

REGULATIONS, CURRICULUM AND SYLLABUS

for

B. TECH

CIVIL ENGINEERING

PONDICHERRY UNIVERSITY
PONDICHERRY-605 014

PONDICHERRY UNIVERSITY
BACHELOR OF TECHNOLOGY PROGRAMMES
(EIGHT SEMESTERS)
REGULATIONS

1. Conditions for Admission:

- (a) Candidates for admission to the first semester of the 8 semester B.Tech Degree programme should be required to have passed :

The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu or any other examination equivalent there to with minimum of 45% marks (a mere pass for OBC and SC/ST candidates) in aggregate of subjects – Mathematics, Physics and any one of the following optional subjects: Chemistry / Biotechnology/ Computer Science / Biology (Botany & Zoology) or an Examination of any University or Authority recognized by the Executive Council of the Pondicherry University as equivalent thereto.

- (b) For Lateral entry in to third semester of the eight semester B.Tech programme :

The minimum qualification for admission is a pass in three year diploma or four year sandwich diploma course in engineering / technology with a minimum of 60 % marks (50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in the subjects covered from 3rd to final semester or a pass in any B.Sc. course with mathematics as one of the subjects of study with a minimum of 60 % marks (50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in main and ancillary subjects excluding language subjects. The list of diploma programs approved for admission for each of the degree programs is given in **Annexure A**.

2. Age Limit :

The candidate should not have completed 21 years of age as on 1st July of the academic year under consideration. For Lateral Entry admission to second year of degree programme , candidates should not have completed 24 years as on 1st July of the academic year under consideration. In the case of SC/ST candidates, the age limit is relaxable by 3 years for both the cases.

3. Duration of Programme :

The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semesters constituting one academic year. The duration of each semester shall normally be 15 weeks excluding examinations.

4. Eligibility for the award of Degree:

No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

5. Branches of Study:

- Branch I - Civil Engineering
- Branch II - Mechanical Engineering
- Branch III - Electronics & Communication Engineering
- Branch IV - Computer Science & Engineering
- Branch V - Electrical & Electronics Engineering
- Branch VI - Chemical Engineering
- Branch VII - Electronics & Instrumentation Engineering
- Branch VIII - Information Technology
- Branch IX - Instrumentation & Control Engineering
- Branch X - Biomedical Engineering

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

6. Subjects of Study:

The subjects of study shall include theory and practical courses as given in the curriculum and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

7. Examinations:

The theory and practical examinations shall comprise continuous assessment throughout the semester in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

(a) Theory courses for which there is a written paper of 75 marks in the university examination.

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows.

- 5 marks for 95% and above
- 4 marks for 90% and above but below 95%
- 3 marks for 85% and above but below 90%
- 2 marks for 80% and above but below 85%
- 1 mark for 75% and above but below 80%

In total, three tests are to be conducted and the better two are to be considered for assessment.

(b) Practical courses for which there is a university practical examination of 50 marks:

The internal assessment marks of 50 has to be distributed as 20 marks for the periodic practical works and records submitted thereof, 15 marks for an internal practical examination, 5 marks for an internal viva voce, and 10 marks for class attendance in the particular subject. The distribution of marks is as given below.

- 10 marks for 95% and above
- 8 marks for 90% and above but below 95%
- 6 marks for 85% and above but below 90%
- 4 marks for 80% and above but below 85%
- 2 marks for 75% and above but below 80%

8. Requirement for appearing for University Examination:

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

(i) He / She secures not less than 75% overall attendance arrived at by taking into account the total number of periods in all subjects put together offered by the institution for the semester under consideration.

(Candidates who secure overall attendance greater than 60% and less than 75% have to pay a condonation fee as prescribed by University along with a medical certificate obtained from a medical officer not below the rank of Asst. Director)

(ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester.

(iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution.

A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

9. Procedure for completing the course:

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course requirements for the previous semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.

However, the entire course should be completed within 14 consecutive semesters (12 consecutive semesters for students admitted under lateral entry).

10. Passing Minimum:

(i) A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination.

(ii) A candidate who has been declared "Failed" in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.

(a) Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.

(b) The candidate should have attended all the college examinations as well as university examinations.

(c) If a candidate has failed in more than two papers in the current university examination, his/her representation for revaluation will not be considered.

(d) The request for revaluation must be made in the format prescribed duly recommended by the Head of the

Institution along with the revaluation fee prescribed by the University.

The internal assessment marks obtained by the candidate shall be considered only in the first attempt for theory subjects alone. For the subsequent attempts, University examination marks will be made up to the total marks. Further the University examination marks obtained in the latest attempt shall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts.

11 Award of Letter Grades:

The assessment of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain points, will be awarded as per the range of total marks (out of 100) obtained by the candidate, as detailed below:

Range of Total	Letter	Grade
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	F	0
Incomplete	FA	

'F' denotes failure in the course. 'FA' denotes absent / detained as per clause 8.

After results are declared, grade sheets will be issued to the students. The grade sheets will contain the following details:

- (a) The college in which the candidate has studied.
- (b) The list of courses enrolled during the semester and the grades scored.
- (c) The Grade Point Average (GPA) for the semester and The Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.
- (d) GPA is the ratio of sum of the products of the number of

credits (C) of courses registered and the corresponding grades points (GP) scored in those courses, taken for all the courses and sum of the number of credits of all the courses

$$GPA = (\text{Sum of } (C \times GP) / \text{Sum of } C)$$

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. FA grades are to be excluded for calculating GPA and CGPA.

The conversion of CGPA into percentage marks is as given below

$$\% \text{ Marks} = (CGPA - 0.5) \times 10$$

12 Award of Class and Rank:

(i) A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters (six semesters for lateral entry candidates) within a maximum period of 7 years (6 years for lateral entry candidates) reckoned from the commencement of the first semester to which the candidate was admitted shall be declared to have qualified for the award of degree.

(ii) A candidate who qualifies for the award of the degree passing in all subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters (3 academic years) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in **FIRST CLASS** with **DISTINCTION**.

(iii) A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of eight semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall be declared to have passed the examination in **FIRST CLASS**.

(iv) All other candidates who qualify for the award of degree shall be declared to have passed the examination in **SECOND CLASS**.

(v) For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 1st to 8th semester alone should be considered and it is mandatory that the candidate should have passed all the subjects from 1st to 8th semester in the first attempt. Rank certificates would be issued to the first ten candidates in each branch of study.

13. Provision for withdrawal:

A candidate may, for valid reasons, and on the recommendation of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencement

of the last theory examination pertaining to that semester.

Withdrawal

shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded DISTINCTION whereas they are not eligible to be awarded a rank.

14. Discontinuation of Course:

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through the Head of the Institution in advance and obtain a written order from the University permitting discontinuance. A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

15. Revision of Regulations and Curriculum:

The University may from time to time revise, amend or change the regulations of curriculum and syllabus as and when found necessary.

ANNEXURE – A

B.Tech courses in which admission is sought	Diploma courses eligible for admission
Civil Engineering	Civil Engineering Civil and Rural Engineering Architectural Assistantship Architecture Agricultural Engineering
Mechanical Engineering	Mechanical Engineering Automobile Engineering Agricultural Engineering Mechanical and Rural Engineering Refrigeration and Air-conditioning Agricultural Engineering & Farm Equipment Technology Metallurgy Production Engineering Machine Design & Drafting Machine tool maintenance and Repairs Printing Technology / Engineering Textile Engineering / Technology Tool Engineering
Electrical and Electronics Engineering Electronics & Communication Engineering Electronic and Instrumentation Engineering Instrumentation and Control Engineering Bio Medical Engineering	Electrical Engineering Electrical and Electronics Engineering Electronics and Instrumentation Engineering Instrumentation Engineering / Technology Electronics and Communication Engg. Electronics Engineering Medical Electronics Instrumentation and Control Engineering Applied Electronics
Chemical Engineering	Chemical Engineering Chemical Technology Petrochemical Technology Petroleum Engineering Ceramic Technology Plastic Engineering Paper & Pulp Technology Polymer Technology
Information Technology Computer Science & Engineering	Computer Science and Engineering Computer Technology Electrical and Electronics Engineering Electronics & Communication Engineering Electronics & Instrumentation Engineering Instrumentation Engineering / Technology

CURRICULUM
B.Tech. – CIVIL ENGINEERING

I SEMESTER

Code No.	Name of the Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
T 101	Mathematics – I	3	1	-	4	25	75	100
T 102	Physics	4	-	-	4	25	75	100
T 103	Chemistry	4	-	-	4	25	75	100
T 104	Basic Electrical and Electronics Engineering	3	1	-	4	25	75	100
T 105	Engineering Thermodynamics	3	1	-	4	25	75	100
T 106	Computer Programming	3	1	-	3	25	75	100
	Practicals							
P 101	Computer Programming Lab	-	-	3	2	50	50	100
P 102	Engineering Graphics	2	-	3	2	50	50	100
P 103	Basic Electrical & Electronics Lab	-	-	3	2	50	50	100
	Total	22	4	9	29	300	600	900

II SEMESTER

Code No.	Name of the Subjects	Periods			Cr	Marks		
		L	T	P		IA	UE	TM
	Theory							
T 107	Mathematics – II	3	1	-	4	25	75	100
T 108	Material Science	4	-	-	3	25	75	100
T 109	Environmental Science	4	-	-	3	25	75	100
T 110	Basic Civil and Mechanical Engineering	4	-	-	4	25	75	100
T 111	Engineering Mechanics	3	1	-	4	25	75	100
T 112	Communicative English	4	-	-	3	25	75	100
	Practical							
P 104	Physics lab	-	-	3	2	50	50	100
P 105	Chemistry lab	-	-	3	2	50	50	100
P 106	Workshop Practice	-	-	3	2	50	50	100
P 107	NSS / NCC *	-	-	-	-	-	-	-
	Total	22	2	9	27	300	600	900

* To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.

III SEMESTER

Code	Name of the Subject	Periods			Cr	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T31	Mathematics-III	3	1	-	4	25	75	100
CE T32	Building Materials	4	-	-	3	25	75	100
CE T33	Building Construction	4	-	-	3	25	75	100
CE T34	Mechanics of Solids-I	3	1	-	4	25	75	100
CE T35	Mechanics of Fluids	4	-	-	4	25	75	100
CE T36	Surveying-I	4	-	-	4	25	75	100
	Practical							
CE P31	Survey Lab-I	-	-	3	2	50	50	100
CE P32	Material Testing Lab-I	-	-	3	2	50	50	100
CE P33	Building Planning and Drawing	2	-	3	2	50	50	100
		24	2	9	28	300	600	900

IV SEMESTER

Code	Name of the Subject	Periods			Cr	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T41	Mathematics-IV	3	1	-	4	25	75	100
CE T42	Concrete Technology	4	-	-	3	25	75	100
CE T43	Engineering Geology	4	-	-	4	25	75	100
CE T44	Mechanics of Solids-II	4	-	-	3	25	75	100
CE T45	Hydraulics and Hydraulic Machinery	3	1	-	4	25	75	100
CE T46	Surveying-II	4	-	-	4	25	75	100
	Practical							
CE P41	Survey Lab-II	-	-	3	2	50	50	100
CE P42	Material Testing Lab-II	-	-	3	2	50	50	100
CE P43	Engineering Geology Lab	-	-	3	2	50	50	100
PE P44	Physical Education	2	-	-	-	-	-	-
		24	2	9	28	300	600	900

*** Under pass/fail option only and not counted for CGPA calculation**

V SEMESTER

Code	Name of the Subject	Periods			Cr	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T51	Computational Methods	3	1	-	4	25	75	100
CE T52	Structural Analysis-I	3	1	-	4	25	75	100
CE T53	Geotechnical Engineering-I	4	-	-	4	25	75	100
CE T54	Environmental Engineering -I	4	-	-	4	25	75	100
CE T55	Transportation Engineering-I	4	-	-	4	25	75	100
CE T56	Hydrology and Water Resources Engineering	4	-	-	3	25	75	100
	Practical							
CE P51	Geotechnical Engg. Lab	-	-	3	2	50	50	100
CE P52	Fluid Flow and Hydraulic Machinery	-	-	3	2	50	50	100
CE P53	Transportation Engineering Lab	-	-	3	2	50	50	100
HS P54	General Proficiency -I	-	-	3	2	100	-	100
		22	2	12	31	400	600	1000

VI SEMESTER

Code	Name of the Subject	Periods			Cr	Marks		
		L	T	P		IA	UE	TM
	Theory							
CE T61	Structural Analysis-II	3	1	-	4	25	75	100
CE T62	Geotechnical Engg.-II	4	-	-	4	25	75	100
CE T63	Environmental Engg.-II	4	-	-	4	25	75	100
CE T64	Structural Design -I	4	-	-	3	25	75	100
CE T65	Transportation Engg.-II	4	-	-	4	25	75	100
-	Elective -I	4	-	-	3	25	75	100
	Practical							
CE P61	Environmental Engg. Lab	-	-	3	2	50	50	100
CE P62	Estimation, Costing and Valuation	-	-	3	2	50	50	100
CE P63	Computer Aided Design Lab	-	-	3	2	50	50	100
HS P64	General Proficiency -II	-	-	3	2	100	-	100
		23	1	12	30	400	600	1000

List of Electives to be offered in VI Semester

- CEE 61 Pre-stressed Concrete Structures
- CEE 62 Coastal Engineering
- CEE 63 Industrial Waste Disposal and Treatment
- CEE 64 Irrigation and Drainage Engineering
- CEE 65 Architecture and Town Planning
- CEE 66 Mass Transportation System
- CEE 67 Construction Methods and Equipment

VII SEMESTER

Code	Name of the Subject	Periods			Cr	Marks		
		L	T	P		IA	UE	TM
	Theory							
HS T71	Engineering Economics	4	-	-	3	25	75	100
CE T72	Structural Design-II	4	-	-	3	25	75	100
CE T73	Coastal and Offshore Structures	4	-	-	3	25	75	100
-	Elective -II	4	-	-	3	25	75	100
-	Elective -III	4	-	-	3	25	75	100
	Practical							
CE P71	Design and Drawing -I							
CE P72	Seminar							
CE P73	Industrial Visits /Training	1	-	3	2	50	50	100
CE PW7	Project Work Phase-I	-	-	-	1	100	-	100
		-	-	-	1	100	-	100
		-	-	6	2	100	-	100
		21		9	21	475	425	900

List of Electives to be offered in VII Semester

- CEE 71 Geotechnical Processes and Application
- CEE 72 Geographical Information System
- CEE 73 Hydraulic Structures
- CEE 74 Finite Element Analysis
- CEE 75 Advanced Structural Design - RCC
- CEE 76 Failure Analysis and Rehabilitation of Structures
- CEE 77 Bridge Engineering
- CEE 78 Hydro Power Engineering
- CEE 79 Site Investigation Methods and Practices
- CEE 710 Highway and Airport Pavement Design
- CEE 711 Matrix methods of structural analysis
- CEE 712 Experimental Measurements and Analysis

VIII SEMESTER

Code	Name of the Subject	Periods			Cr	Marks		
		L	T	P		IA	UE	TM
	Theory							
CE T81	Construction Management	4	-	-	3	25	75	100
CE T82	Disaster Mitigation and Management	4	-	-	3	25	75	100
-	Elective –IV	4	-	-	3	25	75	100
-	Elective –V	4	-	-	3	25	75	100
-	Elective -VI	4	-	-	3	25	75	100
	Practical							
CE P81	Design and Drawing –II	-	-	3	2	50	50	100
CE P82	Comprehensive Viva Voce	-	-	3	2	50	50	100
CE P83	Professional Ethical practice	-	-	3	1	100	-	100
CE PW8	Project Work Phase-II	-	-	12	6	50	50	100
		20		21	26	375	525	900

List of Electives to be offered in VIII Semester

- CEE 81 Advanced Structural Design - Steel
- CEE 82 Optimization Techniques for Civil Engineering
- CEE 83 Advanced Open Channel Flow
- CEE 84 Ground Water Hydrology
- CEE 85 Water Resources System Engineering
- CEE 86 Machine Foundations
- CEE 87 Earth Retaining Structures
- CEE 88 Air and Noise Pollution
- CEE 89 Environmental Impact Assessment
- CEE 810 Dock and Harbour Engineering
- CEE 811 Traffic Engineering and Management
- CEE 812 Photogrammetry and Remote Sensing
- CEE 813 Prefabrication and Construction Techniques
- CEE 814 Earthquake Resistant Design of Structures.
- CEE 815 Structural Dynamics
- CEE 816 Theory of Elasticity and Plasticity
- CEE 817 Design of Industrial Structures

T 101 MATHEMATICS – I

Unit I - Calculus

Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

Unit II - Multiple Integrals And Applications

Multiple integrals – change of order of integration. Applications: Areas (double integration) and volumes by triple integration (Cartesian and polar) – mass and center of mass (constant and variable densities).

Unit III - Analytical Solid Geometry

Directional cosines and ratios – angle between two lines – the equation of plane - equations to a straight line and shortest distance between two skew lines.

Unit IV - Differential Equations

Exact equations, First order linear equations, Bernoulli's equation, orthogonal trajectories, growth and decay, geometrical applications and electric circuits. Equations not of first degree: equations solvable for p , equations solvable for y , equations solvable for x and Clairaut's type.

Unit V - Differential Equations (Higher order)

Linear differential equations of higher order – with constant coefficients, the operator D - Euler's linear equation of higher order with variable coefficients - simultaneous linear differential equations – solution by variation of parameters method – simple applications to electric circuits.

Text Books

1. Venkataraman, M. K, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, 2001.

Reference Books

1. Bali, N. P, and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi, 2007.

T 102 PHYSICS

Unit I – Acoustics & NDT

ultrasonics - Ultrasonic Waves Productions (Piezoelectric & Magnetostriction method) – Detections (Acoustic Grating)

Acoustics - Factors affecting Acoustic of Buildings (Reverberation, Loudness, Focusing, Echo, Echelon Effect and Resonance) and their Remedies - Sabine's formula for Reverberation Time

NDT applications - Pulse Echo Method - Liquid Penetrant Method

Unit II – Optics

Interference - Air Wedge – Michelson's Interferometer – Wavelength Determination – Interference Filter – Antireflection Coatings

Diffraction - Diffraction Grating – Dispersive power of grating - Resolving Power of Grating & Prism

Polarisation - Huygens Theory of Double Refraction – Quarter and Half Wave Plates – Specific Rotary Power – Laurent Half Shade Polarimeter

Unit III – Lasers & Fiber Optics

Lasers - Principles of Laser – Spontaneous and Stimulated Emissions - Einstein's Coefficients – Population Inversion and Laser Action – Optical resonators – Types of Lasers - NdYAG, CO₂ laser, GaAs Laser

Fiber Optics - Principle and Propagation of light in optical fiber – Numerical aperture and acceptance angle – Types of optical fibers (material, refractive index, mode)

Unit IV – Wave mechanics

Matter Waves – de Broglie Wavelength – Uncertainty Principle – Schrödinger Wave Equation – Time Dependent – Time Independent – Application to Particle in a One Dimensional Box – Quantum Mechanical Tunneling – Tunnel Diode.

Unit V – Nuclear energy source

General Properties of Nucleus (Size, Mass, Density, Charge) – Mass Defect – Binding Energy - Disintegration in fission – Nuclear Fusion (p-p & C-N cycle) – Nuclear Reactor: Materials Used in Nuclear Reactors. – PWR – BWR - FBTR

Text Books

1. A S Vasudeva, Modern Engineering Physics, S. Chand & Co, New Delhi, 2006.
2. V Rajendran, Engineering Physics, TMH, New Delhi 2008.

Reference Books

1. Richtmyer, Kennard and cooper , Introduction to Modern Physics, TMH, New Delhi 2005.
2. Ajay Ghatak, Optics, TMH, New Delhi, 2007.
3. Thiagarajan and Ghatak, Laser and Application, TMH, New Delhi 2008.
4. Arthur Beiser, Concept of Modern Physics, TMH, New Delhi 2008.
5. Avadhanulu M N and Kshir Sagar , A Text Book of Engineering Physics, S. Chand & Co, 2007.
6. R. Murugesan, Modern Physics, S. Chand & Co, New Delhi 2006.
7. K.R.Nambiar, Lasers, New Age International, New Delhi, 2008.

Unit I - Water

Hardness of water – units and calcium carbonate equivalent. Determination of hardness of water- EDTA method. Disadvantages of hardwater-boiler scale and sludge, caustic embrittlement, priming & foaming and boiler corrosion. Water softening method – internal & external conditioning – lime-soda process, zeolite process and ion exchange process. Desalination – reverse osmosis & electrodialysis.

Unit II – Polymers

Classification, types of polymerization reactions - mechanism of radical, ionic and Ziegler-Natta polymerizations. Polymer properties - chemical resistance, crystallinity and effect of temperature. Thermoplastics and thermosets. Polymerization techniques - bulk, suspension, emulsion, solution and gas phase polymerization. Preparation, properties and uses of PVC, TEFLON, Nylons, Bakelite, polyurethane, Mn and Mw. Rubbers - vulcanization, synthetic rubber, buna S, buna N, silicone and butyl rubber. Conducting polymers - classification and applications. Polymer composites – FRP - laminar composites.

