.
Operating system commands
 Directory Related Utilities.
 File and Text Processing Utilities.
 Disk, Compress and Backup Utilities.
 Networking Utilities and
 Vi editor

CYCLE-II Programming Exercises:

- Write a program to read x, y coordinates for 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?
- Write a program, which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs. (eg. For, while, and do write).
- Write a set of string manipulation functions e.g. for getting a sub-string from a given position. Copying one string to another, reversing a string, adding one string to another.
- Write a program which determines the largest and the smallest number that can be stored in different data types of like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?
- Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, and sort them in descending order.
- Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix).

First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their means and standard deviation.

Write a program for implementing students management system(attendance, marks and fees reports) using structures and pointers.

Implement bisection method to find the square root of a given number to a given accuracy.

Implement Newton Raphson method to determine a root of polynomial equation.

Given a table of x and corresponding $f(x)$ values, write a program which will determine $f(x)$ value at an intermediate x value using Lagrange's interpolation.

Lectures : 4 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University Exam. Marks : 70

Credits : 4

UNIT- I

Partial Differential equations

Partial differential equations – Introduction, Formation ; Solution of partial differential equations – Linear equations of first order , Non-linear equations of first order (standard type); Method of separation of variables – Solution of one dimensional heat, wave equations and Laplace equations

UNIT- II

Numerical Methods

Solution of algebraic and transcendental equations – Introduction, Bisection method, Method of false position, Iteration method, Newton's Raphson method; Numerical Integration – Trapezoidal rule, , Simpson's 1/3 rule, 3/8 rule ; Numerical solution of first-order ordinary differential equations – Picard's method, Taylor's series method, Euler's method (simple) , R-K method of 4th order

UNIT- III

Probability and Distributions

Definition of probability and conditional probability ; Addition theorem , Multiplication theorem , Baye's theorem, ; Random variables – Binomial , Poisson and Normal distributions

Complex variables

Introduction –Limit, derivative of a functions of complex variable ; Analytic functions; Harmonic functions

UNIT - IV

Complex variables (Continued)

Complex integration –Cauchy's theorem , Cauchy's integral formula; Taylor's series and Laurent's series (without proof) ; Zeroes and singularities; Residues –Residue theorem , Calculation of residues

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

Higher Engineering Mathematics by B S Grewal, Khanna Publishers

REFERENCE BOOK

1. Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons

BUILDING MATERIALS, PLANNING & CONSTRUCTION

Lectures : 4 /1 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. Marks : 70

Credits : 4

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 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

Engineering Materials by S. C. Rangwala; Charotar Publishing House, Anand.
Building construction by B. C. Punmia et all; Laxmi Publications, New Delhi.
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

Lectures / Tutorials : 3 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT – I

Surveying & Measurements

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

Errors

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

UNIT – II

Measurement of horizontal distance

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

Measurement of angles and directions

Angles and Bearings; Instruments used to measure angles and directions; 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

Chain and Compass Surveying

Basic definitions; chain survey of an area – Principle, selection of scale of the map, Selection of stations, Offsets and Booking the survey; Accuracy of measurements; Office work; Problems encountered in chain survey; Chain and Compass Traversing; Field work; Plotting of a compass traverse.

Traversing – Uses of traversing surveying

Types of traverses – Open and closed traverse, 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

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.

Contouring

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

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:

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

REFERENCE TEXT BOOKS

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

CODE: CE214

SOLID MECHANICS – I

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT-I

Stress

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

Strain

Introduction; Normal strain; Stress-strain diagrams; Hooke's law; Deformation of axially loaded bars; Thermal strain and deformation; statically indeterminate axially loaded bars; Shear strain; Hooke's law for shear stress and shear strain

Generalized Hooke's law and Pressure vessels

Poisson's ratio; 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

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

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

Shear stresses in beams

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

Torsion

Introduction; Application of the method of sections; Torsion of circular elastic bars – Basic assumptions, the torsion formula ; Power transmission by circular shafts

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. Mechanics of Materials by Pytel and Kiusalaas , Cengage Learning

REFERENCES

1. Mechanics of materials by E.P. Popov , Prentice Hall of India
2. Engineering mechanics of solids by E.P.Popov, PHI Learning
3. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd.

CODE: CE 215

FLUID MECHANICS

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT – I

Introduction

Dimensions and units – Physical properties of fluids- specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion

Fluid Statics

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

Buoyancy

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

UNIT – II

Fluid Kinematics

Methods of describing fluid motion; Classification of flows; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; One, two and three dimensional flows; Irrotational and rotational flows; Streamline; Path line; Streak line; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flow net; Vortex flow – free vortex and forced vortex flow.

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.

UNIT – III

Flow Measurement In Pipes

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

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.

Flow Over Notches And Weirs

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

UNIT – IV

Analysis Of Pipe Flow

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

Laminar Flow

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

Turbulent Flow In Pipes

Characteristics of turbulent flow, 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 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. Hydraulics and Fluid Mechanics including Hydraulic Machines by P. N. Modi and S. M. 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 Wylie, McGrawhill Publications
4. Fluid Mechanics by S K Som and G Biswas, Tata Mcgraw Hill Publications
5. Fluid Mechanics by John F. Douglas, Janusz M Gasiorek, John A. Swaffield, Pearson Education Publishers
6. Fluid Mechanics, Hydraulics and Hydraulic Machines by K R Arora, Standard Publishers

CODE: CE 216

ENGINEERING GEOLOGY

Lectures	: 4 Periods/Week	Sessional Marks	: 30
University Exam.	: 3 Hours	University Exam. Marks:	70
			Credits : 4

UNIT-I

1. Introduction

Branches of geology; Importance of geology in Civil engineering.

2. Physical Geology

Geological processes; Weathering, Erosion, and Civil engineering importance of weathering and Erosion:

3. Mineralogy

Definition of mineral; Importance of study of minerals; Significance of different physical properties in mineral identification; Study of physical properties, structure and chemical composition of following common rock forming and economic minerals: Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite, Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite, Bauxite and Clay minerals:

UNIT- II

4. Petrology

Introduction; Definition of Rock, Civil engineering importance of petrology; Rock cycle, Geological Classification of rocks:

5. Igneous Rocks

Forms, Structures and textures of igneous rocks. Megascopic description and civil engineering uses of Granite, Basalt, Dolerite, Pegmatite and Charnockite:

6. Sedimentary Rocks

Formation; Structures and textures of sedimentary rocks. Megascopic description and civil engineering uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale:

7. Metamorphic Rocks

Types of metamorphism; Structures and textures of metamorphic rocks. Megascopic Description and Civil engineering uses of Gneiss, Schist, Quartzite, Marble and Slate:

UNIT-III

8. Structural Geology

Introduction; Out crop, Strike and dip, Causes for development of secondary structures: Classification of Structures associated with rocks like Folds, Faults, Joints, Unconformities and their Civil engineering importance :

Earthquakes

Classification and causes; Intensity and magnitude and their measuring scales; Effects of earthquakes; Seismic belts; Civil Engineering considerations in seismic areas; Seismic zones of India:

10. Land Slides

Classification; Causes and effects; Preventive measures of landslides:

Ground water

Introduction: Classification of rocks based on porosity and permeability; Types of aquifers; Effects of groundwater over draft:

UNIT- IV

12. Geophysical Investigations

Geophysical methods of investigation – Over view; Electrical resistivity method; Seismic refraction method:

13. Dams

Types of Dams; Geological considerations for the selection of dam sites; Stages of investigation; Case histories of some dam failures; Geology of some Indian dam sites:

14. Tunnels

Purpose of Tunneling; Geological considerations for tunneling; Effects of tunneling; Over break; Geology of some tunnel sites:

15. Improvement in the Properties of Rock Mass

Materials and Methods of Grouting, Principles and mechanism of Rock bolting:

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. A text Book of Engineering Geology by N. Chennakesavulu; Macmillan India Ltd., Delhi.