Unit III - Electrochemical Cells

Galvanic cells, single electrode potential, standard electrode potential, electromotive series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes-hydrogen calomel, Ag /AgCl & glass electrodes. Batteries - primary and secondary cells, laclanche cell, lead acid storage cell, Ni-Cd battery & alkaline battery. Fuel cells - H₂-O₂ fuel cell.

Unit IV - Corrosion And Its Control

Chemical & electrochemical corrosion-Galvanic series-galvanic, pitting, stress and concentration cell corrosion. Factors influencing corrosion-corrosion control methods - cathodic protection and corrosion inhibitors. Protective coating - types of protective coatings-metallic coating-tinning and galvanizing, cladding, electroplating and anodizing.

Unit V -Phase Rule

Definition and derivation of phase rule. Application to one component system - water and sulphur systems. Thermal analysis, condensed phase rule. Two component alloy systems - Pb-Ag, Cu-Ni and Mg-Zn systems.

Text books

1. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai and Sons, New Delhi 2004.
2. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, 2nd edition. PHI Learning PVT., LTD, New Delhi, 2008.

Reference Books

1. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand & Co., Ltd. New Delhi.
2. B. K. Sharma, Engineering Chemistry, 3rd edition Krishna Prakashan Media (P) Ltd., Meerut, 2001.

Part A - Electrical

Unit – I

Review of Kirchoff's laws – series and parallel circuits, equivalent resistance, star/delta conversion. Concepts of AC circuits – rms value, average value, form and peak factors – real and reactive power – power factor.

Unit – II

Node and mesh methods of analysis of DC circuits and simple AC circuits. Introduction to three phase circuits, Introduction to three phase system - phase and line parameters – relations, power measurement – voltmeter and ammeter method, two and three wattmeter methods.

Unit – III

Principle of DC generator and motor, Transformer, synchronous generator, induction motor (single phase). Sources for electrical energy conversion-thermal and hydraulic plant (Block diagram approach only). Components of AC transmission and distributions systems – line diagram.

Part B – Electronics

Unit – IV

Half-wave rectifier and Full-wave rectifier- filters - Amplifiers-common emitter and common collector amplifiers- Hartley oscillator and RC phase shift oscillator. Transducers – Resistance temperature detector (RTD) – Linear variable differential transformer (LVDT) - Strain gauge – Piezo electric transducer.

Unit – V

Boolean algebra – Reduction of Boolean expressions – De-Morgan's theorem – Logic gates – Implementation of Boolean expressions – Flip flops – RS, JK, T and D. Combinational logic – Half adder, Full adder and Subtractors. Sequential logic – Ripple counters and shift registers.

Unit – VI

Model of communication system – Analog and digital – Wired and wireless channel. Block diagram of various communication systems – Microwave, satellite, optical fiber and cellular mobile system. Network model – LAN, MAN and WAN – Circuit and packet switching – Overview of ISDN.

Text Books

1. Hughes revised by John Hiley, Keith Brown, Ian McKenzie Smith, Electrical and Electronics Technology, Pearson Education Limited, New Delhi, 2007.
2. Smarajit Ghosh, Fundamentals of Electrical and Electronics Engineering, Second Edition, Prentice Hall of India Private Limited.
3. George Kennedy and Bernard Davis, Electronics communication Systems, Tata McGraw-Hill Ltd, New Delhi.

Reference Books

1. D.P.Kothari and I.J.Nagrath, Theory and Problems of Basic Electrical Engineering, Prentice Hall of India Ltd., New Delhi.
2. J.B.Gupta, A Course in Electrical Power, Katson Publishing House, New Delhi, 1993.

T 105 ENGINEERING THERMODYNAMICS

Unit I - Basic Concepts and Definitions

Energy conversion and efficiencies - System, property and state - Thermal equilibrium - Temperature - Zeroth law of Thermodynamics.

Unit II - First Law of Thermodynamics

The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases

Unit III - Second Law of Thermodynamics

Equilibrium and the second law - Heat engines - Kelvin-Planck statement of second law of thermodynamics - Reversible and irreversible processes - Carnot principle - Clausius inequality- Entropy

Unit IV - Gas Power Cycles

Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies

Unit V - Refrigeration Cycles and Systems

Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system (only theory)-
Liquifaction and solidification of gases

Text Books

1. Nag, P. K., "Engineering Thermodynamics", 4th edition, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi, 1995
2. Wark, K., "Thermodynamics", 4th edition, Mc Graw Hill, N.Y., 1985

Reference Books

1. Arora, C.P., "Thermodynamics", Tata Mc Graw Hill Publishing Co. Ltd., New Delhi, 1998.
2. Burghardt, M.D., "Engineering Thermodynamics with Applications", 4th edition, Harper & Row, N.Y., 1986.
3. Huang, F.F., "Engineering Thermodynamics" 2nd edition, Macmillan Publishing Co. Ltd., N.Y., 1989.
4. Cengel, Y.A. and Boles, M.A., "Thermodynamics - An Engineering Approach", 5th edition, Mc-Graw Hill, 2006

T 106 COMPUTER PROGRAMMING

Unit – I

History of Computers – Block diagram of a Computer – Components of a Computer system – Classification of computers - Hardware – Software – categories of Software – Operating System – Applications of Computers - Role of Information Technology – Internet and its services – Intranet – Study of word processor – Preparation of worksheets

Unit – II

Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code.

Introduction to C – C tokens – data types – Operators and expressions – I/O functions

Unit – III

Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions

Storage classes – Strings – String library functions

Unit – IV

Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types– Union

Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and structures

Unit – V

Files – operations on a file – Random access to files – command line arguments

Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives

Text Books

1. Ashok N Kamthane, "Computer Programming", Pearson education, Second Impression, 2008.
3. Venugopal.K and Kavichithra.C, "Computer Programming", New Age International Publishers, First Edition, 2007.

Reference Book

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Third edition, 2006.

List of Exercises

OS Commands, Word Processor and Spreadsheets

1. Study of OS commands-Compilation and execution of simple C programs
2. Use of mail merge in word processor
3. Use of spreadsheet to create Charts(XY, Bar, Pie) and apply the formulae wherever necessary C Programming (Flowcharts and algorithms are essential for the programming exercises)
4. Greatest of three numbers using conditional operator and if statement
5. Read two numbers and swap those two numbers using temporary variable and without using temporary variable.
6. Solve quadratic equation for different sets of inputs.
7. Use of Switch....Case statements
8. Generation of prime and Fibonacci series
9. Evaluate the COSINE series using for, while and do while loops
10. Matrix operations
 - a) Addition
 - b) Transpose
 - c) Multiplication
11. Evaluate the sin(x) series using functions and recursive functions
12. Read a string and find solution to remove the duplicates of a given string from the given sentence
13. Create an array of structures for a list of items with the following details

Item - Code	Item_ Name
102	Paste – Colgate
102	Paste –Pepsodent
102	Paste –Close-up
101	Soap-Cinthol
101	Soap-Lux
101	Soap-Hamam
101	Soap-Dove

Arrange the set of items in ascending order of its Item_Code and descending order of its Item_ name as given below

Item-Code	Item_ Name
101	Soap-Lux
101	Soap-Hamam
101	Soap-Dove
101	Soap-Cinthol
102	Paste –Pepsodent
102	Paste –Colgate
102	Paste – Close-up

14. Use of Structure to define a user defined data types, input the data and write the data into the file
15. Use of pointers and array of pointers
16. Functions with static data types
17. Write command line program to implement the following DOS commands using files
 - Del
 - Copy

Unit 0

Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning

Unit I

Conic sections, Involute, Spirals, Helix. Projection of Points, Lines and Planes

Unit II

Projection of Solids and Sections of Solids.

Unit III

Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone)

Unit IV

Isometric projections and Orthographic projections

Unit V

Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning.

Text Books

1. Gopalakrishna K.R. and Sudhir Gopalakrishna, Engineering Graphics, Inzinc Publishers, 2007.
2. Natarajan K.V., A Text Book of Engineering Drawing, Dhanalakshmi Publishers, 2006. BIS, Engineering Drawing practice for Schools & College, 1992.

Reference Books

1. Bhatt N.D., Engineering Drawing, 49th edition, Chorotar Publishing House, 2006.
2. Venugopal K., Engineering Drawing and Graphics + Auto CAD, 4th edition, New Age International Publication Ltd., 2004 .
3. David I cook and Robert N Mc Dougal, Engineering Graphics and Design with computer applications, Holt – Sounders Int. Edn. 1985.
4. James D Bethune and et. al., Modern Drafting, Prentice Hall Int., 1989.

Electrical Lab

1. Study of tools and accessories
2. Study of joints
3. Staircase wiring
4. Doctor's room wiring
5. Godown wiring
6. Tube Light and Fan connection
7. Lamp controlled from three different places-wiring

Electronics Lab

1. Rectifiers

Construction of half wave and full wave rectifiers with and without filters – Calculation of ripple factors.

2. Frequency Response of RC Coupled Amplifiers

Determination of frequency response of given RC coupled amplifier - Calculation of bandwidth.

3. Verification of Kirchoff's Voltage and Current Laws

Determine the voltage and current in given circuits using Kirchoff's laws theoretically and verify the laws experimentally.

4. Study of Logic Gates

- a. Verification of Demorgan's theorems
- b. Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR gates and Flipflops - JK, RS, T and D
- c. Implementation of digital functions using logic gates

5. Study of CRO

- a. Measurement of AC and DC voltages
- b. Frequency and phase measurements (using Lissajou's figures)

6. Study of Transducers

- a. Displacement and load measurements with transducers
- b. Temperature measurement with thermocouple

Unit I - Algebra

Binomial, exponential and logarithmic series (without proof) – problems on summation, approximation and coefficients.

Unit II – Matrices

Inverse of matrix by row transformation – Eigen values and Eigen vectors - Cayley-Hamilton theorem (without proof) – Diagonalisation – rank of matrix – solution of a general system of m linear algebraic equations in n unknown ($m \leq n$).

Unit III – Trigonometry

Expansions for $\sin^n \theta$, $\cos^n \theta$, $\tan^n \theta$, $\sin (n\theta)$, $\cos(n\theta)$, $\tan (n\theta)$. Exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable – separation of real and imaginary parts.

Unit IV - Vector Analysis

Scalar fields and Vector fields – Gradient, Divergence and Curl – their properties and relations – Gauss and Stokes theorems (without proof), simple problems for their verification.

Unit V - Statistics

Moments, kurtosis and skewness based on moments only. Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions. Correlation and regression – rank correlation.

Text Books

1. Venkataraman M.K, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, 2001.
2. Venkataraman M.K, Engineering Mathematics (Third Year-Part A), The National Publishing Company, Madras, 2001.

Reference Book

1. Bali N.P. and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi, 2007.

T 108 MATERIAL SCIENCE

Unit I - Crystal structure and Defects

Crystal Systems – Bravais Lattices – Coordination Number, Atomic Radius, Packing Factor for FCC & HCP structures – Miller Indices for a cubic crystal– Powder X Ray Diffraction Method - Lattice defects – Qualitative ideas of point, line, surface and volume defects

Unit II – Dielectric properties

Dielectric Polarization and Mechanism – Internal or local Field - Clausius-Mossotti relation – Dielectric loss - Temperature and frequency dependence of dielectric constant – Measurement of Dielectric constant and loss using Scherring bridge – Elementary ideas of Piezoelectrics, Ferroelectrics and Pyroelectric materials and its Applications

Unit III – Magnetic Properties

Elementary Ideas of classification of magnetic materials (Dia, Para, Ferro & Ferri) – Quantum theory of Para & Ferro Magnetism – Domain Theory of Hysteresis – Heisenberg Theory of Exchange Interaction (without derivation) – Qualitative ideas of Anti ferromagnetic Ordering – Structure and Properties of Ferrites – Properties of Soft & Hard Magnetic Materials – Applications: floppy disks, CD ROM, Magneto optical recording

Unit IV – Semiconductors and superconductors

Derivation of Carrier concentration in intrinsic Semiconductor – Hall effect in Semiconductors -- Application of Hall Effect - Basic Ideas of Compound Semiconductors (II-VI & III-V) - Basic concepts of superconductivity – transition temperature – Meissner effect – Type I and II superconductors – high temperature superconductors – 123 superconductor.

Unit V – Advanced Materials

Liquid Crystals – Types – Application as Display Devices – Metallic Glasses – Nanomaterials (one, Two & three Dimensional) – Physical Properties and Applications of Carbon Nano Tubes

Text books

1. V Raghavan , Materials Science and Engineering- A First Course, Prentice Hall of India, 2008.
2. M Arumugam , Materials Science, Anuratha Printers, 2004.

Reference Books

1. Ali Omar M, Elementary Solid State Physics, Addison Wesley Publishing Co., 2000.
2. William D Callister Jr., Material Science and Engineering, John Wiley and sons, 2006.
3. Srivatsava J P, Elements of Solid State Physics, Prentice Hall of India, 2001.
4. Charles Kittel, Introduction to Solid State Physics, John Wiley & sons, Singapore, 2007.
5. Pillai S.O, Solid State Physics– New Age International, 2005.
6. Charles P Poole & Frank 5. J Owens, Introduction to Nanotechnology, Wiley nterscience, 2003.

7. T 109 ENVIRONMENTAL SCIENCE

Unit I - Environmental Segments And Natural Resources

Environmental segments-lithosphere, hydrosphere, biosphere and atmosphere-layers of atmosphere. Pollution-definition and classification. Pollutants-classification. Forest resources-use and overexploitation, deforestation, forest management. Water resources-sources, use and conflicts over water, dams-benefits and problems. Mineral resources-mineral wealth of India, environmental effects of extracting and using mineral resources. Food resources-world food problems, environmental impact of modern agriculture-fertilizer and pesticides, overgrazing and land resources-land degradation- land slides, soil erosion and desertification. Energy resources-growing energy needs renewable and non-renewable energy resources and use of alternate-energy sources.

Unit II - Ecosystem & Biodiversity

Concept of an ecosystem-structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of forest, grass land, desert and aquatic (fresh water, estuarine and marine) ecosystem. Biodiversity-definition-genetic species and ecosystem diversity. Value of biodiversity – consumptive use, productive use, social, ethical, aesthetic and option values. Hot spots of biodiversity. Threats to biodiversity-habitat loss, poaching of wild life, human-wildlife conflicts. Endangered and endemic species. Conservation of biodiversity-in situ and ex-situ conservation of biodiversity.

Unit III - Air Pollution

Air pollution-sources of air pollution. Sources, effects and control measures of oxides of nitrogen, oxides of sulphur, oxides of carbon, hydrocarbon, chlorofluoro carbons and particulates. Green house effect-causes and effects on global climate and consequences. Ozone depletion-causes, mechanism and effect on the environment. Smog-sulfurous and photochemical smog-effect on the environment. Acid rain-theory of acid rain and effects.

Unit IV - Water Pollution And Solid Waste Management

Sources, effects and control measures of –water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and radioactive pollution. Solid waste management – causes, effect and control measures of urban and industrial wastes.

Unit V - Social Issues And The Environment

From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, water shed management. Resettlement and rehabilitation of people. Environmental ethics. Consumerism and waste products. Environmental protection act-air (prevention and control of pollution) act, water (prevention and control of pollution) act, wildlife protection act, forest conservation act. Role of an individual in prevention of pollution. Human population and the environment-population growth, variation among nations, population explosion, role of information technology in environment and human health.

Text Books

1. Raghavan Nambiar K., "Text Book of Environmental Studies" 2nd edition, Scitech Publications, India, Pvt. Ltd, Chennai, 2008.

2. A.K. De, "Environmental chemistry" 6th edn; New age international (P) Ltd, New Delhi, 2006.

Reference Books

- 1) Sharma B.K., "Environmental chemistry" goel publishing house, Meerut, 2001.
- 2) Sodhi G. S., Fundamental concepts of environmental chemistry, Narosa publishing house, New Delhi
- 3) Dara S .S., " A text book of environmental chemistry and pollution control, S. Chand & Company Ltd, New Delhi, 2002.
- 4) Richard T. Wright, environmental science, 9th edition, Pearson education inc, New Delhi, 2007
- 5) Meenakshi P., "Elements of environmental science and engineering" Prentice-hall of India, New Delhi, 2006.

Part-A Civil Engineering

Unit I - Buildings, Building Materials

Buildings-Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index-construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.

Unit II - Buildings and their components

Buildings- Various Components and their functions. Soils and their classification Foundations-Functions and types of foundations, Masonry, Floors-functions and types of floors, Roofs and types of roofs.

Unit III - Basic Infrastructure

Surveying-classification, general principles of surveying – Basic terms and definitions of chain, compass and leveling surveying , uses of surveying , contours, their characteristics and uses. Roads-types, Water bound macadam road, cement concrete road, bituminous road. Bridges-components and types of bridges. Dams-Purpose, selection of site, types of dams and components. Water supply-sources and quality requirements. Rainwater harvesting.

PART - B Mechanical Engineering

Unit IV - Internal and external combustion systems

Working principles of IC engines – Classification – Diesel and petrol engines: two stroke and four stroke engines. Steam generators(Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories.

Conventional Power Generation Systems

Hydraulic, steam and gas turbines power plants – Schemes and layouts – Selection criteria of above power plants.

Unit V - Non-Conventional Energy Systems (Description Only)

Solar thermal systems – Solar photovoltaic – Solar pond – wind, wave, tidal, geothermal and ocean thermal energy conversion systems.

Casting

Green and dry sand moulding processes for ferrous and non-ferrous metals – applications.

Unit VI - Metal Joining

Elements of arc and gas welding, brazing and soldering – Bolted joint types – Adhesive Bonding; classification of adhesives – applications. Sheet Metal Processing Punching, blanking, shearing, bending, and deep drawing processes; descriptions and applications

Text Books

For Part –A

- a) Purushothama Raj.P., Basic civil engineering, 3rd Edn., Dhanam Publications, Chennai, 2001.
- b) Natarajan, K V, Basic Civil Engineering, 11th Edition, Dhanalakshmi Publications, Chennai, 2001.

For Part –B

1. Lindberg, R.A. Process and Materials of Manufacture, PHI, 1999.
2. Nagpal, Power Plant Engineering, Khanna Publishers, Delhi, 1998.

Reference Books

1. Rajput, R K, Engineering Materials, S Chand & Co. Ltd., New Delhi, 2002.
2. Punmia, B.C., et. al., Surveying , Vol-I, Laxmi Publishers, New Delhi, 2002.
3. Punmia, B.C., et.al Building Construction, Laxmi Publishers, New Delhi ,2002.
4. El.Wakil, M.M., Power Plant Technology, Mc Graw Hill Book Co., 1985.
5. Hajra Choudhry, et. al., Workshop Technology Vol I and II, Media Promoters Publishers Pvt. Ltd., Bombay, 2004.

Unit I - Fundamental of Mechanics

Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon's theorem, Resultant of force system – Concurrent and non concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, concept of free body diagrams, applications in solving the problems on static equilibrium of bodies.

Unit II - Plane Trusses

Degrees of freedom, Types of supports and reactions, Types of loads, Analysis of Trusses- method of joints, method of sections.

Friction. Introduction, Static dry friction, simple contact friction problems, ladders, wedges, screws and belt friction.

Unit III - Properties of Surfaces

Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.

Unit IV - Kinematics and Kinetics of Particles

Equations of motion - Rectilinear motion, curvilinear motion, Relative motion, D'Alembert's principle, work- Energy equation – Conservative forces and principle of conservation of energy, Impulse – momentum, Impact – Direct central impact and oblique central impact.

Unit V - Kinematics and Kinetics of Rigid bodies

Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum

Text Books

1. Bhavikatti, S.S and K.G. Rajashekarappa, Engineering Mechanics, New Age International (P) Ltd, New Delhi, 2008.
2. Rajesekaran, S and Sankara Subramanian., G., Engineering Mechanics, Vikas Publishing House Private Ltd., 2002.

Reference Books

1. Palanichamy, M.S. Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw-Hill, 2001.
2. Beer, F.P and Johnson Jr. E.R, Vector Mechanics for Engineers, Vol. 1 Statics and Vol.2 Dynamics, McGraw – Hill International Edition, 1997.

T112 COMMUNICATIVE ENGLISH

Unit I – Basic Communication Theory

Importance of Communication – stages of communication, modes of communication – barriers to communication – strategies for effective communication – Listening: Importance, types, barriers – Developing effective listening skills.

Unit II – Comprehension And Analysis

Comprehension of technical and non-technical material – Skimming, scanning, inferring- Note making and extension of vocabulary, predicting and responding to context- Intensive Reading and Reviewing

Unit III – Writing

Effective sentences, cohesive writing, clarity and conciseness in writing – Introduction to Technical Writing – Better paragraphs, Definitions, Practice in Summary Writing – Four modes of writing – Use of dictionaries, indices, library references – making bibliographical entries with regard to sources from books, journals, internet etc.