REFERENCE BOOKS

Principles of Engineering Geology- KVGK Gokhale - B. S. Publication

Fundamentals of Engineering Geology, F.G.Bell - Butterworths Publications – New Delhi.

Principles of Engineering Geology and Geotechnics- CBS Publishers & Distribution.

Engineering Geology for Civil Engineers by D. Venkata Reddy; Oxford & IBM Publishing Company Pvt. Ltd., New Delhi.

Engineering and General Geology by Parbin Singh; S. K. Kataria & Sons, New Delhi.

Rock Mechanics for Engineers by Dr.B.P.Varma, Khana Publishers, Delhi-6.

Principles of Engineering Geology by K M Bangar, Standard Publishers and Distributers

CODE: CE251

LABORATORY

ENGINEERING GEOLOGY LABORATORY

Practicals : 3 Periods/Week

Sessional Marks: 30

University Exam: 3 Hrs.

University Exam. Marks: 70

Credits: 2

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

1. Study of Survey of India Topographical Maps
2. Study of Satellite Imageries through appraisal cards
3. Study of Physical Properties and identification Minerals (2 experiments)
 - I. Silicate minerals
 - ii. Non silicate minerals
4. Megascopic description and identification of Rocks (3 experiments)
 - I. Igneous rocks
 - ii. Sedimentary rocks
 - iii. Metamorphic rocks
5. Joint Data Analysis
6. Simple Structural geology Problems
7. Study of Geological Maps and their Cross-section
8. Electrical Resistivity Method (demo)
9. Seismic Hammer Sounding Method (demo)
10. Study of Structural Models
11. Study of Tunnel Models

CODE: CE252

LABORATORY

SURVEYING FIELD WORK - I

Practical : 3 Periods/Week

Sessional marks: 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

Chain & Compass Survey

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

Simple Leveling

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

Plane Table Survey

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

VI) Theodolite

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

CODE : CE253

LABORATORY

BUILDING DRAWING

Practicals : 3 Periods/Week

Sessional marks : 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

Note: Any ten of the following shall be done using AutoCAD /3D MAX software

6. Learning basic commands of CAD software & drawing various geometrical shapes
 - Draw commands
 - Editing commands
 - Creating text
 - Dimensioning
7. Draw Conventional signs for building materials and symbols for sanitary installations and fittings
8. Draw symbols for Doors & Windows and Electrical Installations
9. Draw Elevation and Sections of Door & Window
10. Draw Cross section of load bearing wall over spread footing
11. Draw plan & sectional elevation of Dog-Legged staircase
12. Draw Pitched roof (King post truss)
13. Draw plan of a single storied residential building showing furniture & cub-boards using layers and blocks in CAD software
14. Draw plan of a single storied residential building showing Electrical and Sanitary features using layers and blocks in CAD software
15. Draw Plan, Section & Elevation of single storied residential building
16. Learning basic commands in 3-D, creating pre-defined solid primitives and applying Boolean operations
17. Create a two roomed ground floor building in 3-D and render the model

CODE: CE 221

CONCRETE TECHNOLOGY

Lectures : 4 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT-I

1. Cement

General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, Hydration of cement, heat of hydration, structure of hydrated cement.

2. Types Of Cements and testing of cement

Ordinary Portland cement, low alkali cement, Rapid hardening cement, Sulphate resisting cement, Portland blast furnace slag cement, Portland pozzolana cement, air entraining cement, white cement, hydro phobic cement, oil well cement, low heat Portland cement.

Soundness test, Setting times test, Compressive strength test and Fineness test by air permeability apparatus.

3. Aggregates And Testing Of Aggregates

Classification of aggregates according to size and shape. Characteristics of aggregates-shape and texture, cleanliness, toughness, hardness.

Tests for bulking of fine aggregate, Fineness modulus and Zoning of fine aggregate, Fineness modulus of coarse aggregate.

UNIT-II

4. Water

Tolerable concentrations of impurities in mixing water, Use of sea water for mixing concrete.

5. Fresh Concrete

Workability, factors affecting workability, Segregation and Bleeding in concrete, measurement of workability using slump cone test, Kelly ball test, Vee-Bee test, compaction factor test.

6. Hardened Concrete

Factors affecting compressive strength of concrete, Cube compression test, split tensile strength test, flexural strength of concrete.

Durability of concrete, factors affecting durability of concrete.

UNIT-III

7. Production Of Concrete

Batching of materials, mixing, transportation, placing, compaction and finishing of concrete.
Curing of concrete and methods of curing.

8. Concrete Mix Design

Basic considerations for concrete mix design, factors influencing the choice of mix proportions, Indian standard method of concrete mix design.

9. Ready Mixed Concrete (RMC)

Advantages of RMC, components of RMC plant, distribution and transportation, handling and placing, specifications for ready mix concrete as per IS:4926-2003.

UNIT-IV

10. Chemical And Mineral Admixtures

Functions of admixtures, accelerators, retarders, air entraining admixtures, plasticizers and super plasticizers, water proofers, fly ash, silica fume, ground granulated blast furnace slag.

11. Special Materials In Construction And Concreting Techniques

Ferro-cement, self-compacting concrete, fibre reinforced concrete, high strength concrete.

Shotcrete or guniting.

12. Future Trends In Concrete Technology

Recycled aggregate concrete, properties of recycled aggregate concrete, green building, maintenance, need for green buildings.

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. Concrete technology by A.R.Santha kumar, Oxford University Press
2. Concrete technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi

REFERENCE BOOKS

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

CODE : CE222

ENVIRONMENTAL STUDIES

Lectures / Tutorials : 4 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT-I

Introduction:

Definition, Scope and Importance.

Natural Resources:

Forest Resources – Use and over-exploitation, Deforestation, Mining, dams and their effects on forests and tribal people; Water Resources – Use and over-utilization of surface and ground water, floods and droughts, Water logging and salinity, Dams – benefits and problems, Conflicts over water; Energy resources – Energy needs, Renewable and non-renewable energy sources;

Land resources – Land as a resource, land degradation, soil erosion & desertification, Effects of modern agriculture on land resources.

Ecosystems:

Definition, Structure and functions of an Ecosystems, Biogeochemical cycles-water, carbon, nitrogen and water cycles, Types-Forest, Greenland, Desert, Aquatic ecosystem.

UNIT-II

Biodiversity and its Conservation:

Definition, Value of biodiversity. Bio-geographical classification of India, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to bio-diversity, Endemic and endangered species of India, Conservation of biodiversity.

Environmental Pollution:

Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear pollution, Solid waste management.

UNIT-III

Social Issues and Environment:

From unsustainable to sustainable development, Population growth and environment, Green revolution, Rain water harvesting, watershed management, cloud seeding, Resettlement and rehabilitation of people - problems and concerns, Environmental Impact Assessment.

Climate Changes:

Global warming & Green house effect, Acid rain, Ozone layer depletion.

UNIT-IV

Environmental acts:

Prevention and Control of Water pollution & Air Pollution act, Environmental protection act, Wildlife protection act, Forest Conservation act.

International Conventions:

Stockholm Conference 1972, Earth Summit 1992. Copenhagen Summit 2009.

Case Studies:

Chipko movement, Narmada Bachao Andolan, Silent Valley Project, Madhura Refinery and Taj Mahal, Chernobyl Nuclear Disaster, Ralegaon Siddhi, Florosis and Bhopal Tragedy.

Field work:

Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain.

Study of local environment-common plants, insects, birds.

Study of simple ecosystems – pond, river, hill, slopes etc.

Visits to industries, water treatment plants, effluent treatment plants.

Text Books

1. Environmental Studies, by Dr. Suresh K. Dhameja, Published by S.K. Kataria & Sons, Ludhiana.

Reference Books

1. Environmental studies by Anubha Kaushik and C.P.Kaushik., New Age International Publishers, New Delhi.
2. T Benny Joseph, Environmental Studies, the Tata McGraw-Hill Publishing Company Limited, New Delhi.

CODE: CE 223

SURVEYING – II

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks:70

Credits : 4

UNIT – 1

Modern Systems in Surveying (2)

Digital theodolite; Electronic Total Station; Digital Level; Global Positioning System; Electronic Distance Measurements - Basic concepts, Instrumental errors in EDM;

Computation of Areas and Volumes (12)

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

UNIT – II

3. Trigonometric Leveling (6)

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 (6)

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

Triangulation (6)

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

Construction Surveying (6)

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 (8)

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; Compound and Reverse curves;

8. Map Projections (4)

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

REFERENCE TEXT BOOKS

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.
4. Higher Surveying by AM Chandra, New Age International (P) Ltd.

CODE : CE 224

SOLID MECHANICS – II

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks:70

Credits : 4

Unit-I

Compound stresses

Introduction; Superposition and its limitation; Superposition of normal stresses; Stresses in a dam-middle-third rule; 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

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

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

Failure Theories

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

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

Deflection of statically determinate beams

Introduction; strain-curvature and Moment-Curvature relation; Governing differential equation for deflection 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.

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. Mechanics of Materials by Pytel and Kiusalaas , Cengage Learning

REFERENCES

1. Mechanics of materials by E.P. Popov , Prentice Hall of India
2. Engineering mechanics of solids by E.P.Popov, PHI Learning
3. Elements of strength of materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press Pvt.Ltd.

CODE: CE 225

HYDRAULICS AND HYDRAULIC MACHINES

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT – I

18. 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; Pressure distribution.

19. 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.

UNIT – II

20. Open Channel Flow - Gradually Varied Flow

Dynamic equation; surface profiles; Computation of surface profiles by single step method; Back water curves and Draw down curves; Examples of various types of water surface profiles.

1. Open Channel Flow - Rapidly Varied Flow

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

UNIT – III

2. Momentum Principles

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

3. Hydraulic Turbines

Classification; Impulse; Reaction; Radial, Axial, mixed and tangential flow turbines; Pelton, Francis 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.

UNIT – IV

4. Centrifugal Pumps

Manometric head; Losses and efficiencies; Work done; Working Principle; Priming; Velocity triangles; Performance and characteristic curves; Cavitation effects; Similarity considerations.

5. Dimensional Analysis And Similitude

Dimensional homogeneity; Rayleigh's method; Buckingham π -method ; Geometric, Kinematic and Dynamic similarities; Reynold's, Froude, Euler, Mach and Weber numbers; Model laws; Scale effect; Distorted models.

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

5. Hydraulics and Fluid Mechanics including Hydraulic Machines by P. N. Modi and S. M. Seth; Standard Book house, New Delhi

REFERENCE BOOKS

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

CODE: CE 226

ELEMENTS OF ELECTRICAL AND MECHANICAL ENGINEERING

Lectures	: 4 Periods/Week	Sessional marks	: 30
University Exam.	: 3 Hours	University exam. marks:	70
			Credits : 4

Part A : ELECTRICAL ENGINEERING

UNIT – I

7. Electrical Installation

Alternating current and its advantages; Single phase and three phase power supply ; Ratings of different electrical appliances ; Wires /Cables ; Standard wire gauge; Number of strands and current carrying capacity ; Types of wiring systems; Fuses ; MCBs; Earthing – Purpose, Types ; First aid for electric shock

8. Transformers

Function; Principle of operation ; Construction details ; Types of transformers

UNIT – II

9. Electrical Machines

Single phase induction motor–Principle of operation, types and applications

Three phase induction motor – Principle of operation, types and applications

1. 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

5. Transmission of motion and Power

Methods of drive; Power transmission elements – Shafting , Belt-drive, Belting, Pulleys ; Velocity ratio of pulleys ; Creep and slip in belt; Tension in a belt; Power transmitted by a belt ; Rope drive; Chain drive; Friction drive; Gear drive; Spur gear ; Power transmitted by gearing

6. Air Compressors

Introduction; Reciprocating compressors – Single stage , multi-stage; Rotary compressors

UNIT – IV

7. Metal Forming

Metal working Processes – Hot working , Cold working ; Rolling – Principle , Rolling stand arrangement , Roll passes, Break down passes, Roll pass sequences ; Extrusion and other processes – Extrusion principle, hot extrusion , Cold extrusion, Extruding tubes ; Wire drawing ; Bar and tube drawing

7. Fabrication processes

Classification ; Welding – Classification of welding ; Electric arc welding – Principle of arc, Arc welding equipment, Electrodes, Manual metal arc welding, Submerged arc welding

NOTE

1. Part A

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

2. Part B

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

3. In the University examination , Part A and Part B should be answered on separate booklets.

TEXT BOOKS

1. Electrical Installation and estimation by M. Rajalingam , Radiant Publishing House
2. Fundamentals of Electrical and Electronics Engineering by T. Thyagarajan , SCITECH Publications (India) Pvt. Ltd.
3. An Introduction to High Voltage Engineering by Subir Roy, Prentice-Hall of India , 2006.
4. Elements of Mechanical Engineering by K.P. Roy , Media Promoters
5. Manufacturing Technology – Foundary, Forming and Welding by P.N.Rao , TataMcGraw-Hill Publishing Company Ltd.

CODE : CE 261

LABORATORY

HYDRAULICS AND HYDRAULIC MACHINES LABORATORY

Practicals : 3 Periods/Week

Sessional marks : 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

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

5. 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 bend /sudden contraction/ sudden expansion.
9. Determination of Coefficient of discharge for rectangular notch / V – notch.
10. Determination of Manning's and Chezy's coefficients in open channel.

Study on Characteristics of Hydraulic Jump

Measurement of force due to impact of jets on vanes of different types.

Performance studies on Pelton turbine.

Performance studies on Francis turbine /Kaplan turbine.

Performance studies on single stage centrifugal pump.

Performance studies on Reciprocating pump.

CODE : CE262

LABORATORY

MATERIAL TESTING LABORATORY

Practicals : 3 Periods/Week

Sessional marks : 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

Note: A minimum of 6 experiments from PART-A and 6-experiments from PART-B shall be done and recorded

PART-A

1. Study of stress-strain characteristics of mild steel bars by UTM.
2. Study of stress-strain characteristics of HYSD bars by UTM.
3. Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam.
4. Determination of modulus of rigidity by conducting torsion test on solid circular shaft.
5. Determination of hardness of the given material by Brinell's/Vicker's/ Rockwell hardness test.
6. Determination of impact strength of the given material by conducting Charpy/Izod test
7. Determination of ultimate shear strength of steel by conducting direct shear test.
8. Determination of modulus of rigidity of the material of closely coiled helical spring.
9. Determination of compressive strength of wood with grain parallel / perpendicular to loading.

PART-B

1. Determination of (a) Normal consistency of cement (b) Fineness of cement using 90 microns IS sieve.
2. Determination of Initial setting and final setting time of cement.
3. Determination of (a) Specific gravity of cement (b) soundness of cement.
4. Determination of Fineness modulus of (a) Fine aggregate (b) Coarse aggregate.
5. Determination of workability of concrete by conducting Slump cone test .
6. Determination of workability of concrete by conducting Compaction factor / Vee-Bee consistometer test
7. Determination of (a) Cube compressive strength (b) Split tensile strength of concrete.
8. Determination of modulus of elasticity of concrete by conducting compression test on concrete cylinder
9. Determination of Bulk density and Specific gravity of (a) fine aggregate (b) coarse aggregates.
10. Determination of Bulking of fine aggregate.
11. Non-destructive test on concrete using Rebound Hammer / Ultrasonic Tester .