Unit IV – Business Writing / Correspondence

Report writing – Memoranda – Notice – Instruction – Letters – Resumes – Job applications

Unit V – Oral Communication

Basics of phonetics – Presentation skills – Group Discussions – Dialogue writing – Short Extempore – Debates-Role Plays-Conversation Practice

Reference Books

1. Ashraf M.Rizvi., Effective Technical Communication. Tata-McGraw, 2005.
2. Boove, Courtland R et al., Business Communication Today. Delhi. Pearson Education ,2002.
3. Meenakshi Raman and Sangeeta Sharma., Technical Communication Principles And Practice,OUP, 2007.
4. Robert J.Dixon. ,Complete Course in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2006.
5. Robert J.Dixon., Everyday Dialogues in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2007.
6. Sethi,J and Kamalesh Sadanand., A Practical Course in English Pronunciation, Prentice-Hall of India Pvt. Ltd, New Delhi,2007.

P 104 PHYSICS LABORATORY

List of experiments (Any 10 Experiments)

1. Thermal conductivity – Lee's DISC
2. Thermal conductivity - Radial flow
3. Spectrometer – Prism or Hollow prism
4. Spectrometer – Transmission grating
5. Spectrometer - Ordinary & Extraordinary rays
6. Newton's rings
7. Air – wedge
8. Half shade polarimeter – Determination of specific rotatory power
9. Jolly's experiment – determination of a
10. Magnetism: $i - h$ curve
11. Field along the axis of coil carrying current
12. Vibration magnetometer – calculation of magnetic moment & pole strength
13. Laser experiment: wavelength determination using transmission grating, reflection grating (vernier calipers) & particle size determination
14. Determination of optical absorption coefficient of materials using laser
15. Determination of numerical aperture of an optical fiber

P105 CHEMISTRY LABORATORY

List of experiments (Any 10 Experiments)

1. Determination of dissolved oxygen in water.
2. Determination of total hardness of water by EDTA method.
3. Determination of carbonate and bicarbonate in water.
4. Estimation of chloride content in water.
5. Estimation of magnesium by EDTA.
6. Estimation of vinegar.
7. Estimation of ferrous by permanganometry.
8. Estimation of ferrous and ferric iron in a solution mixture by dichrometry.
9. Estimation of available chlorine in bleaching powder.
10. Estimation of copper in copper sulphate solution.
11. Estimation of calcium by permanganometry.
12. Estimation of iron by colorimetry.

Demonstration Experiments(Any two of the following)

1. Determination of COD of water sample.
2. Determination of lead by conductometry.
3. Percentage composition of sugar solution by viscometry.

P 106 WORKSHOP PRACTICE

Sl.No.	Trade	List of Exercises
1.	Fitting	Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle.
2.	Welding	Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding
3	Sheet metal work	Study of tools and Machineries – exercises on simple products like Office tray and waste collection tray.
4.	Carpentry	Study of tools and Machineries – Exercises on Lap joints and Mortise joints

List of Exercises

I Fitting

- 1.Study of tools and Machineries
- 2.Symmetric fitting
- 3.Acute angle fitting

II Welding

- 1.Study of arc and gas welding equipment and tools
- 2.Simple lap welding (Arc)
- 3.Single V butt welding (Arc)

III Sheet metal work

- 1.Study of tools and machineries
- 2.Funnel
- 3.Waste collection tray

IV Carpentry

- 1.Study of tools and machineries
- 2.Half lap joint
- 3.Corner mortise joint.

P107 NCC / NSS

NCC/NSS training is compulsory for all Undergraduate students

1. The activities will include Practical/field activities/Extension lectures.
2. The activities shall be carried out outside class hours.
3. For the above activities, the student participation shall be for a minimum period of 45 hours.
4. The activities will be monitored by the respective faculty in charge and the First Year Coordinator.
5. Pass /Fail will be determined on the basis of participation, attendance, performance and behavior. If a candidate Fails, he/she has to repeat the course in the subsequent years
6. Pass in this course is mandatory for the award of degree.

MAT 31 MATHEMATICS -III

Unit - I

Laplace Transform: Definitions - Laplace transform of unit impulse and step functions - Laplace transform of periodic functions - Exponential shift formula- Initial and final value theorems - Laplace transform of derivatives and integrals - Convolution theorem - Inverse Laplace transform - Methods of determining inverse Laplace transform -Solution of linear differential equations using Laplace transforms.

Unit – II

Function Of A Complex Variable: Functions of a complex variable - continuity, derivative and analytic function - Cauchy - Riemann equations – Necessary and sufficient conditions for analyticity - Harmonic and orthogonal properties of real and imaginary parts - Conformal mapping - Bilinear transformations.

Unit – III

Complex Integration: Cauchy's theorem -Cauchy's integral formula - Taylor's and Laurent series - Residue theorem - Contour integration round the unit circle and semi-circular contour.

Unit – IV

Fourier Series: Dirichlet's conditions - Expansion of periodic functions into Fourier series- Change of interval- Half-range Fourier series. Complex form of Fourier series - Root mean square value - Parseval's theorem on Fourier coefficients - Harmonic analysis.

Unit – V

Fourier Transform: Fourier Integral (statement only) - Fourier transform, Inverse Fourier transform, Fourier sine and cosine transforms, definitions and properties.

Text Books

1. Venkataraman M.K., Engineering Mathematics, Vol. II The National Publishing Company, Madras (2009) (For Units I, II and III)
2. Venkataraman M.K., Engineering Mathematics, Vol. III The National Publishing Company, Madras (2009) (For Units IV and V)

Reference Books

1. Bali N.P. & Manish Goel, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi 2008.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd. (2005).
3. Grewal B.S, Higher Engineering Mathematics, Khanna Publishers, Delhi (2008).

CE T32 BUILDING MATERIALS

Unit-I

Bricks – classification and testing of bricks-Fire bricks-Building blocks- solid, hollow and paving blocks- types and applications. Lime –types and applications. Pozzolanic materials – fly ash, rice husk ash and GGBFS – Industrial wastes for concrete making.

Unit-II

Tiles – ceramic, terrazzo and clay tiles – types and uses. Materials of finish for residential, commercial and industrial floors. Materials of wall finish – interior and exterior. Wall paneling materials. Materials for architectural finishes.

Unit-III

Materials for building services-Timber-Market forms-Industrial Timber-Plywood Veneer-Thermo Cole-Panels of laminates-Steel-composition-Uses-Market forms-Mechanical Treatment- Aluminium and plastics - Paints-Varnishes-Distemper

Unit IV

Pavement Grade bitumen – Asphalt - cut back bitumen - Bituminous Emulsion - Mastic Bitumen - Bituminous felt – Joint filler compound – Joint sealant compound – Anti-stripping compound – Polymer modified bitumen – Latex modified bitumen – crumb rubber modified bitumen

Unit-V

Glass-Ceramics-Sealants for joints-Sheets for pitched roof coverings-Fibre glass reinforced plastic-Clay products-Refractories –Composite materials-Types- application of laminar composites-Fibre textiles- Mats and pads for earth reinforcement- Polymers and resins for building repair.

Text Books

1. Surendra Singh, Building Materials, Vikas Publishing Company, New Delhi, 2002.
2. Rajput,R.K., Engineering Materials, S.Chand & Co. Ltd., New Delhi, 2000.

Reference Books

1. Khanna, S.K., Justo, C.E.G, Highway Engineering, Nem Chand & Bros, Roorkee, 2007.
2. Kadiyali, L. R, Highway Engineering, Khanna Publishers, New Delhi, 2007

CE T33 BUILDING CONSTRUCTION

Unit-I

Introduction-basic functions of building- building component and their basic requirements

Foundation-need for foundation-Concept of bearing capacity-types of foundation-recommended foundation for different soils.

Unit –II

Masonry construction- Stone masonry –types. Brick masonry-bonds-types. hollow block masonry-reinforced masonry-composite masonry.

Walls-types and their uses. Floors and roofs-different types of floors and their suitability. floor finishes- Roofs-different types of flat, pitched and curved roofs- roof coverings.

Unit-III

Vertical transportation-stair cases-types- layout design. Lifts-ramps – escalators. Doors and windows-location and size specifications-types-fixtures and fastenings for doors and windows-ventilators.

Unit –IV

Building finishes-plastering-methods and types- special external finishes for plastered surfaces- defects in plastering- pointing- white washing-colour washing – painting, varnishing and distempering. Proofing for dampness and fire-anti termite protection.

Unit –V

Temporary structures- form work-scaffolding- shoring-underpinning.

Acoustics of buildings – sound absorbent material and sound insulation

Ventilation, air conditioning and thermal insulation-functional requirement of ventilation system-system of ventilation and their choice. Air conditioning-purposes and classification- systems of air conditioning. Thermal insulation-principles-heat insulating materials and methods of heat insulation

Text Books

1. Arora . S.P. Bindra S.P . A Text of Building Construction, Dhanpat rai & Sons, New Delhi, 2002.
2. Punmia, B.C, Building Construction, Lakshmi Publications Pvt. Ltd., New Delhi, 2002.

CE T34 MECHANICS OF SOLIDS-I

Unit – I

Simple Stresses and Strains – Tension, compression and shear stresses - Hooke's law - compound stresses - thermal stresses – Compound bars. Analysis of trusses by methods of joints and sections.

Unit – II

Shear force and bending moment diagrams for beams and simple frames - Theory of simple bending – Bending stress distribution at sections.

Unit – III

Theory of simple Torsion – Torsional rigidity – Composite shafts in series and parallel. Thin cylinders and shells – Thick cylinders.

Unit – IV

Shear stress distribution due to bending – Shear center. Springs – Closed and open coiled springs – Leaf springs. Complex stresses – Principal planes and stresses-Mohr's circle.

Unit – V

Columns – Euler's theory – Rankine – Jordon formula – Columns with initial curvature and eccentric loads –Long columns- Laterally loaded columns. Masonry dams and retaining walls – Middle Third rule – Stability Check.

Text books

1. Bhavikatti. S. S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.
2. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vols. I & II, XI Edition, Laxmi Publications (P) Ltd, New Delhi, 2002.
3. Hearn, E. J., Strength of Materials, Pergamon Press, Oxford, 1997.

CE T35 MECHANICS OF FLUIDS

Unit - I

Fluid Properties: Density, specific weight, specific volume, specific gravity, compressibility, viscosity, surface tension, capillarity, vapour pressure. Fluid Statics: Pressure in a fluid, pressure head, Measurement of pressure, Hydrostatic forces on submerged plane and curved surfaces, Buoyancy, Metacentre, stability of floating and submerged bodies.

Unit-II

Fluid Kinematics: Stream line, streak line, Path line and stream tube. Types of flow, steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows. Equation of continuity for one, two, three dimensional flows, Stream function and velocity potential function, flow net analysis,.

Dynamics of Flow: Euler's equation of motion, Bernoulli's equation, simple applications of Bernoulli's equation, Momentum equation. Kinetic energy and Momentum correction factors.

Unit - III

Boundary Layer Theory:; Boundary Layer thickness, Displacement thickness, Momentum thickness, Energy thickness, Boundary layer growth and separation. Laminar flow: Laminar flow through pipes, Hagen - poissuille flow, energy loss. Turbulent flow: Turbulent flow through pipes, Darcy's equation, Minor losses, Energy and hydraulic gradients, pipes in series and parallel.

Unit- IV

Flow measurement: Pitot tube, Venturimeter, orificemeter, Flow nozzle, and mouthpieces, flow over notches and weirs, Venturiflume and Standing wave flume, Velocity measurement in open channel.

Unit - V

Dimensional Analysis and Similitude: Dimensional analysis - Rayleigh's method, Buckingham's π theorem, Dimensionless numbers, Laws of similitude, Model Analysis, Distorted models, Principles of analogy.

Text Books

1. Modi, P.N., and Seth, S.M., Hydraulics, Fluid Mechanics and Hydraulic Machines, Standard Book Home, New Delhi, 2005.
2. Rajput, R.K., Text Book of Fluid Mechanics and Hydraulic Machinery, S.Chand & Company, Ltd., New Delhi, 2005.

Reference Books

1. Douglas, J.F., Gasiorek, J.M and Swaffield, J.A., Fluid Mechanics 4th Edn. Pearson Education India, 2002.
2. Das M.M Fluid Mechanics and Turbimachines , Prentice Hall of India (P) Ltd New Delhi, 2008.
3. Arore, K.R Fluid Mechanics, Hydraulic and Hydraulic Machines , Standard Publishers and Distributors , New Delhi , 2005

CE T36 SURVEYING-I

Unit –I

Introduction

Definition –classification- principles – Accuracy and errors – Linear measurements – methods – ranging out survey lines –chaining –Error due to incorrect chain – chaining on uneven or sloping ground – Error in chaining – Tape correction Chain surveying – arrangements of survey lines – locating ground features – Field book – field work – Basic problems in chaining - Obstacles in chaining

Unit –II

Compass surveying – Basic terms and definitions –Bearing and angles- compass –types - Magnetic declination –Dip-Traversing - Local attraction
plane table surveying-Plane table instruments and accessories- merits and demerits- methods- intersection - traversing – resection – Three point problem – Two point problem – Errors in plane tabling – Advantages and Disadvantages of Plane Tabling

Unit –III

Leveling and applications

Basic terms and definitions – Methods of leveling – levels and staves- temporary and permanent adjustments –Direct levelling – Differential leveling - booking and reducing Levels – Balancing of sights-curvature and refraction- reciprocal leveling- longitudinal and cross sections- traversing –Levelling problems – errors in Levelling Contouring – methods – characteristic and use of contours – plotting

Unit –IV

Traversing – Basic terms and definitions-Chain and compass traversing –checks in closed traverse – plotting a traverse –coordinate systems – closing errors – balancing a traverse – degree of accuracy in traversing
omitted measurements- cases

Unit- V

Areas and Volumes-Areas enclosed by straight lines – Irregular figures – volume – earthwork calculations – capacity of reservoirs – mass – haul diagrams. Setting out works- introduction – Controls for setting Out – Horizontal Control – Vertical Control – Setting Out in Vertical Direction – Positioning of Structure – Setting Out Foundation Trenches of Building

Text Books

1. Punmia . B.C . , et . al..” Surveying “, Vols, I,II and III, Laxmi Publications, 2002
2. Kanetkar, T.P. ,Surveying and leveling, Vols. I & II, United book corporation, Pune.

CE P31 SURVEY LAB-I

1. Measurement with chain and tape, ranging, offsets (perpendicular and oblique)
2. Offset survey over an ear-marked boundary.
3. Closed traverse by chain and plotting
4. Study of prismatic compass and setting out a regular polygon
5. Closed traverse by chain and compass, plotting and adjustment (graphical and analytical).
6. Plane table survey by radial resection and traverse method.
7. Two point problem
8. Three points problem (Bessels method)
9. Three point problem (Trial and error method and mechanical method)
10. Study of levelling instruments and observation of staff reading
11. Differential levelling
12. Fly levelling
13. Reciprocal levelling
14. Check levelling
15. Contour survey and plotting
16. L.S. and C.S. and plotting

CE P32 MATERIAL TESTING LAB-I

I Tests on Metals (Ferrous and Non - Ferrous)

Tension Tests : To find yield stress, ultimate stress , percentage elongation and reduction of area of cross-section , Young's modulus and Barba's constants.

Double Shear test, 180° bend test

Hardness Test : Vickers ,Brinell and Rockwell

Torsion Test : Wires and Rods

Impact Test : Charpy and Izod

Ductility Test : Erichsen cupping test

Fatigue Test (demonstration)

II Test on Timber :

Compression, tension , shear , bending and hardness

III Test on Plastics .

IV Test on Springs.

CE P33 BUILDING PLANNING AND DRAWING

I Planning Aspects

Principles of building planning - specifications and dimensions - building bye laws - orientation - planning of different buildings.

II Computer Aided Drafting

Basic 2D objects - Draw Tool bar - Modify standard Toolbar - Dimensioning Toolbar - Preparation of plan, elevation and Section Drawings of Simple Structural Objects - Introduction to 3D -Wire frame Modeling Solid Modeling, Solid editing - Rendering - Script files - Printing and plotting Drawings.

Planning and drafting with AutoCAD and other Auto CAD layered software.

III Preparation of working drawings

Preparation of line sketches - development of line sketches - preparation of working drawing for the following types of buildings - Residential buildings, framed structures, schools, hospitals, hostels, commercial buildings, banks and factory buildings. Working drawing of doors, windows, ventilators and stair cases.

Text Books

1. George Omura, Mastering AutoCAD 2002 BPB Publishers, New Delhi, 2002
2. Rom Mansfield, The compact Guide to Microsoft Office, BPB Publishers, 1994
3. Deodhar.S.V., "Building sciences and Planning", Khanna Publishers, New Delhi , 2005

MA T41 MATHEMATICS-IV

Unit – I

Partial Differential Equations: Formation of PDE by elimination of arbitrary constants and arbitrary functions - General, singular, particular and complete integrals - Lagrange's linear first order equation - Higher order differential equations with constant coefficients.

Unit – II

Solution of partial differential equation by the method of separation of variables - Boundary value problems - Fourier series solutions - Transverse vibration of an elastic string.

Unit – III

Fourier series solution for one dimensional heat flow equation - Fourier series solutions for two dimensional heat flow equations under steady state conditions (Cartesian and polar forms).

Unit - IV

Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Unit - V

Small samples: Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Text Books

1. Venkataraman M.K., Engineering Mathematics, Vol II & III, The National Publishing Company, Madras (2007).
2. Gupta C . and V.K.Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi (2008).

Reference Books

1. Bali N.P. & Manish Goel, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi 2008.
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley Eastern Ltd. (2005).
3. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, Delhi (2008).

CE T42 CONCRETE TECHNOLOGY

Unit – I

Portland cement – chemical composition – hydration of Portland cement – heat of hydration – hardening of cement paste – types of Portland cement – special hydraulic cements.

Unit – II

Aggregates – natural and mineral aggregates – characteristics of aggregate and their significance – testing of aggregates – admixtures for concrete – concrete at early ages – workability of concrete – early volume changes – setting time.

Unit – III

Concrete – introduction – components of concrete – types – properties of hardened concrete and their significance, structure of the hardened concrete - Compressive strength of concrete and factors affecting it – elastic behaviour of concrete – drying shrinkage and creep.

Unit – IV

Durability of concrete – significance – causes of concrete deterioration – alkali-aggregate reaction – deterioration by chemical actions – concrete in marine environment.

Unit – V

Concept of proportioning concrete mixes – mix design – IS code method – ACI method. Testing, evaluation and control of concrete quality.

Text Books

1. Mehta, K.P., Concrete – microstructure, properties and materials, TMH, 2008.
2. Shetty, M.S., Concrete Technology, Chand & Co., New Delhi, 2006.

Reference Books

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Co., New Delhi, 2002
2. Neville, A.M., Properties of Concrete, Longman, Indian reprint 2000.
3. Neville, A.M. & Brooks J.J., Concrete Technology, Pearson Education, Indian reprint 2002.
4. 4. Krishnaraju, N., Design of Concrete Mixes, CBS Publishers, New Delhi, 2002.
5. IS : 10262-1982, Recommended Guidelines for Concrete Mix Design, BIS, New Delhi.

6. CE T 43 ENGINEERING GEOLOGY

Unit-I

General Geology: Scope of geology in Civil Engineering - the earth, its structure and environment - physiographic, stratigraphic and tectonic divisions of India - geomorphological (surface) processes – weathering – types , weathered products, assessment of degree of weathering , Fluvial processes, glaciation, wind action, and their significance in Civil Engineering – earthquake, its causes, classification, earthquake zones of India, Geological considerations for construction of buildings.

Unit-II

Mineralogy: Physical properties of minerals – classification - study of important rock forming minerals – Quartz family, feldspar family, Augite, Hornblend, Mica family, calcite, Iron oxide minerals, Augite, Hornblend, and Clay minerals and their behaviour and significance in the field of Civil Engineering .

Unit-III

Petrology: Classification of rock - mode of formation - distinction between igneous, sedimentary and metamorphic rocks - Physical and Mechanical properties of rocks-. Study of important rocks - granite, syenite, diorite, gabbro, pegmatite, dolerite , basalt , sand stone, limestone, shale, breccia , conglomerate , gneiss, quartzite, marble, slate, schist, phyllite and conglomerate - role of petrology in the field of construction.

Unit-IV

Structural Geology and Geophysical methods: Attitude of beds - out crops, study of structures such as folds, faults, joints, unconformities in lie and out lie their brief classification and their bearing on engineering construction – principles of geophysical methods, electrical resistivity method , seismic method and its applications in civil engineering

Unit-V

Geology and construction: Role of geology in site investigation , Geotechnical classification of rock, geological considerations in open excavation, tunnels and dam site, reservoir site, buildings, road cuttings, study of air photographs and satellite images and interpretation for civil engineering projects, landslides-its causes, classification and preventive measures, groundwater- types of aquifers , properties of geological formations affecting groundwater and its role as a geological hazard.

Text Books

1. Parbin Singh, "Engineering and General Geology ", Katson Publications House, 2001 .
2. Venkata Reddy,D., " Engineering Geology for Civil Engineers", Oxford & IBH , 1995

Reference Books

1. Leggot, R.F.," Geology and Engineers ", McGraw Hill , New York.2002
2. Blyth, F.G.M., " A Geology for Engineers", Arnold, Londo,(2003.
3. Bell.F.G, " Fundamentals of Engineering Geology" Butterworth, 1983.