CODE : CE263

LABORATORY

COMMUNICATION AND SOFT SKILLS LAB

Lectures: 3 Periods/week

Sessional Marks: 30

University Exam: 3 hours

University Examination Marks: 70

Credits : 2

Course Objectives:

The course mainly focuses on to improve the Linguistic Competence, Communicative Competence, Telephonic Skills, Interpersonal Skills and Soft Skills of the learners. Activities in the Communication and Soft Skills Lab will simulate actual discourses that students will engage in their interaction with their peers, teachers or strangers in their day-to-day situations.

By the time the students complete the course they would be able to identify and use the general features of discourse development, which may be, realized differently in different situations.

Syllabus:

Module-1: Phonetics

- a) Introduction to vowels and consonants
- b) Introduction to Accent, Intonation and Rhythm

Module-2: Presentation Skills

- a) Debate
- b) Paper Presentation:
 - i) Identification of source material
 - ii) Arrangement of Collected Data
- c) Extempore

Module-3: Employability Skills

- a) Resume Preparation
 - i) Identification of information
 - ii) Arrangement of collected data
- b) Group Discussions
- c) Interview Skills
 - i) Dress code
 - ii) Behavioral Skills

Module-4: Telephonic Skills

- a) Formal & Informal interaction

b) Receiving Messages & Complaints

Module-5: Soft Skills

- a) Voluntary & Involuntary Body Language
- b) Self-Esteem
- c) Creative Thinking
- d) Team Management

Module-6: Interpersonal and Intrapersonal Skills

- a) Motivation
- b) Stress Management
- c) Negotiation Skill
- d) Effective Listening

NOTE: 12 Lab Activities are minimum in Record (125 pages single side book) with contents: Name of the Activity, Source, Skill Improved.

Minimum Requirements:

The Communication and Soft Skills Lab shall need two labs. One is Communication Skills Lab with LAN facilitated 60 multimedia systems and English language software suggested by the concern faculty. The other, Conversational Skills Lab with 6 to 10 round tables, 60 movable chairs and audio-visual Devices with LCD Projector.

Suggested Software:

- Cambridge Advanced Learners' English Dictionary with CD.
- Clarity Pronunciation Power
- The Rosetta Stone English Library
- Dorling Kindersley series of Grammar, Punctuation, Composition etc.
- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge
- Language in Use, Foundation Books Pvt. Ltd with CD.
- Mastering English in Vocabulary, Grammar, Spellings, Composition
- Telephoning in English
- A Practical Course in Spoken English with CD by J.K. Gangal, PHI Publications.

- Communicate to Conquer: A Handbook of Group Discussions and Job Interviews with CD, PHI Publications.

Reference Books: Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems) :

1. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
2. English Pronouncing Dictionary Daniel Jones Current Edition with CD.
3. Spoken English- R. K. Bansal and J. B. Harrison, Orient Longman 2006 Edn.
4. Speaking English Effectively by Krishna Mohan & NP Singh (Macmillan)
5. A Practical Course in English Pronunciation, (with two Audio cassettes) by J. Sethi, Kamlesh Sadanand & D.V. Jindal, Prentice-Hall of India Pvt. Ltd., New Delhi.
6. A text book of English Phonetics for Indian Students by T.Balasubramanian (Macmillan)
7. English Skills for Technical Students, WBSCTE with British Council, OL
8. Soft Skills: Know Yourself & Know the World, Dr.K.Alex, S.Chand Publications
9. The ACE of Soft Skills: Attitude, communication and Etiquette for Success, by Pearson Publications.
10. Converston Developing Soft Skills,4 th Edition,pearson Publication.
11. Manageing Soft Skills, K.R.Lakshminarayanan and T.Murugavel, Scitech Publications.

DISTRIBUTION AND WEIGHTAGE OF MARKS

Communication and Soft Skills Lab Practical Paper:

1. The practical examinations for the Communication and Soft Skills Laboratory shall be conducted as per the University norms prescribed for the Core Engineering Practical Sessions.
2. For the ***Communication and Soft Skills Lab*** sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 year-end Examination marks. Of the 25 marks, 10 marks shall be awarded for day-to-day performance (i.e. Final Grade in the Record) and 15marks (including 5 Marks for attendance) to be awarded by conducting Internal Lab Test(s) by the

teacher concerned. The year- end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department. Of 50 marks, 40 marks shall be equally distributed to LSRW Skills and 10 marks for vice-a-voce.

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 by Hardy-cross method and Equivalent pipe method.

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 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. 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. Environmental Engineering by Peavy and Rowe, Mc Graw Hill Publishers, New York.
3. Water Supply and Sewerage by E.W. Steel and Terence J. Mc Ghee, Mc Graw Hill Publishers, New York.
4. Water & Wastewater Technology by Mark J. Hammer; John Wiley & Sons.
5. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development; Govt. of India, New Delhi.

CODE: CE 312

STRUCTURAL ANALYSIS – I

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. Marks : 70

Credits : 4

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

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

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

REFERENCES

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

CODE: CE 313

WATER RESOURCES ENGINEERING – I

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

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.

3. 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; 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

2. 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 and Recuperation test.

3. Introduction To Irrigation

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

4. Methods Of Irrigation

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

UNIT – III

5. 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 ; 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.

4. Irrigation Channels – Silt Theories And 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, Kennedy’s method of channel design; Drawbacks in Kennedy’s theory; Lacey’s regime theory; Lacey’s theory applied to channel design; Defects in Lacey’s theory; Comparison of Kennedy’s and Lacey’s theory.

UNIT – IV

6. 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.

9. 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, Silt control at head works.

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

REFERENCE BOOKS

1. Irrigation, Water Resources and Water Power Engineering by 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
5. Applied Hydrology by Ven Te Chow, Maidenment and Mays, Mc Graw Hill Publications.

CODE: CE 314

DESIGN OF CONCRETE STRUCTURES-I

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT – I

1. Introduction

Role of structural engineer; Reinforced concrete; Structural elements ; Loads on structures ;
Strength and serviceability ; Methods of design ; Codes of practice

2. Design of beams for Flexure (Working Stress Method)

Assumptions; Permissible stresses in concrete and steel; Transformed section; Analysis and design of beams for flexure of singly reinforced, doubly reinforced and flanged sections

UNIT-II

3. Design of beams for Shear and Bond (Working Stress Method)

Shear in a homogeneous beam; Shear in R.C. beams; Diagonal tension and diagonal compression; Design for shear ; Anchorage bond; Flexural bond, Design for bond – Development length

4. Deflection And Cracking

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

UNIT-III

5. 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

6. Design of beams for Shear, Bond and Torsion (Limit State Method)

Design for shear ; Design for bond – Development length

Torsion – Introduction, Effect of torsion, IS Code provisions

UNIT-IV

7. Design and detailing of the following

- a) Simply supported and Cantilever beams (Working stress method)
- b) Simply supported and Cantilever beams (Limit State method)
- c) Dog-legged stair case (Limit State method)

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. Reinforced concrete , Vol.1 by H. J. Shah, Charotar publishing house Pvt. Ltd.