CE T44 MECHANICS OF SOLIDS-II

Unit – I

Deflection of beams – Macaulay's method, moment area method -conjugate beam Methods.

Unit – II

Strain energy due to axial, bending, shear and torsional forces – Impact loads. Principle of virtual displacement – principle of minimum potential energy –Castigliano's Theorems – Maxwell – Betti's theorem.

Unit – III

Deflection of trusses and frames – strain energy and dummy/unit load methods.

Unit – IV

Analysis of continuous beams using generalized theorem of three moments – shear force and bending moment diagrams. Unsymmetrical bending – principal moments of inertia – stresses due to unsymmetrical bending.

Unit – V

Complex strains – linear strains for tri-axial state of stress – principle strains in terms of stress – Mohr's strain circle – relationship between Mohr's strain and stress circles – Rosette analysis. Theories of failure – Brittle and Ductile materials.

Text Books

1. Bhavikatti. S. S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.
2. Bhavikatti. S. S., Structural Analysis – I, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.
3. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vols. I & II, XI Edition, Laxmi Publications (P) Ltd, New Delhi, 2002.

CE T45 HYDRAULICS AND HYDRAULIC MACHINERY

Unit – I

Open Channel flow: Types of flow, Types of Channel, Velocity distribution, Chezy, Manning and Basin formulae, for uniform flow, Most economical section , critical flow ,Specific energy, specific force. Computation of uniform flow and critical flow.

Unit-II

Open channel flow: Non-Uniform flow, Dynamic equation for Gradually varied flow, computation for length of backwater curve, Rapidly Varied flow - hydraulic jump, types, uses. Surges in open channels.

Unit-III

Basics of Turbo machinery : Impulse momentum equation, Hydrodynamic forces of jets on vanes, velocity Triangles, Angular momentum principle, application to radial flow turbines.

Unit-IV

Turbines: Classification, impulse and reaction turbines, characteristic curves, draft tubes, governing of turbines, specific speed, unit quantities concept, similarity, cavitation,

Unit-V

Pumps: Centrifugal pumps - classification, work done, minimum starting speed, losses and efficiencies, specific speed, multistage pumps, specific speed, characteristic curves, NPSH, Cavitation in pumps. Reciprocating pumps - types, effects of acceleration and frictional resistance, separation, Air vessels, work saved by fitting air vessels.

Text Books

1. Modi, P.N., and Seth, S.M., Hydraulics, Fluid Mechanics and Hydraulic Machines, Standard Book Home, New Delhi, 2005.
2. Rajput,R.K., Text Book of Fluid Mechanics and Hydraulic Machinery, S.Chand & Company, Ltd., New Delhi, 2005.

Reference Books

1. Douglas, J.F., Gasiorek, J.M and Swaffield, J.A., Fluid Mechanics 4th Edn. Pearson Education India, 2002.
2. Das M.M Fluid Mechanics and Turbimachines , Prentice Hall of India (P) Ltd New Delhi, 2008.
3. Arore, K.R Fluid Mechanics, Hydraulic and Hydraulic Machines , Standard Publishers and Distributors , New Delhi , 2005

CET 46 SURVEYING-II

Unit-I

Theodolites description and uses- temporary and permanent adjustments of Theodolite – horizontal angles – vertical angles – Trigonometrical Levelling – Base of the Object Accessible – Inaccessible :for instruments at same and different plane of observation

Unit-II

Tacheometric surveying –Principle of stadia measurement –Basic systems of tacheometric measurement - Determination of Tacheometric measurements – subtense bar – Errors in tacheometry

Unit-III

Setting out curves: Horizontal curves – Elements of a circular curve and notations – Designation of a curve – Setting out a simple circular curve – Compound curve – Reverse curve – Transition – vertical curve .

Unit-IV

Horizontal and vertical control, triangulation - Classification of triangulation system, network, signals, satellite stations - base line measurement - corrections, extension of base- Theory of error and adjustments - true and most probable value, residual error, weighted observation, principle of least square, normal equations, correlatives, adjustment of simple triangulation figure, station and figure adjustment

Unit-V

Hydrographic surveying – shore line measurement, soundings – tides and tide gauge – Mine surveying- Equipment for Mine survey- station and station markers – measurement of distance and difference in elevation- Introduction to– EDM and total station – Remote sensing – GIS

Text Books

1. Punmia,B.C., Surveying, Vol I & II, Laxmi Publications, 1998.
2. Duggal, S.K., Surveying, Vol.I & II, TMH Publications, 2000.

Reference Books

1. Kanetkar, T.P., and Kulkarni,S.V., Surveying and Levelling, Part I & Part II , United book Corporation, Pune. 1998.
2. Shahani, P.B., Text book of Surveying, Vol.I & II, Oxford & IBH Publications, 1998.
3. Lillesand,T.M.,and Kiefer R.W., Remote sensing and Image Interpretation, John Wiley and Sons, Inc, New York,1997.
4. Paul.R. Wolf Elements of Photogrammetry with air photo interpretation, McGraw –Hill, International Book Company, Japan, 1993.
5. Rueger,J.M. Electronic Distance Measurement, Springer – Verlag, Berlin,1990.

CE P41 SURVEY LAB-II

(A) List of Field Work

1. Study of Theodolite, Measurement of horizontal angle (Repetition and reiteration), Measurement of Vertical angle.
2. Theodolite closed traverse, plotting and adjustment.
3. Heights and Distances (Base of the object accessible & inaccessible)
4. Heights and Distances - Instrument station in the same vertical plane
5. Heights and Distances (Base of the object in accessible - Instrument station not in the same vertical plane)
6. Determination of tacheometric constant
7. Tacheometric survey - Distance and Elevation by stadia method.
8. Tacheometric survey - Distance and Elevation by tangential method.
9. Tacheometric survey - Contouring and plotting
10. Use of Subtense bar.
11. Setting out for building.
12. Setting out curves

(B) List of Demonstration Only

1. Interpretation of Aerial Photographs- Demonstration
2. EDM, Total Station and GPS- Demonstration

CE P42 MATERIAL TESTING LAB-II

I) Tests on Cements

Specific Gravity, Fineness, Standard Consistency, Soundness, Setting times, Compressive strength of mortar cubes.

II) Tests on Aggregates- Gradation, Modulus, Bulking of Sand, water absorption

III) Tests on Concrete

(i) Fresh Concrete: Workability Tests, Setting time, Mix Design by IS guide lines.

(ii) Hardened Concrete: Compressive and Tensile strengths, effect of w-c ratio on strength of concrete, ultimate strength of beams

IV) Non-destructive tests (demonstration only)

Rebound hammer test and Ultrasonic pulse velocity test on concrete specimens.

V) Tests on Bricks and Tiles

Water absorption, compressive strength and flexural strength.

CE P43 ENGINEERING GEOLOGY LAB

1. Mineralogy : Megascopic study of important silicate, and non-silicate minerals.
2. Petrology : Megascopic study of important igneous, sedimentary and metamorphic rocks.
3. Structural Geology : Elementary problems in dip and strike, construction and interpretation of geological sections.
4. Geophysical methods : Electrical resistivity method (not recommended for examination).
5. Aerial photographs : Interpretation of Aerial photographs. (not recommended for examination)

SP P 44 PHYSICAL EDUCATION

Physical Education is compulsory for all the Undergraduate students

1. The activities will include games and sports / extension lectures.
2. Two Hrs. / Week will be allocated for physical education in the third and fourth semesters. The student participation shall be for a minimum period of 45 hours in both the semesters put together.
3. These activities will be monitored by the Director of Physical Education.
4. Pass /Fail will be determined on the basis of participation, attendance, and performance. If a candidate Fails, he/she has to repeat the course in the subsequent years
5. Pass in this course is mandatory for the award of degree.

MA T51 COMPUTATIONAL METHODS

Unit – I

Solution Of Algebraic And Transcendental Equations And Eigen Value Problem :The method of bisection, the method of false position, Newton-Raphson method (single and system of two equations) and Graeffe's Root squaring method. Eigen value and Eigen vector by power method.

Unit-II

Solution of linear simultaneous equations and matrix inversion:
Gauss and Gauss-Jordan elimination methods- Method of triangularization and Crout's reduction. Iterative methods: Gauss-Jacobi, Gauss-Seidel and Relaxation methods. Matrix inversion by Gauss-Jordan elimination and Crout's methods.

Unit-III

Interpolation: Finite Differences, Relation between operators - Interpolation by Newton's forward and backward difference formulae for equal intervals. Newton's divided difference method and Lagrange's method for unequal intervals. Differentiation based on finite differences. Integration by Trapezoidal and Simpson's rules. Difference equations.

Unit-IV

Solution of Ordinary Differential Equations:
Single step methods: Taylor series method, Picard's method, Euler and Improved Euler methods, Runge-Kutta method of fourth order only. Multistep methods: Milne and Adams-Bashforth methods. Boundary value problems using finite differences.

Unit – V

Solution of Partial Differential Equations:
Solution of Laplace and Poisson equations: Leibmann's iterative method. Diffusion equation: Bender-Schmitt method and Crank-Nicholson implicit difference method. Wave equation: Explicit difference method

Text Book

1. Venkataraman M.K., Numerical methods in Science and Engineering, National Publishing Company, Madras, 2007.

Reference Book

1 Kandasamy . P., Gunavathy K. and Thilagavathy K, Numerical Methods, S. Chand & Company Ltd, New Delhi 2007.

CE T52 STRUCTURAL ANALYSIS-I

Unit – I

Static indeterminacy – Analysis of statically indeterminate beams and frames by consistent deformation/force method.

Unit II

Analysis of plane trusses with one or more redundant members by force method - trusses with lack of fit - Thermal stresses - Settlement of supports – analysis of trussed beams.

Unit – III

Slope Deflection Method - Continuous beams and rigid frames (with and without sway) - Symmetry and antisymmetry – Simplification for hinged end - Support displacements.

Unit IV

Moment Distribution Method - Stiffness and carry over factors – Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway

Unit – V

Kani's method of analysis of beams and frames. Column-analogy method of analysis of simple and symmetric beams and frames.

Text Books

1. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vol. II, Eleventh Edition, Laxmi Publications, New Delhi, 2002.
2. Bhavikatti. S. S., Structural Analysis, Vol. I, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.

Reference Books

1. Wang. C. K., Intermediate Structural Analysis, McGraw Hill Publishing Co., Tokyo, Fourth Edition, 1989.
2. Jindal, R. L., Indeterminate Structural Analysis, S.Chand & Co. New Delhi, Third Edition, 1997.
3. Kinney. S.J., Indeterminate Structural Analysis, Oxford IBH Publishing Co., 1999.

CE T53 GEOTECHNICAL ENGINEERING-I

Unit-I

Soil formation – soil minerals – soil structure - three phase system – definitions- inter-relationships – Index properties - IS soil classification – soil deposits in India.

Unit-II

Soil hydraulics : soil water – capillary phenomenon – permeability – field and laboratory test - seepage and flow nets – geostatic stress - neutral and effective stress.

Unit-III

Stress Analysis- Stress due to concentrated load, due to uniformly loaded area, line load strip load- pressure distribution diagrams - contact stress - Westergarrd's analysis.

Unit-IV

Compressibility : One dimension consolidation - consolidation process - consolidation theory – laboratory test – pre consolidation pressure. Compaction – laboratory tests – field compaction.

Unit-V

Shear strength- Mohr – coulomb theory – shear strength parameter – laboratory and field tests – pore pressure parameters - stress path - insitu shear strength - factors affecting shear strength - shearing characteristics of sand and clay.

Text Books

1. Purushothama Raj. P, Soil Mechanics and Foundation Engineering, Pearson Education, 2008
2. Punmia, B.C., Soil Mechanics and foundation Engineering, Standard Book House, 1997.

Reference Books

1. Bowles, J.E., Physical and Geotechnical Properties of Soils, McGraw Hill, 1998
2. Venkataramiah. C., Geo Technical Engineering, NAIP, 2002.

CE T54 ENVIRONMENTAL ENGINEERING –I

Unit – I

Introduction: Water supply Scheme - objectives and requirements - Domestic, commercial and public requirements - Various methods of estimating population Variations in rate of demand and its effects on design.

Unit-II

Sources of Water and intakes: Surface and groundwater sources - Computation of storage capacity of reservoirs by analytical and graphical methods - Forms of underground sources like wells, Infiltration wells and galleries, Intake structures, tube wells - Sanitary protection of wells,

Unit-III

Quality of Water: Indian and W.H.O. Standards for drinking water - Impurities in water - Physical, chemical and bacteriological tests for water - quality of water for trade purpose and swimming pools

Unit-IV

Water Treatment system: Unit process of water treatment - Principles, functions and design of flocculators, sedimentation tanks, sand filters, principles of disinfection, water softening, aeration, Iron and manganese removal.

Unit-V

Conveyance and distribution –Service reservoir location, determination of capacity – Leak detection - lining of pipes, various materials used for pipes, selection and class of pipes -. - Method of Layout of distribution systems, analysis of pipe networks by different methods, pipe appurtenance for distribution system – Plumbing works and layout of water supply system for buildings, Effects of corrosion and its prevention.

Text Books

1. Duggal, K.N., Elements of Environmental Engineering ,S. Chand & Company , New Delhi 2008
2. Birdie G. S and Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai and Sons (1998), New Delhi

Reference Books

1. Peavy, H.S., Rowe, D.R. and Tehobanoglous, G., Environmental Engineering, McGraw Hill Book Company, 1998
2. Hussain ,S.K., Water supply and sanitary engineering , Oxford & IBH, New Delhi, 1997
3. Steel, E.W., Water supply and Sewerage , McGraw Hill, 1996
4. Fair, G.M., Gayer, I. and Okun , Water and Waste Water Engineering , John Wiley & Sons,1981

CE T55 TRANSPORTATION ENGINEERING.-I

Unit – I

Importance Road transportation, Highway alignment - Requirement, Engineering surveys for highway location. Maps & drawings to be prepared. Geometric design - Cross section element, width, camber, design - Speed, sight distances, requirements and design of horizontal and vertical alignments.

Unit – II

Highway materials - Properties of sub-grade pavement component materials - Tests on aggregates, sub-grade soil & bituminous materials. Pavement Design Factors in the design of flexible and rigid pavements, Group index and CBR methods. IRC recommendations of rigid & flexible pavement design.

Unit – III

Traffic Engineering – Fundamentals of traffic flow, Level of service, analysis of Speed studies. Accident studies and analysis. Principles and design of signalized and un-signalized intersections as per IRC standards

Unit – VI

Pavement construction techniques-Types of pavements- WBM Road construction. Construction of bituminous and rigid pavements. Pavement failures and their remedies. Surface and subsurface highway drainage. Pavement evaluation – structural, functional, design of overlays based on Benkelman beam studies, pavement Maintenance.

Unit – V

Airport planning - Aircraft characteristics - Zoning laws and site selection. Runway & taxiway design -runway orientation and configuration, Basic runway length and corrections. Taxiway design, airport marking and lighting, Drainage

Text Books

1. Khanna S.K& Arora, M.G.Airport Planning and Design, Nemchand and Bros., 2007
2. Khanna, S.K. and Justo, C.E.G., Highway Engineering, Khanna Technical Publications, Delhi, 2007(reprint).

Reference Books

1. Gupta B. L and Amith Gupta, Highway and Bridge Engg., Standard publishers, and Distributor New Delhi 2003
2. Partha Chakroborthy and Animesh Das, Principles of Transportation Engineering, Prentice Hall of India Pvt. Ltd., New Delhi,2003.
3. Kadiyali, L. R, Lal, N. B, "Principles and practice of highway engineering", Khanna Publishers New Delhi ,006
4. Kadiyali, L. R, "Traffic Engineering and Transport Planning", Khanna Publishers New Delhi , 2006
5. Sharma, S. K. "Principles Practice and Design of Highway Engineering", S. Chand & Co Ltd. New Delhi, , 2006
6. Robert Horonjeff, Planning & Design of Airports, McGraw Hill Book Co., NewYork, 2007

CE T56 HYDROLOGY AND WATER RESOURCES ENGINEERING

Unit – I

Precipitation: Hydrologic cycle, precipitation, stream flow, evaporation, transpiration and infiltration, types and measurement of precipitation, gauge networks, hyetographs, average depth of precipitation over the basin, mass rainfall curves, intensity duration curves - estimates of missing data and adjustment of records.

Unit – II

Evapo-transpiration and Infiltration: Evaporation, factors affecting, measurement and estimation of evaporation, transpiration, factors affecting and determination of transpiration, methods of estimating evapo-transpiration, factors affecting and measurement of infiltration, infiltration indices.

Unit – III

Groundwater: Occurrence and movement of ground water, Darcy's law, aquifers - types and specific yield of aquifers and basin, steady & unsteady flow in wells in confined and unconfined aquifers, well loss and specific capacity of a well.

Unit – IV

Runoff: Factors affecting runoff, Hydrograph analysis - Unit hydrograph theory and analysis, Space distribution and variability of runoff, stream flow measurement - selection of site, velocity and discharge measurements - base flow separation methods. Probability Concepts : Rainfall frequency, Flood frequency, Stream flow synthesis - Elements of stochastic methods.

Unit – V

Floods: Design flood, estimation by empirical and statistical methods, Flood control Measures - Levees and flood walls, Flood control reservoirs, Water shed management, Flood forecasting methods, Flood routing (elementary treatment only)
Planning for Water Resources Development: Level, phases, objectives, Project formulation, systems analysis, multipurpose projects.

Text Books

1. Sharma, R.K. and Sharma, T.K., Hydrology and Water Resources Engineering, Dhanpat Rai & Sons, 2002.
2. Linsley, R.K., and Franzini, J.B., Water Resources Engineering, ISE - McGraw Hill, 2002.

Reference Books

- 1 Chow, V.T. Hand book of Applied Hydrology, Mc-Graw Hill, 1964.
2. Mutreja, K.N., Applied Hydrology, Tata Mc-Graw Hill, 1986.
3. Varshney, R.S., Engineering Hydrology, Nem Chand & Bros., 3rd edn. 1986.
4. Das, M.M, Saikia, M.D, Hydrology, Prentice Hall of Indian , 2008

1. CE P51 GEOTECHNICAL ENGG. LAB

(A) List of Experiments

1. Visual classification of soil and Specific gravity test.
2. Liquid limit and Plastic limit Test
3. Shrinkage limit and Free swell Test
4. Grain size analysis. – Mechanical Method
5. Grain size analysis. – Sedimentation Analysis
6. In situ Unit weight determination.
7. Laboratory Permeability test
8. Proctor compaction test.
9. Unconfined compression test.
10. Direct shear test.
11. Triaxial compression test

(B) Demonstration Tests

1. Consolidation test.
2. Swell Pressure Test
3. Insitu Field Tests (SPT, SCPT, VST, Pressuremeter)

Reference Books

1. Alam Singh., Soil Engineering (In Theory and Practice), Geotechnical Testing and Instrumentation (Vol .2), 1998.
2. Bowles,J.E., Engineering Properties of Soils and Measurements, McGraw Hill, 1978

CE P52 FLUID FLOW AND HYDRAULIC MACHINERY LAB

A. Fluid Flow Laboratory

1. Calibration of rectangular, triangular, trapezoidal notches
2. Determination of coefficient of discharge for orifices and mouthpieces
3. Calibration of venturimeters, orifice meters and Rota Meters
4. Verification of Bernoullis theorem
5. Determination of pipe friction
6. Determination of minor losses in pipe due to bends, elbows, sudden contraction, expansion etc.,
7. Determination of Metacentric height of various ship models
8. Determination of force due to Impact of jet on vanes

B. Fluid Machinery Laboratory

1. Study of performance characteristics of centrifugal pump (constant speed)
2. Study of performance characteristics of Reciprocating pump
3. Study of performance characteristics of Submersible pump
4. Tests on Turbine

I. Test on Highway Materials

Testing of sub-grade soil

1. C.B.R. Test - (on sub grade soil)
2. Sand-Gravel mix design -(on sub grade soil)

II. Tests on Aggregate:

1. Crushing value
2. Los Angles Abrasion test
3. Impact test
4. Shape Tests (elongation index, flakiness index, angularity number)
5. Specific gravity & Water absorption

III. Tests on Bitumen:

1. Penetration Value
2. Ductility
3. Softening point
4. Flash & fire point
5. Specific gravity
6. Viscosity of cutback Bitumen
7. Tests on rubberized/polymer bitumen
8. Marshall's test on bituminous mixes
9. Bitumen content

HS P54 GENERAL PROFICIENCY –I

Unit -I Art Of Communication

Verbal and Non-verbal Communication – Barriers to Communication – Importance of Body Language – Effective Listening – Feedback

Unit - II : Introduction To Soft Skills

Attitude – Self-Confidence – Leadership Qualities – Emotional Quotient – Effective Time Management Skills – Surviving Stress – Overcoming Failure – Professional Ethics – Interpersonal Skills

Unit – III Writing

Importance of Writing – Written Vs Spoken Language – Formal and Informal Styles of writing – Resources for improving writing – Grammar and Usage – Vocabulary Building – SWOT analysis

Unit – IV Speaking Practice

Dialogue – Telephone Etiquette – Public Speaking – Debate – Informal Discussions – Presentations

Unit – V Aptitude

Verbal and Numerical aptitude

References

1. Nicholls, Anne. Mastering Public Speaking. Jaico Publishing House,2003.
2. Aggarwal, R.S. Quantitative Aptitude. S.Chand &Co.,2004.
3. Leigh, Andrew and Michael Maynard. The Perfect Leader. Random House Business Books,1999.
4. Whetton .A.David and Kim S. Cameron. Developing Management Skills. Pearson Education, 2007.
5. Lakshminarayan K.R, Developing Soft Skills. Scitech, 2009.
6. Sherfield M Robert. Developing Soft Skills Pearson Education, 2005.
7. Hair O' Dan, Friedrich W. Gustav and Lynda Dee Dixon. Strategic Communication in Business and the Professions. Pearson Education,2008.
8. Chaney Lilian and Jeanette Martin. Intercultural Business Communication, Fourth Edition. Pearson Education, 2008.