REFERENCES

1. Reinforced Concrete (limit state design) by Ashok K. Jain; NemChand & Bros., Roorkee
2. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hill

CODE: CE 315

**DESIGN OF STEEL STRUCTURES – I
(using Limit State Method)**

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. Marks : 70

Credits : 4

UNIT - I

1. Introduction

What are steel structures ? ; What a steel structure consists of ? ; Structural steel;
Products of structural steel ; Standards , Codes and Specifications; Fatigue ;
Brittle fracture ; Corrosion protection of steel structures ; Design philosophies ;
Methods of structural analysis ; Plate(Local) buckling ; Classification of sections

2. Structural steel fasteners

Introduction ; Welding ; Bolting

3. Tension members

Introduction ; Net area ; Shear-lag ; Design of tension members

UNIT - II

4. Compression members

Introduction ; Euler's buckling theory ; Behaviour of real columns ; Types of
sections ; Design of columns ; Validity of design strength calculations ; Design of
compression members ; Design Procedure ; Built-up compression members

UNIT - III

5. Beams

Introduction ; Flexural behaviour of beams which does not undergo lateral buckling;
Flexural behaviour of beams which undergo lateral buckling ; Shear behaviour ;
Web buckling and Crippling ; Design strength in bending ; Design strength in shear ;

Limit state serviceability – Deflection

UNIT - IV

6. Beam-columns

Introduction ; Analysis of beam-columns ; Modes of failure ; Design specifications

7. Column Splices and Bases

Introduction ; Column splices ; Column bases

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

Design of steel structures by K.S.Sai Ram, Pearson Education, 2010

REFERENCE BOOKS

- 1. Steel Structures – Design and Practice by N. Subramanian, Oxford University Press**
- 2. Limit state design of steel structures by M.R.Shiyekar , PHI Learning**

CODE: CE 316

GEOTECHNICAL ENGINEERING – I

Lectures : 4 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT – 1

3. Introduction

Soil formation and soil types; Regional soil deposits of India

5. 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

6. Soil Classification

Introduction; Particle size classification as per IS-code; Unified soil classification system; Indian standard soil classification system

7. 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.

8. Seepage Through Soils

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

UNIT – III

9. Compaction Of Soils

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

10. Vertical Stresses Below Applied Loads

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

UNIT – IV

11. Compressibility Of Soil And Consolidation

Introduction; Compressibility; Time-rate of consolidation; Consolidation test; Computation of settlement; extrapolation of field consolidation curve; Settlement analysis.

12. 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 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

8. 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.Purushothama Raj, Pearson Education

CODE : CE351

LABORATORY

ENVIRONMENTAL ENGINEERING LABORATORY

Practicals : 3 Periods/Week

Sessional marks : 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

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

6. 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: CE352

LABORATORY

GEOTECHNICAL ENGINEERING LABORATORY

Practicals : 3 Periods/Week

Sessional marks : 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

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

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

CODE : CE353

LABORATORY

COMPUTER PROGRAMMING LABORATORY

Practicals : 3 Periods/Week

Sessional marks: 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

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

CYCLE-1

(Write any SIX programmes)

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 simply supported one-way slab.
5. Design of steel tension member
6. Design of steel compression member
7. Design of slab base for a steel column
8. Design of laterally supported steel beam
9. Design of beam to column framed connection using bolts

CYCLE-2

(Write any THREE programmes)

1. Classification of soil by Indian standard classification system.
2. Stresses due to applied loads both Boussinesq and Westerguard analysis
 - a. Concentrated load b) circular loaded area c) Rectangular loaded area
3. Determination of permeability coefficient by constant head and falling permeability tests.
4. Determination of index properties of soil.

CYCLE-3

(Write any THREE programmes)

3. Design of an open channel
4. Analysis of water distribution networks (Hardy cross method).
5. Determination of the height of the building when base is accessible.
6. Determination of included angles from the given bearing and check for local attraction.

CODE: CE 321

ENVIRONMENTAL ENGINEERING – II

Lectures : 4 Periods/Week Sessional marks: 30

University Exam. : 3 Hours University exam. marks: 70

Credits : 4

UNIT – 1

1. Introduction to Sanitary Engineering

Sanitation; Sewerage systems; Relative merits and Suitability.

2. Sanitary Sewage and Storm Sewage

Sanitary Sewage: Factors affecting sanitary sewage; Determination of quantity of sanitary sewage; Storm Water Sewage: Factors affecting storm water sewage; Determination of quantity of storm water sewage.

3. Sewers, Sewer Appurtenances and Sewage Pumping

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

UNIT – II

3. 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.

4. Primary Treatment of Sewage

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

5. Septic Tank

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

UNIT – III

7. Secondary Treatment of Sewage

Trickling filters: Principles of action; Filter types; Recirculation; Operational problems and remedies; Activated sludge process: Principle of action; Features of operation; Organic loading parameters; Methods of aeration; Diffused air system; Mechanical aeration; Combined system; Activated sludge process vs Trickling filter process; Sludge bulking; Sludge volume index, Secondary Settling Tanks, Oxidation Ponds.

8. Sewage Disposal

Objects; Methods; Disposal by dilution; Disposal by irrigation; Sewage sickness.

UNIT – IV

9. Sludge Treatment and Disposal

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

10. 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.

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. 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.

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. Water Supply and Sewerage by E.W. Steel and Terence J. Mc Ghee, Mc Graw Hill Publishers, New York.
4. Environmental Engineering by Peavy and Rowe, McGrawhill, Newyork.
5. Manual on Sewerage & Sewage treatment; CPH and EEO, Ministry of Works and Housing; Govt. of India; New Delhi.

CODE: CE322

STRUCTURAL ANALYSIS – II

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT – I

8. 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

9. 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

10. Multi Storey Frames (Approximate Methods)

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

11. 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

12. Arches

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

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

REFERENCES

1. Structural Analysis by Devdas Menon, Narosa Publishinh House.

2. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications

3. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House

4. Structural analysis by R. C. Hibbeler, Pearson Education.

5. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill

CODE: CE 323

WATER RESOURCES ENGINEERING – II

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. Marks : 70

Credits : 4

UNIT – I

1. 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 float, Sub-surface float, Velocity rod; Current meter; Measurement of stage – Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

2. 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; Types of falls; Canal regulators; Off-take alignment; Head regulators and cross-regulators; Canal escape (Designs not included).

3. Cross Drainage Works

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

UNIT – II

4. 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 – Inflow - Storage Discharge Curves method and Trial and error method (Description only).

5. 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 of site for a dam.

UNIT – III

6. 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

7. 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; Seepage control measures.

8. Spillways

Introduction; Types of spillways; 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 sloping aprons.

9. Water Power Engineering

Introduction; Hydropower - Advantages and disadvantages; Estimation of hydropower; 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 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

2. Irrigation and Water Power Engineering by B.C. Punmia and Pande B.B. Lal; Laxmi Publications, New Delhi.
3. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE BOOKS

1. Irrigation, Water Resources and Waterpower Engineering by P.N. Modi; Standard Book House, New Delhi.
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publishers, New Delhi
3. Water Power Engineering by M.M. Dandekar and K. K. Sharma; Vikas Publishing House Pvt. Ltd., New Delhi.

CODE: CE 324

DESIGN OF CONCRETE STRUCTURES-II

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. Marks : 70

Credits : 4

UNIT – I

1. Continuous Beam (Limit State Method)

Design of continuous beam

2. One way Slabs (Limit State Method)

Design of Simply supported, Cantilever and Continuous slabs

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 rectangular columns (short and Long) subjected to axial load and bending moment using Interaction diagrams (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.

8. Foundations (Limit State Method)

Design and detailing of rectangular Isolated footing and Combined footing

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

Reinforced concrete , Vol.1 & 2 by H. J. Shah, Charotar publishing house Pvt. Ltd.