CE T61 STRUCTURAL ANALYSIS-II

Unit – I

ILD for shear, moment and reactions for statically determinate beams and pin jointed trusses.

Unit – II

Moving loads for statically determinate structures –single and several points loads – maximum bending moment and maximum shear force – equivalent u.d.l. - absolute maximum bending moment - determination of equivalent UDL.

Unit – III

Influence lines – Müller-Breslau Theorem - principle and its application. Influence lines for continuous beams. Muller Breslau Principles qualitative approach for single bay, single storey portals. Analysis of frames for lateral loads by portal and cantilever methods.

Unit – IV

Theory of arches - Analysis of three hinged, two hinged and fixed arches - influence lines, rib shortening, settlement, and temperature effects. Analysis of forces in cables - Suspension bridges.

Unit – V

Plastic Theory – Yield stress - Load Factor – Plastic Hinge – Moment redistribution - Shape factor – Upper and lower bound theorems – plastic analysis of beams and frames.

Text Books

1. Bhavikatti. S. S., Structural Analysis, Vols. I & II, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.
2. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vol. II, Eleventh Edition, Laxmi Publications, New Delhi, 2002.

Reference Books

1. Wang. C. K., Intermediate Structural Analysis, McGraw Hill Publishing Co., Tokyo, Fourth Edition, 1989.
2. Jindal, R. L., Indeterminate Structural Analysis, S.Chand & Co. New Delhi, Third Edition, 1997.

CE T62 GEOTECHNICAL ENGINEERING.-II

Unit-I

Soil Exploration: Introduction, need, planning, stages - depth and spacing of soil-exploration methods – samplers, sampling method – Insitu tests – SPT,CPT, VST, pressuremeter - exploration reports.

Unit-II

Stability of slopes: Introduction- slopes failure - stability of infinite slope – land slides. Finite slope analysis - Swedish circle method – stability number. Slope stability – improving slope stability by reinforcement and confinement.

Unit –III

Lateral earth pressure: Active, passive and earth pressure at rest, Rankine and Coulomb's theory – Rebhann's Method. Earth pressure due to inclined back fill, line load and earth quake load - Cantilever sheet pile wall in granular and clay soil. Design of braced excavations.

Unit –IV

Shallow foundation: Types and selection criteria. Bearing capacity - Terzaghi's analysis – IS code - methods to determine bearing capacity – field tests - proportioning of foundation – BC of foundation subjected to moments and earthquake loading. Methods to increase BC – compaction – dewatering - pre loading – stone columns – lime stabilisation.

Unit-V

Pile foundations: Introduction- classification-selection criteria- Individual and group carrying capacity- static and dynamic approach-pile load tests under reamed piles-IS Codal provisions. Methods to increase pile carrying capacity – deep compaction methods – grouting.

Text Books

1. Purushothama Raj. P, Soil Mechanics and Foundation Engineering, Pearson Education, 2008
2. Punmia, B.C., Soil Mechanics and Foundation Engineering, Standard Book House, 1997

Reference Books

1. Bowles.J.E., Foundation Analysis and Design, McGraw hill 5th Edition , 1997.
2. Varghese.P.C., Foundation Engineering , Prentice Hall, Indian , 2008
3. Das.B.M, Principles of Foundation Engineering, Brooks/Cole Engineering Division, CA.

CE T63 ENVIRONMENTAL ENGINEERING.-II

Unit-I

Definitions - General considerations- Interdependence of water supply and waste water disposal - source and nature of waste water - Combined and separate system – surface drainage - storm water flow – Investigation and design of sewerage schemes – Data collection - Design flow for separate, storm and combined systems.

Unit-II

Sewage Characteristics- Physical and chemical characteristics - Biology of sewage - chemical tests - D.O. and B.O.D. and its significance. Characteristics and quantification of raw and digested sludge.

Unit –III

Collection and Transport of sewage - Materials for sewers - their strength - Corrosion of sewers - Flow formulae - Self cleansing of sewers - Full and partial flow conditions - Sewer sections. Design of separate sewers - Storm drains and combined sewer systems.- Design principles and procedures, sewer construction: Sewer joints - Jointing materials, specification and tests - Sewer laying under various conditions, Loads on sewers – Tests for sewers.

Flushing equipment for removal of sand, grit - Repair and connections - Clearing catch basins, Gases in sewers - Sewage pumping, types of pumps, capacity, design of centrifugal pumps - Manholes - Inlets - catch basins

- Sand, grease and oil traps. Sanitary fixtures and fittings - General layout and street connection - Principles of design of anti syphonage device -Types - Inspection chamber - Fresh air inlet.

Unit-IV

Primary treatment : Basic principles of sewage treatment - Screens, Grit chamber - Principles of sedimentation - Design of settling tanks - Types of settling tanks - Chemical precipitation. Biological Treatment and unit Process : Contact beds - Trickling filter - Description and operation of low rate and high rate filters, intermittent sand filter - Design of the above filters. Activated sludge Process: Theory - Diffuser and Mechanical aeration - Conventional, High rate and extended aeration process - Process modification - Oxidation

ditch - Principles and design of waste stabilization lagoon - aerated Lagoon. Principle of Sludge digestion - Optimum conditions - Digestion tanks -Supernatant liquid - Sludge gas - Drying beds. Septic and Imhoff tanks.

Unit V

Wastewater Disposal and Reuse - Disposal of sewage - Reduction of BOD - Land disposal - Discharge in to rivers, lakes, estuaries and ocean – River pollution - Oxygen sag curve - recycle and reuse of waste effluents. – Disinfection –Chlorination and odour prevention. Introduction to Low cost treatment methods -Special nature of problem of industrial water - Population equivalent – Process modifications and by product recovery

Text Books

1. Duggal, K.N., Elements of Environmental Engineering, S.Chand & Company Ltd., 2008.
2. Birdie G. S and Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai and Sons (1998), New Delhi

Reference Books

1. Peavy, H.S., Rowe, D.R. and Tehobanoglous, G., Environmental Engineering, McGraw

- Hill Book Company, 1998
2. Hussain ,S.K., Water supply and sanitary engineering , Oxford & IBH, New Delhi,1997
 3. Steel, E.W., Water supply and Sewerage , McGraw Hill, 1996
 4. Fair, G.M., Gayer, I. and Okun , Water and Waste Water Engineering , John Wiley & Sons, 1981

CE T64 STRUCTURAL DESIGN

Unit-I

Role of structural engineer in structural design – elements of structures – reinforced concrete – ductility versus brittleness – methods of design – codes of practice - Working Stress Method - Introduction-Permissible stresses-Factor of Safety- Behaviour of R.C.C beams under Flexure, Shear, Bond and Torsion- Design of beams for flexure, shear, bond and torsion.

Unit-II

Limit State Method: Concepts- Assumptions- Characteristic Strength and Load, Partial Safety Factors- Limit States- Limit State of Collapse in Flexure, Shear, Bond and Torsion- Design of beams for flexure, shear, bond and torsion.

Unit-III

Limit State Design of One-Way, Two- Way and Continuous Slabs using BIS coefficients - Design of Lintel Beams.

Unit-IV

Limit State Design of Short Columns and Long Columns subjected to combined axial load and bending using interaction diagram.

Unit-V

Design of Footings (Limit State method)- Isolated footing with axial and eccentric loading- Combined Rectangular and Trapezoidal footing, Design of Stair Cases.

Text Books

1. Punmia.B.C and Jain, A.K., Comprehensive RCC Designs, Lakshmi Publications (P) Ltd., New Delhi, Ninth Edition, 2002
2. Ashok K. Jain, 'Reinforced Concrete Limit State Design', 4th Edition Nem Chand & Bros, Roorkee, 1993

Reference Books

1. Shah V.L and Karve SR, Advanced Reinforced Concrete Design, Structures Publications, Pune, 2002.
2. Unnikrishna Pillai and Devdas Menon, Reinforced Concrete Design, Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2002.
3. Nilson H., A.H., George Winter,G., 'Design of Concrete Structures', McGraw Hill Book Co., New York, 1972
4. Park R and Pauloy T, Reinforced Concrete Structures, John Wiely & Sons Inc.
5. Mallick S.K., Reinforced Concrete, Oxford & IBH Publishing Company

CE T65 TRANSPORTATION ENGINEERING.-II

Unit – I

Traffic engineering: road user and vehicle characteristics; Traffic volume and composition, speed, headway, concentration, delay; flow principles; micro and macroscopic stream characteristics

Unit – II

Traffic studies - Volume, Speed, Delay, O-D and Parking surveys; statistical applications in traffic engineering.

Unit – III

Traffic regulations and control - Traffic signs, Signals, Markings, Islands, and Rotaries; Traffic signals - Basic concepts and principles, Analysis and design; Types and layout of at-grade and grade separated intersections.

Unit – IV

Parking facilities; Capacity analysis and Level of Service (LOS) for uninterrupted flow facilities – performance measures, LOS analysis, Design; Intelligent Transportation Systems (ITS) – Components, Advanced Traffic Management Systems (ATMS), Advanced Traveller Information System (ATIS)

Unit – V

Railway engineering: location surveys and alignment; permanent way – gauges, components of permanent way; points and crossings; stations and yards.

Text Books

1. Kadiyali, L. R., Traffic Engineering and Transport Planning, Khanna Publishers, New Delhi, 2006
2. Saxena, C.S.and. S. Arora. S.A., course in Railway Engineering, Dhanpat Rai & Sons New ,Delhi. 2007.

Reference Books

1. Antia, K.F, Railway Track, The New Book Company Pvt. Ltd., Bombay, 2006
2. Banks, J. H., Introduction to Transportation Engineering, McGraw-Hill Book Co., 2005.
3. Papacostas, C. S., and Prevedouros, P. D. Transportation Engineering and Planning, Prentice Hall, 3rd edition, 2002.
4. Agarwal, M. M., Indian Railway Track, 14th Edition, Prabha and Co., New Delhi, 2002.
5. Kristi, Lal, Transportation Engineering, PHI, New Delhi, 2008

CE P61 ENVIRONMENTAL ENGG. LAB

1. Determination of Turbidity, pH, Conductivity and Residual Chlorine.
2. Determination of Alkalinity.
3. Determination of Chlorides.
4. Determination of Hardness.
5. Determination of Iron
6. Determination of Manganese.
7. Determination of Fluorides.
8. Determination of Total Solids.
9. Determination of Suspended solids.
10. Determination of Dissolved Oxygen.
11. Jar test for the determination of optimum coagulant Dose.
12. Determination of B.O.D.
13. Determination of C.O.D.
14. Estimation of E-Coli.
15. Plate count (for bacterial analysis of water)

CE P62 ESTIMATION, COSTING AND VALUATION

Introduction: Types of estimate – Methods of measurement – Units of measurement for various item of work – Factors to be considered in the preparation of detailed estimate – Methods of measurement as per IS,1200.

Methods of Estimation: Centerline and crossing methods of estimation – Examples using the above methods. Detailed estimates: Detailed estimates of a simple residential building, Multi- storied building, culverts and bridges, road network inclusive of earth work. Detailed estimates of water tanks and sumps, water supply distribution network, sewer lines man holes, Aqueduct and canal falls and structural steel work.

Specifications: Purpose and basic principles of general and detailed specifications of various item of work. Costing, Analysis of rate – Purpose – Quantity of materials per unit rate of work – Estimating labours – Task of out turn work – Quantity of materials for different item of works.

Valuation: Valuation – Purpose, Common terms used in valuation – Valuation of building using different methods (with example) – Fixation of rent for a building. Valuation of land.

Reference Books

1. Dutta, B.N., Estimating and Costing in Civil Engineering Practice, S.Dutta & co,Lucknow, 1999.
2. Rangwala,S.C. , Valuation of Real Estate Properties, Charoter Publishing House,Anand, 1997.

CE P63 COMPUTER AIDED DESIGN LAB

Introduction and Demonstration –analysis and Design Packages in Structural Engineering like STAAD-III, Pro 2007 GTSTRUDL, ETABS etc. Analysis and Design of continuous beams, Multistory Frames, Trusses– Analysis of results.

GIS Software

Introduction and demonstration –Geographical Information systems –Geomeida Professionals- Thematic –overlays- Applications in Water resources Engineering.

Mat Lab Software

Introduction to Mat lab 6 software – Roots of an equation –Solution of simultaneous equations – Matrix Inversion –Linear Regression line of given points –Curve fitting using polynomial regression – Eigen value extraction and Eigen vectors.

Reference Books

1. Rajaraman,V. Computer Oriented Numerical Methods Prentice Hall of India, 2002
2. Rudra Pratap, Introduction to Mat Lab 6, Oxford Press, 2002
3. STAAD –III/ STADD RD Manual, 2002
4. ETABS and SAP 2000 Manual , 2007
5. GeoMeida Professional 6 Manual, 2001
6. Mat Lab – 6 Manual, 2001

HS P 64 GENERAL PROFICIENCY –II

Unit – I : Composition Analysis

Technical and Non-Technical Passages (GRE Based) – Differences in American and British English – Analyzing Contemporary issues – Expanding Terminology

Unit – II : Writing

Job Application Letter Writing – Resume Writing

Unit – III : Oral Skills

Group Discussion – Introduction and Practice – Team Work – Negotiation Skills – Organizing and Attending Meetings – Facing Interviews

Unit – IV : Adapting To Corporate Life

Corporate Etiquette – Grooming and Dressing

Unit – V : Aptitude

Verbal and numerical aptitude

References

1. Pushplata and Sanjay Kumar. Communicate or Collapse : A Handbook of Effective Public Speaking, Group Discussions and Interviews. Prentice-Hall, Delhi, 2007.
2. Thorpe, Edgar. Course in Mental Ability and Quantitative Aptitude. Tata McGraw-Hill, 2003.
3. Thorpe, Edgar. Test Of Reasoning. Tata McGraw-Hill, 2003.
4. Prasad, H.M. How to prepare for Group Discussion and Interview. Tata McGraw-Hill, 2001.
5. Career Press Editors. 101 Great Resumes. Jaico Publishing House, 2003.
6. Aggarwal, R.S. A Modern Approach to Verbal & Non-Verbal Reasoning. S. Chand & Co., 2004.
7. Mishra Sunita and Muralikrishna, Communication Skills for Engineers, First Edition. Pearson Education, 2004.
- 8.

HS T71 ENGINEERING ECONOMICS

Unit-I

Introduction to Economics-Flow in an Economy, Law of Supply and Demand, Concept of Engineering Economics - Engineering Efficiency, Economic Efficiency, Scope of Engineering Economics, Elements of Costs, Marginal Cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-Even Analysis, P/V ratio, Elementary Economics Analysis- Material selection for product, Design selection for a product, Building material selection, Process Planning,

Unit-II

Make or Buy Decision, Value Engineering-Function, Aims, Value Engineering procedure, Interest Formulas and their Applications - Time Value of Money, Single Payment Compound Amount Factor, Single Payment Present Worth Factor, Equal Payment Series Compound Amount Factor, Equal Payment Series Sinking Fund Factor, Equal Payment Series Present Worth Factor, Equal Payment Series Capital Recovery Factor, Uniform Gradient Series Annual Equivalent Factor, Effective Interest Rate, Examples in all the methods.

Unit-III

Methods of Comparison of Alternatives- Present Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Future Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Annual Equivalent Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Rate of Return Method, Examples in all the methods

Unit-IV

Replacement and Maintenance Analysis- Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, Replacement of an Asset with a New Asset - Capital Recovery with Return and Concept of Challenger and Defender, Simple Probabilistic Model for items which fail Completely.

Unit -V

Depreciation - Introduction, Straight Line Method of Depreciation, Declining Balance, Method of Depreciation, Sum-of-the-Years-Digits Method of Depreciation, Sinking Fund Method of Depreciation/Annuity Method of Depreciation, Service Output Method of Depreciation, Evaluation of Public Alternatives-Introduction, Examples, Inflation Adjusted Decisions- Procedure to Adjust Inflation, Examples on comparison of alternatives and Determination of Economics Life of asset.

Text Book

1. Pannerselvam, R., Engineering Economics, Prentice-Hall of India Pvt. Ltd., New Delhi 2001.

2.Reference Books

1. Degarmo, E.P., Sullivan, W.G. and Canada, J.R.. Engineering Economy, Macmillan, New York, 1984.

2. Grant, E.L., Ireson, W.G. and Leavenworth, R.S., Principles of Engineering Economy, Ronald Press, New York, 1976.

3. Smith G.W. En : 'Engineering Economics, Iowa State Press, Iowa, 1973

CE T72 STRUCTURAL DESIGN-II

Unit-I

Types of Steel and their permissible stresses, Design of Joints - Riveted, Bolted and Welded Connections under axial and eccentric loadings.

Unit-II

Compression Members: Design of axially and eccentrically loaded members, Built-up columns, Design of Lacing and Battens, Design of Column Splices.

Unit-III

Tension Members: Design of Axially and Eccentrically Loaded Tension Members - Tension Splices- Design of Lug Angles, Column bases: Design of Column bases, Slab Bases, Gusseted base,

Unit-IV

Design of Beams- Laterally Supported and Unsupported –Web Crippling- Built Up Beams- Design of Gantry Girder, Design of Beam Column Joints.

Unit-V

Design of Plate Girder (both welded and riveted), Wind load calculations - Design of Roof Truss Elements.

Text Books

1. Subramanian.P, Design of steel structures, Oxford Publishers, New Delhi, 2007.
2. Dayaratnam.P, 'Design of Steel Structures', Wheeler & Co Ltd., Allahabad, 1996
3. Raghupathy. M, 'Design of Steel Structures', Tata McGraw Hill Publishing Company Ltd., New Delhi, 1995.
4. Ramachandra, 'Design of Steel Structures', Vol. I & II, Standard book house, Delhi

Reference Books

1. Punmia B.C, Ahok Kumar Jain and Arun Kumar Jain, Comprehensive Design of Steel Structures, Lakshmi publications (P) Ltd., New Delhi, 1998.
2. Arya, A.S. and Ajmani, J.L., 'Design of Steel Structures', Nem Chand and Bros, Roorkee, 2000
3. Solmon and Johnson, 'Steel Structures- Design and Behaviour', Intext Educational Publishers, 1971

CE T73 COASTAL AND OFFSHORE STRUCTURES

Unit I

Growth and regulation of Ports: History of Port – Classification of Harbours - Factors affecting the growth of Port. - Requirement of a Harbour - General Planning - Site investigation Description of selected Indian ports.

Unit – II

Harbour Planning (Technical): Harbour entrance - Navigational Channel – Depth of harbour – Turning basin – berthing area – Shipping terminal facilities – Essentials of passenger terminal, dry bulk cargo terminal, Liquid bulk cargo terminals and container terminals. Navigational aids – Light house.

Unit - III

Break waters: Types – Selection – Forces and – Design principles of break waters. Berthing structures: Types – Loads – Selection and design principles of berthing structures – Selection and Design principles of Dock fenders and Mooring accessories. Types of dock structures, Dredging.

Unit – IV

Types of offshore structures – selection – function - Physical, environmental and geotechnical aspects of marine and offshore construction – Loads and responses of offshore structures.

Unit - V

Foundations for offshore structures – Introduction to design and installation of offshore piled platforms, concrete offshore platforms, Moored floating structures and Submarine pipelines

Text Books

1. Gerwick, C., Construction of Marine and Offshore structures, CRC Press.
2. Alonzo Def. Quinn., Design and construction of Port and Marine structures McGraw Hill Book co.
3. Chakrabarti.,S.K., Hand Book of Offshore Engineering (Vols. 1 & 2)" Elsevier Publications

CE P71 DESIGN AND DRAWING –I

Detailed Design and Drawing of the following RCC elements/Structures:

1. Continuous beams and slab systems
2. Isolated footings - for axial load and with moments
3. Combined footings - for axial loads and with moments
4. Cantilever retaining walls
5. Elevated - circular and rectangular water tanks (excluding staging)
6. Slab culvert bridges

Reference Books

1. Jain, A.K., Reinforced Concrete Limit State Design, Nem Chand Brothers, 1990.
2. Sinha. S.N. Reinforced Concrete Design, Tata McGraw Hill, 1988.
3. Varghese, P.C .Limit State Design of Concrete, Oxford IBH, 1983.

CE P72 SEMINAR

Each one of the students will be assigned a Seminar Topic in the current and frontier areas. The student has to conduct a detailed study/survey on the assigned topic and prepare a report. The student will make an oral presentation followed by a brief question and answer session. The Seminar (presentation and report) will be evaluated by an internal assessment committee for a total of 100 marks.

CE P73 INDUSTRIAL VISITS /TRAINING

During the course of study from 3rd to 7th semester each student is expected to undertake a minimum of four industrial visits or undertake a minimum of two weeks of industry/field training. The students are expected to submit a report, which shall be evaluated by an internal assessment committee at the end of seventh semester for 100 marks.

CE PW7 PROJECT WORK (PHASE-I)

The objective of the project is to enable the students to work in groups of not more than four members in each group on a project involving analytical, experimental , design or combination of these in the area of Civil Engineering. Each project shall have a guide. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. The evaluation is based on continuous internal assessment by an internal assessment committee for 100 marks.

CE T81 CONSTRUCTION MANAGEMENT

Unit – I

Management process- Roles – management theories – Social responsibilities – planning and strategic management – strategy implementation – Decision making: tools and techniques - Organizational structure – Human resource management- motivation performance- leadership.

Unit-II

Classification of Construction projects, Construction stages, Resources- Functions of Construction Management and its Applications –Preliminary Planning- Collection of Data- Contract Planning - Scientific Methods of Management: Network Techniques in construction management - Bar chart, Gant chart, CPM, PERT- Cost & Time optimization.

Unit-III

Resource planning - planning for manpower, materials, costs, equipment. Labour, - Scheduling –Forms of scheduling - Resource allocation – budget and budgetary control methods

Unit-IV

Contract - types of contract, contract document, specification, important conditions of contract - tender and tender document - Deposits by the contractor - Arbitration – negotiation - M.Book - Muster roll - stores.

Unit-V

Management Information System - Labour Regulations: Social Security - welfare Legislation - Laws relating to Wages, Bonus and Industrial disputes, Labour Administration - Insurance and Safety Regulations - Workmen's Compensation Act -other labour Laws - Safety in construction : legal and financial aspects of accidents in construction – occupational and safety hazard assessment. Human factors in safety – legal and financial aspects of accidents in construction – occupational and safety hazard assessment

Text Books

1. Ghalot, P.S., Dhir,D.M., Construction Planning and Management, Wiley Eastern Limited,1992.
2. Chitkara,K.K., Construction Project Management, Tata McGraw Hill Publishing Co, Ltd., New Delhi,998.
3. Punmia,B.C., Project Planning and Control with PERT and CPM, Laxmi Publications, New Delhi,1987.

CE T82 DISASTER MITIGATION AND MANAGEMENT

Unit-I

Introduction to Disaster Management- Natural and Man made Disasters- International Year of Disaster Reduction

Unit-II

Natural Disasters- Hydro-meteorological based disasters- Tropical Cyclones, Floods, droughts and Desertification Zones- Forest Fires-Geological based disasters- Earthquake, Tsunamis, Landslides, and Avalanches.

Unit-III

Man made Disasters- Chemical Industrial hazards, major power break downs, traffic accidents, Fire hazards etc.

Unit –IV

Use of remote sensing and GIS in disaster mitigation and management.

Unit- V

Risk and Vulnerability to disaster mitigation and management options- Warning and Forecasting.

Text Books

1. Thomas D. Schneid., Disaster Management and Preparedness, CRC Publication, USA, 2001
2. Patrick Leon Abbott, Natural Disasters, Amazon Publications, 2002
3. Ben Wisner., At Risk: Natural Hazards, People vulnerability and Disaster, Amazon Publications, 2001
4. Oosterom, Petervan, Zlatanova, Siyka, Fendel, Elfriede M., "Geo-information for Disaster Management", Springer Publications, 2005

Reference Books

1. Selected Resources Published by the National Disaster Management Institute of Home Affairs, Govt. of India, New Delhi.

CE P81 DESIGN AND DRAWING – II

Detailed design and drawing of the following steel elements/structures.

1. Built-up columns with lacing and batten plates.
2. Column bases for columns subjected to axial force and bending moment
3. Beams and beam column joints.
4. Welded plate girder.
5. Gantry girder.
6. Roof trusses and joints including purlins.

Reference Books

1. Subramanian.P , Design of steel structures , Oxford Publishers , New Delhi, 2007
2. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, Comprehensive design of steel structures, 2000
3. Arya, A.S. And Ajmani, A.L., Design of Steel Structures, Nemchand and Brothers, Roorkee, 1986.
5. Ramchandra, Design of Steel Structures, Vol I and Vol II, Standard Book House, New Delhi, 1991.

CE P82 COMPREHENSIVE VIVA-VOCE

The student will be tested for his understanding of basic principles of the core Civil Engineering subjects. The internal assessment for a total of 50 marks will be made by an internal assessment committee. The committee will conduct two written examinations of objective or short questions type from the all the core subjects. The external university examination, which carries a total of 50 marks, will be a Viva Voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.

CE P83 PROFESSIONAL ETHICAL PRACTICE

The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:

Engineering Ethics – Moral issues, Ethical theories and their uses

Engineering as Experimentation – Code of Ethics

Engineer's responsibility for safety

Responsibilities and rights

Global issues of engineering ethics,

Constitution of India

Reference Book

1. Charles D.Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999

CE PW8 PROJECT WORK (PHASE II)

Project work phase II will be an extension of the project work started in the seventh semester. On completion of the work, a project report should be prepared and

submitted to the department. The project work and the report will be evaluated by an internal assessment committee for 50 marks. The external university examination, which carries a total of 50 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.

ELECTIVES

CEE 61 PRE-STRESSED CONCRETE STRUCTURES

Unit – I

Introduction-Principles of pre-stressing-Materials-Losses-Systems of pre-stressing-Simple cable profiles-Load balancing method.

Unit – II

Pre-tensioned and Post-tensioned beams-Principles of designs-Design for flexure, bond and shear – IS Code provisions-Ultimate Strength of pre-stressed concrete beams in flexure and shear- Design of end anchorage Zones using I S Code method.

Unit – III

Deflection of pre-stressed concrete members – Methods of pre-stressing-principles of partial pre-stressing –non-pre-stressed reinforcements-Analysis and Design of composite beams.

Unit-IV

Design of Tension and Compression members-Circular pre-stressing-Pipes- Water Tanks- Analysis and design –IS-Code provisions

Unit- V

Analysis of continuous beams –Primary moment-secondary moment-cable layout-Linear Transformation – Concordant cable.

Text Books

1. Krishna Raju, N., Prestressed Concrete Structures, Tata McGraw Hill, 1997.
2. Dayaratnam. P. Prestressed Concrete Structures, Oxford & I B H, 1991.

Reference Books

1. Pandit. G.S, Gupta. S.P, Prestressed Concrete, CBS Publishers and Distributors, New Delhi, 1993.
2. Lin. T.Y. Design of Pre-stressed Concrete Structures, Asia Publishing House, Madras, 1987.

CEE 62 COASTAL ENGINEERING

Unit – I

Coastal zone: Definition and sub division – Factors influencing coastal topography - Waves: Definitions - Classification – Linear wave theory – Assumptions and derivations of relationships – Pressure within progressive wave – Wave energy – Problems

Unit – II

Wave Transformation: Wave generation – Shoaling – Refraction – Reflection – Diffraction – Breaking of waves – Near shore currents – Tides - Tsunamis - Wave Hindcasting – forecasting - Sea level changes.

Unit – III

Wave forces on Structures: Force due to non breaking, breaking and broken waves on vertical, sloping, curved, stepped barriers and on piles – Problems.

Unit – IV

Sediment Movement : Types – Littoral Drift – Erosion process – Near shore, long shore currents and effects - Beach profile changes – case studies – Beach process - Environmental parameters- Coastal erosion in India - Dredging – Dredgers - Environmental effects of dredging - Remote sensing and GIS application in coastal engineering

Unit – V

Coastal Protection: Methods – Function – Types - Design concepts – Sea walls – Bulkhead – Revetment – Groins – Artificial beach nourishment – Scour – Maintenance of coastal structures.

Text Book

1. Narasimhan & S. Kathirolu, Harbour and Coastal Engineering (Indian Scenario) Vol - I & Vol – II, NIOT- Chennai
2. Shore Protection Manual (Vol – I, II, III) U.S. Army Corps of Engg. USA.

Reference Books

1. Ippen, A.T., Estuarine and coastline Hydrodynamics, McGraw Hill Book Co., New York
2. Wiegel. R.L. Oceanographical Engineering., Prentice Hall, Eagle Wood Cliffs, New Jersey
3. Dean .R.G. and Darymple, R.A. Water Mechanics for Engineers and scientists.

3. CEE 63 INDUSTRIAL WASTE DISPOSAL AND TREATMENT

Unit-I

Uses of water by Industry - Sources and types of wastewaters, quality criteria, effluent standards- Individual and common effluent treatment plants - Population equivalent, Effects of industrial wastes on streams, land, air and waste water treatment plants

Unit II

Pretreatment Methods: Process modification – methods and materials changes – Reduce, reuse and recycle methods, house keeping etc. to reduce waste discharge and strength of the waste and established methods for by products recovery within the plant operations

Unit-III

Equalization – Neutralization - Oil separation – Floatation – Precipitation – Adsorption - Aerobic and anaerobic biological treatment - High rate reactors. Chemical oxidation – Ozonation – Ion Exchange – Membrane technologies

Unit-IV

Residuals of Industrial waste treatment —Characteristics of sludge – Thickening, digestion, conditioning, dewatering and disposal of sludge.

Unit –V

Industry and power plants - manufacturing process description - wastewater characteristics and waste treatment flow sheet for typical industries – Textiles – Tanneries – Pulp and Paper –Metal finishing – Petroleum refining – Chemical industries - Sugar and distilleries –Dairy –Iron and Steel- Fertilizers –Nuclear power plants.

Text Books

1. Eckenfelder. W.W., Industrial Water Pollution Control, McGraw Hill, 2000.
2. Arceivala.S.J. Wastewater Treatment for Pollution Control, Tata Mc.Graw Hill. 2008.

Reference Books

1. Nemerow,N.L., Theories and Practices of Industrial Wastes Treatment, Addison and Wesley, 1963.
2. Gurnham,C.F., Principles of Industrial Waste Treatment, John Wiley, New York,1948.

CEE 64 IRRIGATION AND DRAINAGE ENGINEERING

Unit-I

Introduction: Need, advantages and disadvantages of Irrigation - Environmental effects - Types of Irrigation systems - Gravity irrigation, canals, Tanks, Wells and Irrigation galleries - Water lifts.

Soil -water - plant relationship: Soil and its function - Physical properties of soil and their importance in relation to irrigation - Classes and availability of soil water - Movement of water in soils - Measurement of soil moisture - Crop growth and moisture relationship - Salt problems in soil and effect of salts on plant growth.

Unit - II

Irrigation Requirement: Evaporation, Evapo transpiration, Consumptive use and its estimation - Crop factor - Lysimeters - Effective rain fall and irrigation requirements - Water requirements of various crops - Duty of water - Quality of irrigation water.

Unit -III

Methods of Irrigation: Surface, subsurface and overhead methods - Check basin, border & furrow, Drip and sprinkler irrigation - Irrigation efficiency, Depth, Rate and frequency of irrigation - Irrigation schedule.

Unit - IV

Design of channels: Design of unlined and lined channels for irrigation - Location and design of canal regulation structures - Cross drainage structures - Measuring devices.

Unit - V

Land Development: Reclamation and management of saline & alkaline soils, water logging, Causes and remedial measures - Design, construction and maintenance of drainage systems.

Irrigation Management: Management of irrigation system - water charge assessment and water use management.

Text Books

1. Punmia, B.C., and Lal ,B.B., Irrigation and Water Power Engineering, Standard Publishers & Distributors, New Delhi, 2006.
2. Sharma.R.K., and Sharma. T.K., Irrigation Engineering , S.Chand & Company Ltd, New Delhi, 2007.

Reference Books

1. Hansen, V.E., et.al., Irrigation Principles and Practices, John Wiley & Sons, 2001.
2. Sharma, R.K., Text Book of Irrigation Engineering and Hydraulic Structures, Oxford & IBH Publishing Co., 2007.
3. Michael, A.M., Irrigation Theory and Practice, Vikas Publishing House, New Delhi, 1996.
4. Das, M.M, Saikia, M.S Irrigation and water power Engineering, PHI, Learning, (P) Ltd, New Delhi, 2009.

CEE 65 ARCHITECTURE AND TOWN PLANNING

Unit-I

Introduction to Architecture: Origin and definition – Influence of nature – Climate – Topography – material – Social condition – Economic condition on architecture. Architectural science - factors influencing architecture, aesthetic responses: Colour and aesthetic responses- formal and informal organization of solids and voids.

Unit-II

Basic Principles: Concepts of beauty, unity, balance, composition, rhythm, harmony, style, character, integration, scale, proposition, contrast, shape and structure.

Unit-III

Urbanization: Urbanization trends in India- Classification of towns - humans settlements development policy - National approach. Urban growth: planning of towns in ancient India - Greek and Roman towns - Garden city concept - New towns & satellite towns – Urban Renewal- Planning standards for neighborhood

Unit-IV

Evolution of planning legislation in India – Organisation and administration of planning agencies at national, state, regional level and metropolitan level – building bye law – Function of local Authority – Provision of Building regulations.

Unit-V

Planning of Land uses: Residential area planning - Site & service programmes - Commercial areas - Industrial sites - rectangular areas, Principles of planning for traffic and transportation facilities - transport terminals pedestrian path and bikeways.

Text Books

1. Gallion,D., et.al, The Urban pattern city planning & design, Affiliated East West Press Pvt. Ltd., New Delhi.
2. Lewis Keeble, Town Planning Made Plain & Town & Country Planning Association, London, 1983.

Reference Books

1. Rangwala, K.S., Town Planning, Charotar Publishing House, Anand, India.
3. Hiraqskar, G.K., Fundamentals of Town Planning, Dhanpat Rai & Sons., Delhi 2001.
4. Pickering,E., Architectural Design, John Wiley and Sons , London.

CEE 66 MASS TRANSPORTATION SYSTEMS

Unit-I

Role of Transportation: History of transit, Recent Trends in transit, Mass transportation characteristics, Demand Characteristics: Spatial, temporal and behavioral characteristics.

Mass Transportation Planning: Transportation demand surveys, Mass transportation demand estimation, Demand projection, Trip generation, Trip distribution, Model split and route assignment.

Unit-II

Transport system Performance: Performance evaluation and analysis, Structure of decision making, Evaluation and selection methods, selection procedure Generation of alternative schemes, Economic evaluation methods.

Terminals: Functions of terminals, Design, Typical Terminal characteristics.

Unit-III

Scheduling and Routes: Service analysis, Vehicle dispatch policy, Vehicle Requirements, Spacing of bus stops, Route spacing and performance.

Unit-IV

Management: Operational and management issues in transport planning, Reserved buslanes and signals, Vehicle monitoring and control system,, Nodal coordination.

Unit-V

Special Systems: People mover systems, Underground transportation, para transit, Railtransit system, case studies.

Text Books

1. Kristhi, Lal, Transportation Engineering, PHI, Delhi, 2008 Hay, W.W., An Introduction to Transportation Engineering, 2nd Ed., John Wiley & Sons, 2001
2. Kadiyali, L. R, "Traffic Engineering and Transport Planning", Khanna Publishers New Delhi – 110006, 2006

Reference Books

1. Hutchinson, Urban Transport Planning, John Wiley, 2006
2. Dickey, J.W., et. al., Metropolitan Transportation Planning, TMH edition, 2002.
3. Pagnette, R.J., et.al, Transportation Engineering - Planning and design, 2nd edn., John Wiley & Sons, 2002.
4. Railis, V.R, Inter city Transport, Engineering and Planning, The Macmillan Press, 2003.

CEE 67 CONSTRUCTION METHODS AND EQUIPMENT

Unit - 1

Modern Construction Methods - Open excavation, shafts and tunnels, pier and caisson foundation . Basement construction - construction Methods – supporting the excavations- control of ground water- shoring and underpinning- basement waterproofing.

Unit –II

Construction Methods for Bridges, roads railways, dams, harbours , river works and pipelines

Unit –III

Construction equipment and techniques for Earth moving, excavating , drilling, blasting, tunneling and hoisting and erection

Unit –IV

Equipment for: Dredging, tunneling, dewatering- Equipment for Flooring – dewatering and floors finishing

Unit –V

Equipment for production of aggregate and concrete – Crushers- feeders- screening equipment – batching and mixing equipment – hauling, pouring and pumping equipment – transporters

Reference Books

1. Antil J.M., Civil Engineering Construction, McGraw Hill Book Co., 1982
2. Peurifoy, R.L., Ledbette. W.B Construction Planning , Equipment and Methods McGraw Hill Co, 2000
3. Ratay., R.T Hand Book of Temporary Structures in Construction, McGraw Hill,1984
4. Koerner., R.M, Construction & Geotechnical Methods in Foundations Engineering, McGraw Hill, 1984
5. Varma., M., Construction Equipment and its Planning & Application, Metropolitan Book Co., 1979
6. Smith, R.C, Andres, C.K Principles and Prentice of Heavy Construction, Prentice Hall, 1986

CEE 71 GEOTECHNICAL PROCESSES AND APPLICATION

Unit-I

Introduction: Need – methods – suitability – Mechanical modification : principle - Surface compaction: Field compaction and equipments, compaction specification and controls. Vibration methods: dynamic consolidation, vibratory rollers, Vibro floatation.

Unit-II

Drainage methods: Well point systems, deep well drainage, vacuum dewatering system, design of dewatering system – field permeability tests, dewatering by electro osmosis. Preloading, sand drains, wick drains- Thermal methods case studies.

Unit-III

Grouting: Classification – Methods – Types – grouts – equipments, grouting design and layout, grout monitoring – applications – Case studies.

Unit-IV

Stabilization: cement stabilization, Lime stabilisation – chemical stabilisation - methods, principles, applications and field control. Stabilization using reinforcement – rock anchor-soil tie backs.

Unit-V

Geo synthetics: Geotextiles, Geogrids, Geomembranes, Geonets, Geomats, Geomeshes, principles Design and applications – Case studies.

Text Books

1. Koerner, R.M., Construction & Geotechnical methods in foundation engineering, MGH, New York, 1985
2. Hausmann. M.R. Engineering principles of Ground Modification, mcGraw-Hill
3. Purushothama raj. P. Ground improvement techniques, Laxmi Publications (P) Ltd, India

Reference Books

1. Bowle's.J.E., Foundation Analysis and design, 4th edition, MGL, 1998.
2. Jones.C.J.F.P., Earth reinforcement and soil structures, Butter worth &co., London, 1985
3. Arora.K.R., Soil mechanics and foundation Engineering, SPD, 2001

CEE 72 GEOGRAPHICAL INFORMATION SYSTEM

Unit I

Data entry, storage and maintenance Types of data – spatial and non-spatial information, Geographical concepts and terminology, Advantages of GIS. Basic Concepts of GIS, organisation of data in GIS.

Unit II

Field data, Statistical data, Maps, Aerial photographs, Satellite data, points, lines and areas features, Vector and Raster data, Advantages and Disadvantages, Data entry through keyboard, digitizers and scanners, digital data. Preprocessing of data – Rectification and registration, Interpolation techniques.

Unit III

Data analysis and modelling

Spatial analysis – data retrieval – query – Simple analysis –Record – overlay – vector data analysis –raster data analysis – modelling in GIS – digital elevation model – DIM- cost and path analysis –artificial intelligence- expert systems

Unit IV

Data output and error analysis Types of output data – display on screen – printer – plotter –other output devices – sources of errors – types of errors –elimination- accuracies

Unit V GIS Application

Application areas- resource management – agriculture- soil – water resources management – cadastral records and LIS integrated remote sensing application with GIS- knowledge based techniques - multi- criteria evaluation in GIS – introduction to object oriented data base models

Text Books

1. Geo Informational systems –Applications of GIS and related spatial information technologies, ASTER publications co., Chestern (England) , 1992
2. Burrough , p. a., Principles of GIS for land resources assessment, Oxford publications , 1990
3. Jeffrey Star and John Estes , Geographical information systems – An Introduction, Prentice – Hall inc. ,1990

CEE 73 HYDRAULIC STRUCTURES

Unit-I

Planning and Selection of Dams:

Planning , environmental considerations , storage requirements, sedimentation in reservoir, wave height and free board, selection of type of dam. Geological investigation, classification of insitu, rocks for Engineering purposes, foundation treatment ,river diversion works.

Unit-II

Gravity dams: Definition, forces acting on the dam, nonoverflow and overflow sections, causes of failure , design principles , elementary profile of a dam, high and low dam, stability analysis, temperature control in dams, construction and contraction joints, Galleries in dams.

Unit –III

Arch Dam: Classification and type , factors affecting layout , simple design criteria – thin cylinder theory trial load analysis, elastic theory, cantilever and Arch analysis. Earth & Rock fill Dams: Types , profile and design principles of earth dams, height and top width, side slopes and its protection, core and casing , cutoff and seepage control , drainage system, construction methods and quality control.

Unit-IV

Spillways ,sluices and crest gates: Definition and types of spillways , design storm and spillways capacity, energy dissipation, design criteria – design of crest gates and high head gates ,supply and power sluices.