REFERENCES

1. Reinforced Concrete (limit state design) by Ashok K. Jain; NemChand & Bros., Roorkee
2. Reinforced concrete design by Pillai and Menon, Tata Mc Graw- Hill

CODE: CE 325

DESIGN OF STEEL STRUCTURES – II
(using Limit State Method except Chapter 5)

Lectures / Tutorials : 4 / 1 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. Marks : 70

Credits : 4

UNIT - I

1. Gantry girder

Introduction ; Loads on gantry girder ; Web buckling and Crippling ; Deflection
Check ; Design of gantry girder

2. Welded Plate girder

Introduction ; Behaviour of transversely stiffened plate girder panels in shear ;
Design methods for transversely stiffened web panels ; Design of end panels ;
Other design specifications ; Design of stiffeners ; Design of welded plate
girder

UNIT - II

3. Welded connections

Introduction ; Bracket connections ; Simple beam end connections ;
Moment resistant beam end connection

4. Bolted connections

Introduction ; Bracket connections ; Simple beam end connections ;
Moment resistant beam end connection; Splicing of beams /girders

UNIT - III

1. Light-gauge steel sections

Introduction ; Types of sections ; Design of light gauge sections ; Design
specifications

6. Composite Construction

Introduction ; Composite beam ; Method of construction ; Limit states of
collapse; Limit states of serviceability – Deflection

UNIT - IV

1. Roof Trusses

Components of a trussed roof; Types of trusses; Dead, Live and wind loads on trussed roof; Design of purlins ; Design of members of a roof truss ; Design of connections ; Design of end bearings

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

Design of steel structures by K.S.Sai Ram, Pearson Education, 2010

REFERENCE BOOKS

1. Steel Structures - Design and Practice by N. Subramanian, Oxford University Press

2. Limit state design of steel structures by M.R.Shiyekar , PHI Learning

CODE: CE 326

GEOTECHNICAL ENGINEERING – II

Lectures : 4 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks : 70

Credits : 4

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) ; $c-\phi$ Analysis- Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number;

4. Shallow Foundations

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation.

UNIT -III

5. Bearing Capacity Of Shallow 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 settlement –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

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

CODE: CE 327 /1

ELECTIVE – I

PRESTRESSED CONCRETE

Lectures / Tutorials : 4 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks:70

Credits : 4

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. Flexural strength of prestressed concrete sections:

Types of flexural failure; Flexural strength of prestressed concrete sections as per IS1343: 1980

8. Design of sections for flexure as per IS1343 : 1980

Introduction ; Design loads and strengths; Strength and serviceability limit states; Minimum section modulus; Prestressing force ; Limiting zone for the prestressing force; Design of rectangular and I sections sections for the limit state of collapse in flexure.

UNIT – IV

9. Shear Resistance

Shear and Principal Stresses; Ultimate shear resistance of prestressed concrete members and design of shear reinforcement as per IS1343 : 1980

10. 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.

11. Anchorage Zone Stresses In Post-Tensioned Members

Stress distribution in end block; Anchorage zone stresses and Anchorage zone reinforcement as per IS1343 : 1980

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

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 Pandit & Gupta , CBS Publishers
3. Pre-stressed concrete by P. Dayaratnam , Oxford & IBH
4. Prestressed Concrete by N.Raja Gopalan , Narosa Publishing House

CODE: CE 327 /2

ELECTIVE-I

WATER RESOURCES SYSTEMS ANALYSIS

Lectures / Tutorials : 4 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. marks :70

Credits : 4

UNIT I

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, Conjunctive use of surface and sub surface water resources.

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. Water Resources Systems by S.Vedula and P.P. Majumdar, McGraw Hill Publishers

REFERENCE BOOKS

1. Water Resources Systems Planning and Analysis by D.P. Loucks, J.R. Stedinger and D.A. Haith, Prentice-hall, Englewood Cliffs, NJ.
2. Operations Research by H.A.Taha, Prentice hall of India, New Delhi.
3. Optimal design of water distribution networks by PP Bahve, Narosa Publishing House
4. Engineering Optimization by SS Rao.

CODE: CE327/3

ELECTIVE - I

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Lectures / Tutorials : 4 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. Marks : 70

Credits : 4

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 Earthquake 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. Seismo-resistant building architecture

Introduction; Lateral load resisting systems- moment resisting frame, Building with shear wall or bearing wall system, building with dual system; Building configuration – Problems and solutions; Building characteristics – Mode shape and fundamental period, building frequency and ground period, damping, ductility, seismic weight, hyperstaticity/redundancy, non-structural elements, foundation soil/ liquefaction. Foundations; Quality of construction and materials – quality of concrete, construction joints, general detailing requirements

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

5. 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

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. Earthquake Resistant Design of Structures by Pankaj Agarwal, and Manish Shrikhande ,
Prentice Hall of India Private Ltd., New Delhi .
2. Geotechnical Engineering by S.K.Gulati & Manoj Datta, Tata McGraw-Hill Publishing
Company Ltd.

REFERENCE BOOKS

- 1.Elements of Earthquake Engineering by Jai Krishna, A.R.Chandrasekaran and Brijesh Chandra,
Second Edition(1994), South Asian Publishers, New Delhi.
2. Dynamics of Structures by A.K.Chopra,, Prentice Hall India

CODE: CE 327 /4

ELECTIVE – I

GROUND WATER DEVELOPMENT AND MANAGEMENT

Lectures / Tutorials : 4 Periods/Week

Sessional Marks: 30

University Exam. : 3 Hours

University Exam. Marks: 70

Credits : 4

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 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 – Jacob 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

6. Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion.

7. Groundwater Basin Management: Concepts of conjunction use, Case studies.

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. 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 : CE361

LABORATORY

SURVEYING FIELD WORK - II

Practical: 3 Periods/Week

Sessional marks: 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

Theodolite

1. Traversing and adjustment of traverse
2. Determination of Horizontal and Vertical distances by stadia methods
3. Determination of Elevations and Heights
- 1. 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.
- 2. 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

Practicals : 3 Periods/Week

Sessional marks : 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

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.

CYCLE-1

(At least SIX of the following)

1. Analysis and design of continuous beam with simple supports on either ends.
2. Analysis and design of continuous beam with a fixed end support.
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).

CYCLE-2

(At least FIVE of the following)

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

CYCLE-3

(At least one of the following)

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

CODE: CE 411

TRANSPORTATION ENGINEERING – I

Lectures : 4 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. Marks : 70

Credits : 4

UNIT – 1

1. Highway Development And Planning

Brief Introduction; necessity of highway planning surveys preparation of master plan highway planning in India.

2. Highway alignment

Factors controlling alignment; Engineering surveys, Drawing & report.

UNIT – II

3. Highway Geometric Design

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

1. Highway materials

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

UNIT – III

2. 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.

3. 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

4. Highway Drainage

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

5. Traffic engineering:

Introduction; Traffic characteristics- Road user, vehicular & travel pattern; Traffic operation-signal design; Types of intersections; Design of rotary intersection;

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. 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 / Tutorials : 4 / 1 Periods/Week
University Exam. : 3 Hours

Sessional marks : 30
University exam. marks : 70
Credits : 4

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 Behaviour 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 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. 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 BOOKS

1. Advanced structural analysis by Devdas Menon , Narosa Publishing House
2. Structural Analysis by Negi & Jangid

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. 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.

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 414

ESTIMATION AND QUANTITY SURVEYING

Lectures : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks : 30
University exam. marks: 70
Credits : 4

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.

1. Estimate Of Buildings

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

UNIT – II

2. Estimate of RCC works

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

1. 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.