Unit – V

Instrumentation- Embedded instruments in dam section , foundation measurements of dam body , analysis of strain data , automatic control of dam safety.

Text Books

1. Sharma, H.D., Concrete Dams,Metroploitan,2002,
2. Punmia,B.C. and Pande.B.B. Lal, Irrigation and Water power Engineering, Standard Publishers, Ninth edition, 1986.

Reference Books

1. Garg. S.K., Irrigation and Hydraulic structures, Khanna Publishers, 1992.
2. Creager, Justin and Hinds Engineering for dams. Vol I.II.III
3. Das, M.M, Saikia, M.D Irrigation and Water Power Engineering, PHI, Learning (P) Ltd, 2009,

4. CEE 74 FINITE ELEMENT ANALYSIS

Unit –I

Need for Numerical Technique – Solutions to Differential Equations –Finite Difference Methods – Limitations Variation and Weighted Residual and Potential energy formulations – Finite Element Method – Basic steps.

Unit –II

Shape functions – convergence Criteria –Geometric Invariance – Pascal's Triangle – Shape Functions for one Dimensional Structures - Formulation of Element Matrix - Formation of Element Nodal load Vector -Coordinate systems –Global , Local & Natural.

Unit –III

Two dimensional elements – Plane stress – Plane strain – 3,6 Nodded Triangular elements – Rectangular elements – Lagrange and serendipity elements –Isoparmetric elements - shape functions, Element stiffness Matrix – Load vector formulations –Gauss Quadrature rule.

Unit –IV

Basic concepts beam elements –Axisymmetric elements Tetrahedral, hexahedral elements –Formation of shape functions-mesh generation techniques- reduction of band width – static condensation.

Unit –V

Solution Techniques- Gauss elimination –Matrix Decomposition – Based a and Frontal solvers. Requirements of Pre and post processor in GUI based FE packages.

Text Books

1. Krishnamoorthy,C.S, Finite Element Analysis – Theory and Programming – TMH, New Delhi, 1999
2. Zienkiewicz, O.C, Morgan,K, Finite elements & approximations , John & Sons, 1998.

Reference Books

1. Desai, C.S, Able, R.R. Introduction to the Finite Element Method, Affiliated East West Press, 1972
2. Cook, R.D, Concepts and applications of Finite element Analysis, John Wiley and Sons, 1981

CEE 75 ADVANCED STRUCTURAL DESIGN - RCC

Unit-I

Building Frames- Approximate methods – substitute frame analysis- Design of beam column joints - Design of reinforced concrete braced and un-braced walls . Design of flat slabs.

Unit-II

Yield line theory- Equilibrium and Virtual Work method- Analysis and Design of Square, Rectangular and Circular Slabs with different boundary conditions subjected to UDL and Concentrated loads, Hillerborg's method of design of slabs. Analysis and Design of Grid floors by approximate analysis.

Unit-III

Design of Deep Beams, Design of beams curved in plan.-Design of Silos and Bunkers,

Unit-IV

Redistribution of moments in RC beams- introduction-conditions- advantages- moment curvature relation- ACI guidelines , Design for serviceability Limit states – Design calculations of deflection and crack width as per IS456-2000.

Unit –V

Requirements for good formwork- Materials for forms- Loads on formwork - - Design of formwork –Introduction to Composite Construction – behavior and design principles. Steel – Concrete Composite Beams, Beams with in – situ slab and pre cast rib

Text Books

1. Purushothaman ,P, Reinforced concrete structural elements : Behavior, analysis and design, Tata Mc Graw , 1986.
2. Varghese P.C, Advanced Reinforced Concrete Design — Prentice- Hall of India Private Limited , New Delhi, 2002
3. Unnikrishna pillai and Devdas Menon, ' Reinforced Concrete Design', Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2002

References

1. Shah VL and Karve SR , Advanced Reinforced concrete Design", Structures Publications Pune , 2002.
2. Sinha S N , Reinforced Concrete Design , Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 1996
3. Johnson R.P. , Composite Structures Vol.-I
4. Punmia B.C., R.C Structures Vol.II, Lakshmi Publication, New Delhi.
5. Shah H.J. , Reinforced concrete Vol. I, Charotar Publishing House, 2005.

CEE 76 FAILURE ANALYSIS AND REHABILITATION OF STRUCTURES

Unit – I

Condition Assessment – Procedure for assessment – survey – Field visits – inspection – Sampling – structural capacity – load testing – condition assessment of structures – NDT methods – Evaluation and health monitoring.

Unit-II

Agencies causing material deterioration - shrinkage, settlement, weathering, chemical attack, creep, fire, honey combing etc., durability of materials –Safety evaluation of existing structures

Unit-III

Structural and non structural cracks -Types of structural distress in foundations, roofs, floors, walls etc.

Unit-IV

Repair Techniques - Materials for repair – Repair of concrete structures - bridges and water retaining structures – water proofing methods and materials - Non-structural repairs.

Unit-V

Factors influencing corrosion of steel – Corrosion protection of steel structures – Masonry deterioration, Biocidal treatment and use of preservatives – Factors influencing deterioration of wood, use of sealants and adhesives and their role in repair of structures.

Text Books

1. Ransom,W.H., Building Failures, E&FN SPON Ltd., 1981.
2. Perkins.P, Repair, Protection and Waterproofing of Concrete Structures , E & FN SPON, London

Reference Books

1. Moskvina.V., Concrete and Reinforcement Concrete Deterioration and Protection, MIR Publishers, 1983.
2. Richardson,B.A., Remedial Treatment of Buildings, Construction Press, 1989.

CEE 77 BRIDGE ENGINEERING

Unit –I

History and Development of Bridges, Classification of Bridges-Investigations for culverts and minor bridge, Investigations for major bridge – Topography, catchment, hydrology, Geotechnical aspects, Construction Resources – Design Flood Discharge-Methods, Linear waterway.

Unit – II

Choice of Foundation for piers and abutments –Types - relative suitability. Load on Foundation - Well foundation – types –Design well foundation – Scour Depth – Stability of well foundation - well sinking - methods – Tilt correction – Case studies

Unit –III

Loading standards for road and railway bridges- Setting out for piers and abutments, Minor Bridges and Culverts, Single span Bridge, Multispan Bridge, Major/Important Bridges.

Unit –IV

Bridge superstructure – supports and centering for RC bridges – erection process of RC girders and steel girder bridges .

Unit –V

Maintenance-Inspection of bridges, Maintenance of substructure girders-Load testing on bridges- Temporary and movable bridges- Re-building of bridges- bridge failure.

Text Books

1. Ponnusamy S, "Bridge Engineering" Tata McGraw Hill Publishing Co., New Delhi , 2008

Reference Books

1. Whitney, C.S, Bridges, Greenwich House,1983
2. Singh, V.P Wells and Caissons, Nemchand & Sons,1979

CEE 78 HYDRO POWER ENGINEERING

Unit-I

History and types of water power development: History of water power development - water power development in India - Comparison of water power with thermal, nuclear and wind mills - Classification - High, Medium and Low Head schemes - Run off river plants - Storage power station - Tidal power plant - Recent experiences in wave power development - Underground power plants - Pumped storage schemes - Small and mini Hydropower systems - Power demand - Role of Hydropower in a grid.

Unit-II

Planning and Layout of Hydropower schemes: Investigation connected with hydropower development - Site selection, layout of hydro power plant- Capacity - Load factor and Load curve.

Unit-III

Design of Hydroelectric works: Necessities for the construction of a dam - Selection of type of Dam - Spillway, types and design – In take works, types - Design of Intake transition - Trashrack - Design of power canals and penstocks, penstock joints support structures, Elements of laying penstock lines – Water hammer - Rigid and elastic column theory - Characteristics Methods of determining pressure surges in penstocks –surge tanks

Unit-IV

Selection of suitable type and number of turbines - Layout and spacing of turbines. Types and spacing of turbines, tanks, and design, Power house - Types - Layout and spacing of units. Economics of Hydropower Installation: Basic factors in economic Analysis -, Cost of Hydroelectric power.

Unit-V

Mini Hydropower Systems: Small and min hydropower systems - Site selection, Hydrologic computations, Site development, Environmental Impact - Economic and Financial Feasibility.

Text Books

1. Bhattacharya, P.K., Water Power Engineering, Khanna Publishers, 2002.
2. Desmukh, M.M., Water Power Engineering, Dhanpat Rai & Sons, 2002.

Reference Books

1. Brown, G., Hydroelectric Engineering Practice, CPS, 1984.
2. Fritz, J.J, Small and Mini Hydropower Schemes, McGraw Hill, 1984.
3. Creager and Justin, Hydro electric Hand Book, John Wiley.
4. Das, M.M Saikia, M.S Irrigation and water Power Engineering. PHI Learning. Pvt. Ltd,2009

CEE 79 SITE INVESTIGATION METHODS AND PRACTICES

Unit- I

Objections, site investigation in Civil Engineering process, problem solving and various stages in site investigation process. Planning and Desk Study - topographic maps, aerial photographs, applications in site investigation and interpretation of aerial photographs, Geological maps, soil and planning maps, site reconnaissance and local enquiries.

Unit -II

Geological methods - different stages, Geological exploration methods - General principle distribution of physical field in subsurface - Electrical resistivity, Seismic refraction methods, their principle, methods of survey, correction to field data, Interpretation and limitations. Index and Mechanical properties of rocks, Laboratory and insitu tests.

Unit-III

Trial pits, shafts, tunnels, auguring, and different types of drilling methods, their merits and demerits, Bore hole logging techniques (subsurface geophysical exploration) - Need for logging techniques, classification and different types logging methods.

Unit - IV

Soil Exploration methods, samples, sampling procedure, sample disturbances, samplers, Factors controlling spacing and depth of bore hole, Insitu tests, SPT, SCPT, Pressure meter tests, interpretation and application, Laboratory testing, Index properties.

Unit - V

Technical Report writing, report format, recommendations for earth work structures, highway excavations and drainage works, dams, check report site preparation, investigation during construction and operation.

Text Books

1. Joyce, M.D. 'Site Investigation Practice', ESFN. SPON Publishers, 1982.

References Books

1. Hunt, R.E., Geotechnical Engineering Analysis and Evaluation, McGraw Hill Book Company, 1986.
2. Bell, Fundamentals of Engineering Geology, Butterworth and Co., London, 1983.
3. Blyth, F.G.H. and De Freitas, M.H., A Geology for Engineers, Edward - Arnold publishers Ltd., 1984.
4. Legget and Karrow, Hand book of Geology in Civil Engineering, McGraw Hill Publishers, 1983.

CEE 710 HIGHWAY AND AIRPORT PAVEMENT DESIGN

Unit-I

Introduction: Pavement types, components, highway and airport pavements, complexities in pavement design. Design Factors: Sub grade - Significance, soil classification, assessment of strength characteristics, Traffic Loads, Climatic factors - variation in moisture content and applications, wheel load stresses, wheel load configurations in highway and airport pavements, ESWL, repetition of loads and EWL factors, transient loads. Problems.

Unit-II

Pavement materials Characterization – introduction. Soil- characterization, tests. Aggregates- tests, batch mixing. Bituminous – types of bitumen, tests. Bituminous mixes- design. Cement – tests, design of PQC. Soil stabilization – introduction, methods of stabilization.

Unit-III

Flexible pavement Design Methods: General design approaches; Design methods for highway and airport pavements - Group Index, FAA, CBR, Wyoming, Stabilometer, Triaxial test McLeod and by Burmister's two layer theory. Problems.

Unit-IV

Stresses in Rigid Pavements and Design: Stresses due to wheel load and temperature, Westergard's analysis, ESWL in rigid pavements, spacing of joints in CC Pavements, thickness design method, IRC design method for highway Pavement, Design of expansion and longitudinal joint details.

Unit-V

Pavement Evaluation and Testing: Pavement failures; Structural evaluation and strengthening of flexible pavements - CBR and plate load tests, Benkelman beam rebound deflection method, strengthening of rigid pavements, Pavement surface condition evaluation, Testing techniques for flexible and rigid pavements.

Text Books

1. Sharma, S.K., Principles, Practices and Design of Highway Engg. S.Chand & Co., New Delhi. 2002.
2. Justo, C.E.G, S. K. Khanna, Highway Engineering, S. Chand Publishers, New Delhi, 2006

Reference Books

1. Partha Chakroborthy and Animesh Das, "Principles of Transportation engineering, Prentice Hall of India Pvt. Ltd., New Delhi – 110001, 2003
2. Michel Sargious, "Pavements and surfacing for Highways and Airports", Allied Science publishers Ltd. London, 2006.
3. Yang Huang, "Pavement analysis and design", Allied Publishers Ltd. London, 2006.
4. Yoder, Principles of Pavement Design, John Wiley & Sons, 2003

5. CEE 711 MATRIX METHODS OF STRUCTURAL ANALYSIS

Unit – I

Matrix flexibility method – Transformation of forces – Element flexibility to system flexibility. Analysis of statically indeterminate beams and rigid jointed plane -frames – effect of support settlements and elastic supports.

Unit – II

Matrix flexibility method Analysis of pin-jointed frames –effects due to lack of fit and temperature changes. Application to space frames – Direct flexibility approach.

Unit – III

Matrix stiffness method – Transformation of displacements – Elements stiffness to system stiffness – Application to continuous beams – effects of support settlements and elastic supports.

Unit – IV

Matrix stiffness method — Application to pin-jointed plane frames - support settlements – lack of fit and temperature effect. Analysis of three dimensional pinned frames.

Unit – V

Special analysis techniques – Condensation, Substructuring – reanalysis techniques – transfer matrix method. Analysis of frames with semi rigid connections.

Text Books

1. Pandit, G.S. and Gupta, S.P., Structural Analysis – A Matrix Approach, Tata McGraw Hill Publishing Co., New Delhi, 1997.
2. McGuire, W., and Gallagher, R.H., Matrix Structural Analysis, Lohm Wiley & Sons, New York, 1998.
3. Rajasekaran, S., and Sankarasubramanian, G., Computational Structural Mechanics, Prentice Hall of India Pvt. Ltd., New Delhi, First Edition 2001.

Reference Books

1. Wang, C.K., "Intermediate Structural Analysis", McGraw Hill Publishing Co., New York, 1989.
2. Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill Publishing Co., New Delhi, 1996.

CEE 712 EXPERIMENTAL MEASUREMENTS AND ANALYSIS

Unit I

Displacement and Load measurement devices - Strain gauges, principle, types, performance and uses – principle and applications - Hydraulic jacks and pressure gauges – Electronic load cells – Proving Rings – Calibration of testing Machines.

Unit II

Vibration measurement -Characteristics of structural vibrations – Linear variable differential transformer (LVDT) – Transducers for velocity and acceleration measurements – Vibration meter – Seismographs – Vibration analyzer – Electro Dynamic Exciters - Display and recording of signals – Digital data Acquisition systems – principles and applications.

Unit III

Wind Flow Measurements -Principles of pressure and flow measurements – pressure transducer – Wind tunnel and its use in structural analysis – structural modeling.

Unit IV

Distress Measurement - Diagnosis of distress in structures – crack observation and measurement – Corrosion of reinforcement in concrete – Half cell construction and potential measurement – resistivity meter - Damage assessment.

Unit V

Load testing of structures, Buildings, bridges and towers – Rebound Hammer – Ultrasonic Testing, Principles and applications - Moire fringes – brittle coatings – holography – use of Lasers for structural testing –smart materials.

Reference Books

1. Sadhu Singh, "Experimental Stress Analysis", Khanna Publishers, New Delhi, 1996.
2. Dalley.J.W. and Riley.W.F., "Experimental Stress Analysis", Tata McGraw Hill company Ltd. New York, 1991
3. Srinath.L.S.et al, "Experimental Stress Analysis", Tata McGraw Hill company Ltd., New Delhi, 1984
4. Sirohi.R.S., Radha Krishna.H.C., "Mechanical Measurements", New Age International (P) Limited, 1997
5. Garas.F.K., Clarke.J.L.and Armer.G.S.T., "Structural Assessment", Butterworths, London, 1987.
6. Bray.D.E., and Stanley.R.K., "Non-Destructive Evaluation", McGraw Hill Publishing Co., New York, 1989.
7. Ganesan T.P., "Model Analysis of Structures", Universities Press, Hyderabad, 2000

CEE 81 ADVANCED STRUCTURAL DESIGN - STEEL

Unit-I

Design of Portal Frames and Gable Frames

UNIT-II

Chimneys: Design of Self Supporting Chimney- Design principles of Guyed Chimney

Unit-III

Microwave and Transmission Towers: Introduction – Loads- Analysis of Microwave & Transmission Towers- Design of members- Design of Foundations- Design of Connections.

Unit – IV

Design of steel storage structures – pressed steel tank – tanks with hemispherical bottom and supporting structures.

Unit – V

Introduction to design of semi rigid connections – cold formed steel structures – Pre-Engineered buildings- Construction: Tolerances: Fabrication tolerances- Erection Tolerances, Erection methods and stresses.

Text Books

1. Ram Chandra, " Design of Steel Structures", Vol.II, Standard Book House, New Delhi.
2. Ramamrutham S., " Design of Steel Structures", Dhanpat Rai Publishing Co., New Delhi, 2001
3. Edwin H., Gaylord, Jr., Charles N. Gaylord, "Design of Steel Structures", Mc Graw Hill, Inc., Singapore, ISBN 0 -07-112623-6
4. Arya A.S.& Ajmani A.L.," Design of Steel Structures", Nemchand and Brothers , Roorkee

Reference

1. Steel Structures- Design and Behaviour - C.G. Salmon & J.E.Johnso- Harper and Row, Cambridge, 1980

CEE 82 OPTIMIZATION TECHNIQUES FOR CIVIL ENGINEERING

Unit-I

Introduction: Introduction to optimization Techniques - problem formulation and merit function. Linear Optimization: simplex Algorithm duality in Linear Programming.

Unit-II

Non-Linear Optimization-I: Single and multiple variable optimization algorithms, Search methods, gradient methods.

Unit-III

Non-Linear Optimization-II: Multi variable optimization Algorithms, constrained and unconstrained problems - search methods, gradient methods, Kuhntucker conditions.

Unit-IV

Dynamic programming Concepts: Backward recursion method - genetic programming, principle and concepts, simulated ANN, genetic Algorithms

Unit-V

Computer application in optimization: Optimization software for various Civil Engineering problems.

Text Books

1. Ossenbruggen, P.J., Systems analysis for Civil Engineering, John Wiley & Sons, 1984.
2. Rao., S.S Optimization theory and applications, Wiley Eastern Ltd., New Delhi, 1985.
3. Majid,K.I., Optimum Design of Structures, Butter-Worth and Co., Ltd., London, 1974.

Reference Books

1. Kalyanmoy Deb, Optimization for Engineering Design, Prentice Hall of India, Private Ltd., New Delhi, 1996.

CEE 83 ADVANCED OPEN CHANNEL FLOW

Unit-I

Introduction: Geometrical Elements of open channel - Velocity distribution, Coefficients and their determination - Pressure distribution.

Uniform Flow: Energy and momentum Principles applied to prismatic and non-Prismatic channels - Critical flow - Computation and applications. Uniform flow-Manning's and Chezy's equations, Determination of Manning's and Chezy's constants - Computation of uniform flow - Applications of uniform flow concepts, Design of channels for uniform flow - Non-Erodable channels.

Unit-II

Gradually Varied Flow: Theory and analysis, methods of computation,, graphical integration, direct integration, direct step and standard step methods - Computer applications.

Unit-III

Spatially varied flow: Spatially varied flow - Dynamic equation, analysis flow profile, Numerical integration and isoclinal method.

Unit-IV

Rapidly Varied Flow: Rapidly varied flow - characteristics - Flow over spillways.

Unit-V

Unsteady Flow: Unsteady flow – Dynamic equation for unsteady gradually varied flow, uniformly progressive flow - Wave propagation. Rapidly varied unsteady flow - Moving hydraulic pump - positive and negative surges - Surges in power canals, Navigation canals, transitions & Canal junctions.

Flood Routing: Introduction to Flood routing.

Text Books

1. Subramanya, K., Flow in Open channels, TMH, 2007.
2. Ranga Raju, K.G., Flow through open channels, TMH, 2007.

Reference Books

1. Chow, V.T., Open Channel Hydraulics, ISE, McGraw Hill, 1986.
2. French,R.H., Open Channel Hydraulics, ISE, McGraw Hill, 1986.
3. Das, M.M., Open Channel Flow, Prentice Hall of India (P) Ltd, 2008.

CEE 84 GROUND WATER HYDROLOGY

Unit-I

Introduction: Utilization of Groundwater - need for ground water, advantages of Groundwater and Groundwater in Hydrological cycle - types of aquifers, Groundwater Movement: Porosity - Specific yield - Storage coefficient - Permeability and transmissibility - Laboratory and field measurement of permeability. Basic Principles and Fundamental Equation of continuity - Darcy's law - General differential equation governing groundwater flow for steady and unsteady flows - Application to aquifers - Flow nets.

Unit-II

Well Hydraulics: Steady flow to a well in a confined aquifer, unconfined aquifer and a leaky confined aquifer - Unsteady flow to a well in a confined aquifer, an unconfined and a leaky confined aquifer-Effect of storage in a well of finite diameter - Partially penetrating wells - Method of images - Analysis of pump test data for the above aquifers - Problems.