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

CODE: CE 415 /1

OPEN ELECTIVE

FINITE ELEMENT METHOD

Lectures / Tutorials : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks: 30
University exam. marks: 70
Credits : 4

Unit -I

1. The standard discrete system and origins of the finite element method

Introduction ; The structural element and the structural system; Assembly and analysis of a structure ; The boundary conditions; Electrical and fluid networks ; The general pattern; The standard discrete system

2. A direct physical approach to problems in elasticity : plane stress

Introduction ; Direct formulation of finite element characteristics; Generalisation to the whole region ; Displacement approach as a minimization of total potential energy; Convergence criteria; Finite element solution process; Numerical examples

Unit -II

3. Generalisation of the finite element concepts

Weighted residual methods – Integral or weak statements equivalent to the differential equations ; Approximation to integral formulations ; the Galerkin method ; Partial discretisation ; Convergence

Variational principles – What are variational principles ? ; Natural variational principles and their relation to governing differential equations ; Establishment of natural variational principles for linear , self-adjoint , differential equations ; Maximum, minimum or saddle point

Unit -III

4. Standard and hierarchical element shape functions

Standard and hierarchical concepts; Rectangular elements – some preliminary considerations ; Completeness of polynomials ; Lagrange family ; Serendipity family

Triangular element family ; Line elements

5. Mapped elements and numerical integration

Use of shape functions in the establishment of coordinate transformations ; Geometrical conformity of elements; Variation of the unknown function within distorted, Curvilinear elements – continuity requirements; Evaluation of element matrices – transformation in local natural and area/volume coordinates; Order of convergence for mapped elements ; Numerical integration – One-dimensional and two-dimensional ; Required order of numerical integration

Unit -IV

6. Problems in linear elasticity

Governing equations; Finite element approximation; Displacements , strains and stresses; Numerical examples

7. Field problems – Heat conduction, electric and magnetic potential and fluid flow

General quasi-harmonic equation ; Finite element solution process ; Partial discretisation - transient problems ; Numerical examples – an assessment of accuracy

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

The finite element method – Its basis & Fundamentals by Zienkiewicz , Taylor and Zhu , Elsevier India Private Ltd.

REFERENCE BOOKS

1. The finite element method in engineering by S. S.Rao, Butterworth-Heinemann, New Delhi, 1999.
2. Introduction to the finite element method by C.S. Desai and J.F.Abel, CBS Publishers and distributors, 1987.

CODE: 415 / 2

OPEN ELECTIVE

ARTIFICIAL INTELLIGENCE

Lectures : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks : 30
University exam. marks : 70
Credits : 4

UNIT – I

Introduction of Artificial Intelligence (AI) techniques, potential benefits of AI techniques and its limitations, Fuzzy sets and Crisp sets

UNIT – II

Fuzzy Union, Fuzzy Intersection, Membership functions, fuzzification, fuzzy to crisp conversions, defuzzification, Theoretical representations of fuzzy sets and its application to project scheduling.

UNIT – III

Aggregation Procedures, Fuzzy decision Making, Multi objective decision making, Minimax Criteria, Dominance Criteria, Applications of Fuzzy set theory in engineering for evaluation of alternatives, tender evaluation etc.

UNIT – IV

Need for Optimization, Fuzzy Linear Programming, symmetric Fuzzy Linear programming, tolerance interval, and its application to various engineering problems.

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

Fuzzy logic with engineering applications by Timothy J. Ross, McGraw-Hill, Inc.

REFERENCE BOOKS

1. Zimmerman, H. J. (1996). "Fuzzy set theory ." Allied Publishers, India.
2. Dubios, D., and Prade, H. "Fuzzy sets and Systems: theory and applications." Academic Press, New York, 1980.
3. Neural Networks, Fuzzy logic and Genetic Algorithms by Rajasekharan and Pai, PHI Learning

CODE: CE 416 /1

ELECTIVE – II

DESIGN AND DRAWING OF HYDRAULIC STRUCTURES

Lectures / Tutorials : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks: 30
University exam. marks:70
Credits : 4

Design And Drawing Of The Following

UNIT – I

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

UNIT – II

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

NOTE

Only elevation and section of structures need to be drawn.

Two questions of 35 marks each will be given from each unit out of which one is to be answered.

TEXT BOOK

1. Water Resources Engineering - Principles and Practice by C. Satyanarayana Murthy; New age international publishers, New Delhi.

REFERENCE BOOKS

1. Irrigation and Water Power Engineering by B.C.Punmia and Pande B.B. Lal; Laxmi Publications, New Delhi.
2. Irrigation Engineering and Hydraulic Structures by S.K. Garg; Khanna Publishers.

CODE: CE 416 /2

ELECTIVE-II

BRIDGE ENGINEERING
(using Working Stress Method)

Lectures / Tutorials : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks : 30
University exam. marks : 70
Credits : 4

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

Essentials of Bridge Engineering by Dr. Johnson Victor; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

REFERENCE BOOK

1. Design of bridge structures by Jagadeesh and Jayaram, PHI Learning

CODE: CE416/3

ELECTIVE - II

REPAIR AND REHABILITATION OF STRUCTURES

Lectures / Tutorials : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks : 30
University exam. marks: 70
Credits : 4

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

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 416 /4

ELECTIVE – II

GROUND IMPROVEMENT TECHNIQUES

Lectures / Tutorials : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks: 30
University exam. marks: 70
Credits : 4

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 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

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 Geosynthetics, Prentice Hall New Jersey, 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 : CE452

LABORATORY

COMPUTER AIDED DETAILING OF STRUCTURES

Practicals : 3 Periods/Week
University Exam: 3 Hrs.

Sessional marks: 30
University Exam Marks : 70
Credits : 2

Students are required to detail different structural elements using software packages like Auto CAD/Micro station/Rivet etc.,

CYCLE-1

(At least SEVEN of the following)

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.

CYCLE-2

(At least THREE of the following)

1. Detailing of beam to column framed connection (using bolts).
1. Detailing of beam to column moment resistant connection (using bolts).
1. Detailing of welded plate girder.
2. Detailing of welded column base

CYCLE-3

(At least ONE of the following)

1. Typical Reinforcement 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

Practicals : 3 Periods/Week

Sessional marks : 30

University exam.: 3 Hrs.

University Exam. marks : 70

Credits : 2

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

Sessional marks : 30

University Exam. : 3 Hours

University exam. marks : 70

Credits : 4

**UNIT - I
RAILWAY ENGINEERING**

1. Introduction

Role of railways in transportation; Comparison of railway and highway transportation; Development of railway systems with particular reference to India; Classification of railways.

2. Railway Track

Permanent way: Gauges in Railway track, Railway track cross – sections; Coning of wheels.

3. Rails & Rail Joints

Functions of rails; Requirements of rails; Types of rails sections; Standard rail sections; Length of rails; Rail failures; Wear on rails.

Requirements of an ideal joint; Types of rail joints; Welding of rails.

4. Sleepers

Functions of sleepers; Requirements of sleepers; Classification of Sleepers – Timber sleepers, Metal sleepers & Concrete sleepers; Comparison of different types of sleepers.

5. Fish Plates

Fish plates, section of fish plates, failure of fish plates.

6. Ballast

Functions and requirements of ballast; Types of ballast; Renewal of ballast.

UNIT – II

7. Geometric Design Of Track

Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve, Length of vertical curve.

8. Points And Crossings

Functions of components of turnout; Crossings.

9. Stations And Yards

Site selection for railway station; Requirements of railway station; Classifications; Station yards; Level crossing.

10. Signalling

Objects of signaling; Classification of signals; Controlling- absolute block system. Standards of inter locking

UNIT – III

AIRPORT PLANNING AND DESIGN

11. Introduction

Development of air transportation system with particular reference to India; Aeroplane components; Air–craft characteristics.

12. Airport planning and layout

Selection of site; Apron; Hanger; Typical airport layouts; Airport marking; Airport lighting; Drainage systems.

13. Airport Obstruction

Zoning laws; Classification of obstructions; Imaginary surfaces; Approach zone; Turning zone.

14. Runway Design

Runway orientation; Basic runway length; Corrections for elevation; Temperature and gradient; Runway geometric design.

15. Specifications For Structural Design Of Airport Pavements

Design factors methods for flexible and rigid pavements; LCN system of pavement design.

**UNIT – IV
DOCKS AND HARBOUR ENGINEERING**

16. Introduction

Types of water transportation; Economics and advantages of water transportation.

17. Planning And Design Of Port Facilities

General layout and design considerations; Pier and wharf structures; Fender systems; Transit sheds and Apron; Container ports; Docks; Dredging; Light Houses.

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

UNIT I & II: Railway Engineering by S.C.Saxena and S.Arora Dhanpat Rai & sons.

UNITIII & IV: Airport Planning and Design by S. K. Khanna & M. G. Arora; Nemchand & Bros, Roorkee.

REFERENCE BOOKS

1. Railway Engineering by M.M.Agarwal; Prabha & Co, New Delhi.
2. Airport Engineering by G.V.Rao; Tata Mc Graw Hill, New Delhi.

CODE: CE 422

CONSTRUCTION ENGINEERING AND MANAGEMENT

Lectures : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks : 30
University exam. marks: 70
Credits : 4

UNIT – I

1. Introduction

Significance of Construction Management, Objectives and functions of construction management.

2. Planning And Scheduling

Planning techniques - Bar charts; Limitations of Bar Charts; Mile stone charts.

UNIT – II

3. Project Management Through Networks

Objectives of network techniques; Events; Activities; Time estimates; Float and Slack; Critical path, near critical path; CPM and PERT and their use in Construction Planning; Difference between CPM and PERT; Probability of completion time for a project.

4. Cost Control

Direct cost; Indirect cost; Total project cost; Optimization of cost through networks.

5. Resource Management (Manpower)

Introduction; Resource smoothing; Resource leveling.

UNIT – III

1. Construction Equipment

Different types of construction equipment and their use in Construction Industry; Factors affecting selection of Equipments; Owning and operating the equipment; Equipment maintenance.

UNIT – IV

2. Quality Control

Importance of quality; Elements of quality; Quality assurance techniques; Documentation; Total quality management.

3. Safety Management

Importance of safety; Approaches to improve safety in construction industry; Safety benefits to employers, employees and customers.

4. Project Economics

Time value of money; discounted cash flow analysis; Payback period; Return on investment; Benefit cost analysis, replacement analysis, Inflation.

TEXT BOOKS

1. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee; Khanna Publishers, Nai Sarak; Delhi.
2. PERT & CPM Principles and applications by L. S. Srinath; Affiliated East West Press.

REFERENCE BOOKS

1. Construction Engineering and Management by Dr. S. Seetharaman; Umesh Publications, Nai Sarak, Delhi.
2. Construction Planning, Equipment & Methods by Peurifoy R. L.; Mc Graw – Hill International Book Company.

CODE: CE 423

PROFESSIONAL ETHICS AND HUMAN VALUES

Lectures : 3 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. marks : 70

Credits : 4

UNIT – I

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.

(12)

UNIT – II

Engineering Ethics

Senses Of Engineering Ethics – Variety Of Moral Issues – 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.

(12)

UNIT – III

Engineering As Social Experimentation

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

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.

(12)

UNIT – IV

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.,

(9)

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. 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 424 /1

ELECTIVE – III

ADVANCED REINFORCED CONCRETE DESIGN

Lectures / Tutorials : 4 Periods/Week
University Exam. : 3 Hours

Sessional marks: 30
University exam. marks:70
Credits : 4

UNIT – I

1. Water tanks resting on ground (Working stress method)

Introduction, Circular and Rectangular tanks

UNIT – II

2. Elevated circular water tank (Working stress method)

Introduction ; Design of elevated circular water tank

UNIT – III

3. Design of Intze tank (Working stress method)

Calculation of dimensions ; Design of top dome; Design of top ring beam ; Design of cylindrical wall ; Design of bottom ring beam

UNIT -IV

4. Raft Foundations (Limit state method)

Soil design ; Design of slab ; Design of beams

5. Pile Foundations (Limit state method)

Introduction ; Loads on pile groups ; Soil design of a pile; Structural design of a pile

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

2. Reinforced concrete , Vol.1 & 2 by H. J. Shah, Charotar publishing house Pvt. Ltd.

REFERENCE BOOK

1. RCC Designs by BC Punmia et.al. Laxmi Publications (P) Ltd.

CODE: CE 424 /2

ELECTIVE – III

PAVEMENT ANALYSIS AND DESIGN

Lectures / Tutorials : 4 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

UNIT-1

Types of pavements – Functions of individual layers, design factors -wheel loads, tyre pressure, contact pressure, Material characteristics, Environmental and other factors. Traffic factors- ADT, AADT, Lane distribution factor, Vehicle damage factor.

UNIT-II

Stresses in flexible pavement- layered systems concept-one layer system- Boussinesq Two layer system. IRC method of flexible pavement design.

UNIT-III

Westergaard's Theory and assumptions, Stresses in rigid pavement- relative stiffness of slab, modulus of sub-grade reaction- stresses due to loads, temperature and friction. Stresses in dowel bars and tie bars

UNIT-IV

IRC method of flexible pavement design, PCA method of rigid pavement design of joints- Dowel & Tie bar. Over lay- methods of overlay design by Benkelman Beam Deflection method.

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. Highway Engineering-S.K.Khanna & C.J.Justo, Nemchand & Bros.,7th Edition (2000).
1. Principles and Practices of highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal – Khanna publishers- (2003).

REFERENCE BOOKS

- 1.Principles of Pavement Design-Yoder & Wit Zorac- John Willey & Sons.
2. Pavement analysis & design by Y.H. Huang, Pearson Education.

INDIAN STANDARD CODES

1. IRC Code for Flexible pavement-IRC-37-2001.
2. IRC Code for Rigid pavement-IRC-58-2002.
3. Rural Roads Manual - IRC Sp. 20 -2002.

ADVANCED ENVIRONMENTAL ENGINEERING

Lectures / Tutorials : 4 Periods/Week

Sessional marks: 30

University Exam. : 3 Hours

University exam. marks: 70

Credits : 4

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. 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.

UNIT – II

3. Industrial Wastewater Treatment

Introduction to Industrial Wastewater treatment.

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. Sources and Classification of Air Pollution

Stationary and mobile sources; Primary and secondary pollutants; Natural contaminants; Particulate matter; Aerosols; Gaseous pollutants.

5. Effects Of Air Pollution

Global Effects: Global warming; Ozone depletion; Acid rains; Effects of air pollutants on human health; Effects on plants; Economical effects.

6. 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.

UNIT – IV

7. Control of Air Pollution

Objectives; Types of collection equipment: Settling chamber; Inertial separators; Cyclones; Filters; Electrostatic Precipitators; Scrubbers.

8. 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.

9. Urban Solid Waste Management

Sources; Quantities and characteristics; Classification; Collection and transportation;

Recovery and reuse; Treatment methods such as composting, incineration, sanitary landfill and pyrolysis.

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. Wastewater Treatment by M.N. Rao and A.K. Datta; Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern 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. Wastewater Engineering, Treatment, Disposal and Reuse by Metcalf & Eddy Inc.; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
2. Water Supply and Wastewater Disposal by G.M. Fair et al; 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 /4

ELECTIVE – III

ADVANCED FOUNDATION ENGINEERING

Lectures / Tutorials : 4 Periods/Week

Sessional marks : 30

University Exam. : 3 Hours

University exam. marks : 70

Credits : 4

UNIT-I

2. 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.

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 Cofferdams

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

Clay minerals, Clay-water relations ,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 : CE461

LABORATORY

QUANTITY ESTIMATION & PROJECT MANAGEMENT

Practicals : 3 Periods/Week
University exam.: 3 Hrs.

Sessional marks : 30
University Exam. marks : 70
Credits : 2

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

CYCLE-1

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

CYCLE-2

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).

CYCLE-3

*(At least **THREE** of the following by using softwares like MS Excel)*

1. Quantity estimation of RCC roof slab and preparing schedule of bars
2. Quantity estimation of RCC beam and preparing schedule of bars
3. Quantity estimation of RCC Column with foundation footing and preparing schedule of bars
4. Quantity estimation of RCC retaining wall and preparing schedule of bars