Unit-III

Water wells: Types of wells - well design - construction - well development - Testing of wells for well yield - well completion and sanitary protection of wells.

Unit-IV

Model studies of Groundwater: Sand models - Electrical analog models -Viscous models - Membrane - Digital computer models, application of F.D. and F.E. methods (Elementary Treatment only).

Unit-V

Exploration Techniques: Different methods of Groundwater exploration. Artificial Recharge: Necessity - Different methods of artificial recharge - Selection of method - Examples of artificial recharge schemes adopted in India and abroad.

Text Books

1. Todd . D.K., Groundwater Hydrology, Johnwiley and Sons, New York.
2. Raghunath, H.M. ,Ground water, Wiely Eastern, New Delhi, 1989.

Reference Books

1. Jacob Bear , Hydraulics of Groundwater, McGraw Hill, 1979.
2. Walton W.C., Groundwater Resources Evaluation, McGraw Hill Book Co., New York.
3. Abdel, Aziz Ismail Kashef, Groundwater Engineering, McGraw Hill Book Co., New York.

CEE 85 WATER RESOURCES SYSTEM ENGINEERING

Unit-I

Introduction: Scope and steps in systems Engineering - History of systems approach to water resources planning and management - Role of optimization models.

Unit-II

Optimization Techniques: Introduction to optimization - Classical optimization techniques, single and multivariable optimizations with and without constraints - Linear programming, simplex and revised simplex methods.

Unit-III

Duality in linear programming - Non linear programming - Dynamic and mixed integer programming - application of simulation techniques to water resources systems - Statistical decision theory and queueing theory.

Unit-IV

Application to water resources engineering: Objective and valuation criteria - input and demand analysis - System element and planning of subsystem, conveyance and storage subsystems and Irrigation system.

Unit-V

Application of various optimization techniques to water resources systems.

Text Books

1. Chaturvedi, M.C., Water Resources Systems Planning and Management, T.M.H., 2001.

Reference Books

1. Rao, S.S., Optimization theory and applications, Wiley Eastern Ltd., New Delhi, 2002
2. Stank, R.M., Nicholls, R.L., Mathematical foundations for design, McGraw Hill Publishers Co., 1972.
3. Kottegoda, N.T., Stochastic water Resources Technology, Macmillan, 1980.
4. James, L.G., Principles of Farm Irrigation System design, John Wiley and Sons, 1980.

CEE 86 MACHINE FOUNDATIONS

Unit-I

Introduction, nature of dynamic loads free vibrations of spring mass systems, forced vibrations viscous damping, principles of vibration measuring equipments.

Unit-II

Dynamic properties of soils: Elastic properties of soils, coefficient of elastic uniform and non uniform compression and shear, effect of vibration on the dissipative properties of soils , determination of dynamic properties of soils , Codal provisions.

Unit-III

Analysis and design of block type machine foundations: Review of methods for dynamic analysis- modes of vibration, foundations for machines inducing periodical forces and impact type forces.

Unit-IV

Design of framed foundations for high speed machinery: Special consideration in planning, principles design criteria, structural design- foundations for miscellaneous machines.

Unit-V

Vibration isolation, passive and active isolation, use of springs and springs and damping materials, construction aspects of machine foundations.

Text Books

1. Barkon,D.D., Dynamics of basis of foundation, MGH,1974.
2. Bowle's.J.E., Foundation Analysis and design,4th edition,MGL,1998.

Reference Book

1. Arora.K.R., Soil mechanics and foundation Engineering,SPD,2001

CEE 87 EARTH RETAINING STRUCTURES

Unit-I

Introduction, development of earth pressure theory, classical solutions, graphical techniques, active ,passive cases, earth pressure due to external loads, Empirical approaches, arching of soil pressure in soils, grain elevators and coal bunkers.

Unit-II

Soil properties for retaining walls, forces on retaining walls, stability of retaining walls. Design of gravity and semi gravity , counter fort, cantilever retaining walls.

Unit-III

Types of sheet pile walls, analysis of cantilever and anchored sheet pile walls, Row's theory and moment reduction, soil pressure on braced sheeting.

Unit-IV

Types and uses of coffer dams- analysis and design of cofferdams and design of diaphragm cofferdam, construction methods of double wall sheet pile cofferdams and moveable cofferdams.

Unit-V

Shoring and underpinning- earth pressure measuring techniques- load test on anchors prevention of slope failure.

Text Books

1. Das, B.M., Principles of foundation Engineering, PWS, Kent and Co,1999.
2. Arora.K.R., Soil mechanics and foundation Engineering,SPD,2001

Reference Books

1. Bowle's.J.E., Foundation Analysis and design,4th edition,MGL,1998.

CEE 88 AIR AND NOISE POLLUTION

Unit-I

Introduction: Definition of clean air –air pollutants - Sources and classification
Effects of air pollution on man, animal, vegetation and properties -Ambient Air Quality Standards, Air pollution control legislation.

Unit-II

Meteorology and Air pollution – Atmospheric stability – Inversions – Mixing height –Plume behaviour – Plume rise estimation – Effluent dispersion theories –Air pollutants Modelling.

Unit-III

Control of Air pollutants: particulates – Filters – Gravitational settling chambers – Centrifugal-multiple type cyclones – Collection efficiency - Electrostatic precipitators – Wet collectors-Centrifugal spray scrubbers - Venturi scrubbers.

Unit IV

Gaseous pollution control – Absorption - Principles – Description of equipment, Adsorption – Principal adsorbents – Equipment descriptions – Condensation – Contact condensers Incineration –Equipment description

Unit-V

Sound and noise - Source of noise pollution - Environmental and industrial noise -Effects of noise pollution - Fundamentals of sound - generation, propagation, etc., Sound measurement, sound level meters – Measures for prevention and control of noise - Environmental and industrial noise - Noise control legislation.

Text Books

1. Rao.M.N. et al., Air Pollution, Tata Mc.Graw Hill, 1998.
2. Environmental Pollution Control Engineering By C.S. Rao, New Age International Publishers, 2006

Reference Books

1. Noel de Nevers, Air Pollution Control Engineering, Mc.Graw Hill, New York. 1995.
2. Stern, A.C., Air Pollution , Vol.I, II and III, Academic Press, 1962.
3. Cunniff, P.F., Environmental Noise Pollution, John Wiley and Sons, New York, 1981.

CEE 89 ENVIRONMENTAL IMPACT ASSESSMENT

Unit-I

Historical perspective of environmental protection laws and acts in India - Definition of EI, EIA, EIS - Industrial policy statement of the Government of India. Legal and Regulatory aspects in India - Types and Limitations of EIA - Minimum National Standards – Bureau of Indian Standards - WHO standards.

Unit-II

EIA methodologies – Appropriate Methodologies, Quantification, - Cost benefit analysis - Risk assessment, Test Model format - Preliminary assessment

Unit-III

Air quality impact: Background - Typical considerations and factors, air quality impact of industry, transport systems, mitigation methods. Water quality impact: Water quality criteria and standards, Field Surveys water quality- impacts by developmental projects – Land and soil quality impacts- Soil fertility and remediation. Noise impact: Noise and sound, the effects of noise on people, noise scales and rating methods, estimating transportation noise impact.

Unit-IV

Energy Impact: Energy impact considerations, data sources, energy conservation data, EIA of hydro, thermal and nuclear power plants, Vegetation and Wild life impact: Biological concepts and terms, impact on flora and fauna, mitigating measures, alternatives - Types, steps in performing socio economic impact assessment, analysis of public services and facilities, impacts, social impacts

Unit-V

Summarization of environmental impacts - Environmental Management plan, Public involvement - impacts of economic profile of the community, Exchange of information - comparison of alternatives- Training

References Books

1. Canter, L.W., Environmental Impact Assessment, Mc Graw Hill, New York, 1996.
2. Petts, J., Handbook of Environmental Impact Assessment Vol.I and II, Blackwell Science, London, 1999.
3. Environmental assessment of development projects, United Nations Asia and Pacific Development Centre, Kuala Lumpur, 1983.
4. John, G. Rau and David C. Wooten (Ed), Environmental Impact Analysis Hand Book, McGraw Hill Book Co., 1980.
5. Peter Wathern (ed), Environmental Impact Assessment, Theory and practice, Unwin Hyman Ltd., London, 1988.
6. Munn, R.E., (ed), Environmental Impact Assessment, Principles and Procedures, Published on behalf of SCOPE, Unwin Brothers Ltd., London, 1979.

CEE 810 DOCK AND HARBOUR ENGINEERING

Unit –I

Growth and regulation of Ports: History of Port – Classification of Harbours - Factors affecting the growth of Port. - Requirement of a Harbour - General Planning – Port capacity –traffic analysis - Berth occupancy – financial evaluation - EIA -Description of selected Indian ports.

Unit – II

Harbour Planning (Technical) Site investigation – harbour entrance - Navigational Channel – Depth of harbour – Turning basin – Anchor basin – berthing area – Storage area - Shipping terminal facilities – Essentials of passenger terminal, dry bulk cargo terminal, Liquid bulk cargo terminals and container terminals.

Unit-III

Introduction to ocean waves – Wave transformation – Wave and wind climate inside Harbour - Break waters: Types – Factors determining their selection – Forces on break waters – Design of rubble mound and vertical break waters – Physical Model Studies.

Unit-IV

Berthing structures – Types – Loads – Selection of berthing structures – Design principles of diaphragm walls, dolphins and piles. Selection and Design principles of Dock fenders and Mooring accessories.

Unit – V

Design principles of dock structures - Graving dry dock – Slip way – floating dry dock - Monitoring and repair of harbour structures - Dredging - Navigational aids – Light house.

References

1. Harbour and Coastal Engineering (Indian Scenario) Vol - I & Vol – II; S. Narasimhan & S. Kathioli, NIOT- Chennai
2. Design and construction of Port and marine Structures – Alonzo Def. Quinn – McGraw – Hill book Company
3. IS: 7314 1974 - Glossary of terms relating to Port and harbour Engineering.
4. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – I) Site Investigation.
5. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – II) Earth Pressure.
6. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – III) Loading.
7. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – IV) General Design Consideration.
8. IS: 4651 - Code of practice for Planning and Design of Port and harbour (Part – V) Layout and functional Requirement.

CEE 811 TRAFFIC ENGINEERING AND MANAGEMENT

Unit – I

Elements of Transportation Engineering : vehicle characteristics like weight , size, turning radius, concept of design vehicle. Human and Driver characteristics – PIEVE theory, comfort, concept of design driver. Road characteristics – surface conditions, slopes and curves. Control mechanisms. Terminal facilities.

Unit – II

Highway geometric design : introduction, road cross section parameters. Horizontal curves, vertical curves, channelization design. Fundamentals of traffic flow, uninterrupted traffic flow, Interrupted traffic flow, speed studies and analysis, Highway capacity studies and analysis,

Unit – III

Traffic Signal: Fixed and vehicle actuated signals - Optimum cycle length - Warrants for signals - Saturation flow - Signal co-ordination - Area traffic control - Design of signalized and un-signalized intersections. Design of interchanges, Design of roundabouts. Road signs- test of the sign. Lettering and placement of signals.

Unit-IV

Traffic Regulation and Safety: Regulation of speed - Vehicle and road users – Parking regulations - Parking and Traffic Control : Parking studies - Design of parking lots - Traffic signs - Road markings at different locations - Speed breaker Accident investigation - Accident data analysis.

Unit-V

Traffic Management: Legislation enforcement and education for traffic safety, Cost of road accidents, Measures for accident reduction Segregation of traffic, Tidal flow operation, Exclusive bus lane, oneway streets, Street lighting, Noise barrier.

Text Books

1. Kadiyali,L.R., Traffic and Transportation Engineering, Khanna Technical Publications, Delhi, 2003.
2. Khanna, K and Jussto C.E.G., Highway Engineering, Khanna Publishers,Roorkee , 2006.

Reference Books

1. Wofgang.S., Hamburger, Transportation and Traffic Engineering Hand Book, Prentice-Hallo,New Jersey, 2002.
2. Louis,J Pignataro, Traffic Engineering - Theory and Practice, Prentice-Hall Inc., New Jersey, 2003.
3. James.L. Pline, Traffic Engineering Hand Book, Prentice Hall, New Jersey, 2002.
4. Salter. S. A. Highway Traffic analysis and design, Prentice Hall, New Jersey,2003
5. Partha Chakroborthy and Animesh Das, "Principles of Transportation Engineering", Prentice Hall of India Pvt. Ltd., New Delhi – 110001, 2003

CEE 812 PHOTOGRAMMETRY AND REMOTE SENSING

Unit-I

Introduction: History – distinction between aerial & terrestrial photographs – comparison of map and aerial photographs.

Unit-II

Aerial cameras – single vertical aerial photographs – coordinate system – comparators – scale of vertical aerial photograph – relief displacement.

Stereoscopic viewing – stereoscopes – vertical exaggeration – parallax bar – height determination. Elementary method of map making – radial line triangulation – mosaics – types of mosaics and its uses. Tilted photographs, oblique photographs, rectification, ortho photographs (elementary treatment only). Flight planning-end lap and side lap – scale, flying height, season year.

Unit-III

Photographic interpretation: Fundamentals of Aerial photo interpretation – photographic elements – interpretation keys.

Unit-IV

Introduction to Remote Sensing: Definition-history-electromagnetic radiation-reflected and emitted electromagnetic energy-interaction of EMR with atmosphere and Earth surface – platforms-sensors-types of satellites and their orbits, Image enhancement, Image classification.

Unit-V

Application of Photogrammetry & Remote Sensing: Application of aerial photographs and satellite imagery – merits – applications in highway engineering, environmental engineering, water resources engineering, topographic mapping and geology.

Text Books

1. Wolf, P.R., Elements of Photogrammetry, McGraw Hill Inc., 1983.
2. Lillesand, T.M., and Kiefer, R.W., Remote Sensing and Image Interpretation, John Wiley and Sons, New York, 1979.

CEE 813 PREFABRICATION AND CONSTRUCTION TECHNIQUES

Unit – I

Materials, admixtures, pigments – Modular Co-ordination and standardization, System of prefabrication-Principles of production techniques.

Unit – II

Precast concrete components – Precasting and Prefabrication techniques, Planning, analysis and design considerations – Handling techniques – Transportation and erection of structures.

Unit- III

Skeletal and large panel construction, space structures – Joints in construction – curing techniques.

Unit- IV

Appropriate technology for cost effective techniques for roof, wall, door, water tanks etc.

Unit- V

Quality control –Repairs and economical aspects in prefabrication.

Text Books

1. Livitt, H.M. Precast concrete – Materials, manufacture, Properties and usage, Applied science publications, 1992.
2. Richardson, J.G., Precast Concrete Production, Cement and Concrete association, London, 1973.
3. Bruggeling, A.S.G., Huyghe, G.T., Prefabrication with concrete, A.A. Balkama Publishers, U.S.A., 1991.

Reference Books

1. Madhava Rao, A.G., et.al. – Modern trends in housing and developing countries Oxford & I B H Publishing Co., 1985.
2. Levicki, B., Building with Large Prefabrications, Elsevier Publishers.
3. Large Panel Prefabricated Constructions, Proc. of course conducted by SERC, Chennai.

CEE 814 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Unit – I

Elements of seismology - Definitions of Magnitude, Intensity, Epicenter, etc., General features of tectonics of seismic regions, Seismographs. Seismic zones as per IS 1893-2002.

Unit – II

Theory of vibrations - Free vibrations of single degree, two-degree and multiple degree freedom systems, damping ratio, logarithmic decrement , Transmissibility, Response spectra

Unit – III

Principles of earthquake resistant design – Methods of dynamic analysis – Choice of the method - Architectural requirements of buildings – Plan and vertical irregularities .

Unit – IV

Behaviour of reinforced concrete and steel elements under cyclic loading – Confinement- Ductility and absorption of energy- Introduction to Indian Standard Codes - IS:4326 – 1993 and IS13920-1993.

Unit –V

Design of RC frames for earthquake loads – calculation of loads as per IS 1893 – 2002 – Load combinations - Design of beams and columns for earthquake resistance.

Textbooks

1. Pankaj Agrarwal & Manish Shrikhande “Earthquake resistant Design of Structures” Prentice Hall of India Pvt Ltd. New Delhi, 2007.
2. Mario Paz. “Structural Dynamics – Theory & Computations” CSB Publishers & Distributors Shadhdara, Delhi 1985.

Reference Books

1. Anil K.Chopra, “Dynamics of Structures Theory and Applications to Earthquake Engineering” Prentice Hall of India (P) Ltd., New Delhi 1996.
2. Pauley T and Priestley M.J.N, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley & Sons, New York, 1992.
3. Stratta, J.L “Manual of seismic Design” Prentice Hall Inc. NJ 1987.

CEE 815 STRUCTURAL DYNAMICS

Unit- I

Single – Degree of Freedom Systems, Analytical Models, Equation of Motion, Free Vibration, Damping, Types of damping, Response to harmonic loading, Resonance, Support motion, Transmissibility, Vibration isolation .

Unit- II

SDOF system subjected to periodic & impulsive loading, Fourier series loading, Rectangular pulse, Introduction to Frequency Domain analysis

Unit- III

SDOF systems subjected to general dynamic loading, Duhamel's integral, Application to simple loading cases, numerical evaluation of response integral.

Unit- IV

MDOF systems, selection of DOFs, formulation of equations of motion, Structure matrices, Static condensation, Free Vibration Eigen Value problem, Frequencies and Mode Shapes, Determination of natural frequencies and mode shapes by Stodola- Vianello method, Rayleigh method Orthogonality conditions.

Unit -V

Distributed- parameter Systems Free and forced Vibration of beams .

Text Books

1. Chopra A.K. , Dynamics of Structures, Dhanapat Rai & Sons, New Delhi.
2. Structural Dynamics - Mario Paz, CBS Publications, New Delhi.

References

1. Clough R. M. and Ponian, Dynamics of Structures –,McGraw Hill co.New Delhi.
2. Craig R.R , Structural Dynamics – An Introduction to Computer Methods, John Wiley and Sons, 1981.

CEE 816 THEORY OF ELASTICITY AND PLASTICITY

Unit I

Analysis of stress and strain - state of strain at a point - compatibility equations - generalized Hooke's Law - plane stress and plane strain.

Unit II

Airy's stress function - polynomials - biharmonic equations - Two dimensional problems in Cartesian co-ordinates- Bending of a simple beam under uniform load – Triangular Gravity Wall .

Unit III

Solution of plane problems in Polar coordinates – Differential equation in polar coordinates – Hollow cylinder subjected to uniform pressure – Pure bending of curved beams – Rotating Disks

Unit IV

General solution of problems - Torsion of prismatic bars by displacement (warping function) force (Prandtl's stress function) torsion of shafts of circular and non circular cross sectional shapes only (Elliptic, Triangular and Rectangular) - Torsion of thin rectangular sections and hollow thin walled sections.

Unit V

Introduction to problems in plasticity - Physical assumption - Criterion of yielding - Rankine theory - St. Venant's theory - Flow rule (Plastic stress - strain relationship - Elastic Plastic problems of beams in bending - plastic torsion - sand heap analogy.

References

1. Chakrabarty, "Theory of Plasticity", Tata McGraw Hill Book Co., New Delhi, 1975
2. Wang. C.K., "Applied Elasticity", Mc Graw Hill, New Delhi, 1990
3. Timoshenko.S. and Goodier. J.N. "Theory of Elasticity" Mc Graw Hill Book Co., New York, 1988
4. Sadhu Singh "Theory of Elasticity" Khanna Publishers, New Delhi, 1988
5. Zhilun Xu , "Applied Elasticity", Wiley Eastern Limited, New Delhi,1980

CEE 817 DESIGN OF INDUSTRIAL STRUCTURES

Unit I

Classification of Industrial Structures - Layout requirements - lighting and Ventilation - protection against noise and vibration - fire safety - factories act.

Unit II

Roofing configuration – types of trusses - Beams and lattice trusses - Type of roof covering materials - purlins - detailed design.

Unit III

Silos and Bunkers - Shape of hopper for different materials - design of vertical sides - hopper bottom - stiffening girder - staging -design - Conveyors and supporting structures.

Unit IV

Gable frames of uniform cross sections - varying depth – pin-jointed knee bracings - design of joints - analysis by various methods.

Unit V

Load Analysis and design of Transmission line Towers - Substation structures - Foundation analysis - Design Principle only.

Reference Books

- 1 Punmia .B.C.,. Jain A.K, Arun Kumar Jain , "Comprehensive R C C Designs", Laxmi Publications (P) Ltd., New Delhi, 1998
2. Lothar, "Advance Design in Steel Structure", Prentice Hall, USA, 1980
3. Salmon. C.G. and Johnson J.E. "Steel Structure - Design and Behaviour", Harper and Row - 1980
4. Wiliam McGuire - "Steel Structures", Prentice Hall of India New Jersey, 1968
5. Arya and Ajmani, "Design of Steel Structures" Nem Chand Bros, Roorkee, 1990
6. Dayaratnam. P. "Design of -Steel Structures", Wheeler & Co., New Delhi, 1999.