



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System (CBCS) Civil Engineering Scheme of Examination w.e.f. 2016-17 Semester-III/Year :II

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz					
1	MA-112	Mathematics -III	60	30	10				3	1		4	100
2	CE-302	Transportation Bridge&Tunnels	60	30	10				3	1		4	100
3	CE-303	Strength of Material	60	30	10	20	20	10	3	1	2	5	150
4	CE-304	Engineering Geology	60	30	10	20	20	10	3	1	2	5	150
5	CE-305	Building Drawing &Design	60	30	10	20	20	10	3	1	2	5	150
6	CE-306	Java Programing				50	50	50			2	1	150
7	CE-307	Critical Thinking					50	50			2	1	100
8	CE-308	Self Study &Seminar / Group Discussion (Internal Assessment)					50	50			2	1	100
TOTAL			300	150	50	110	210	180	15	5	12	26	1000

L: Lecture

T:Tutorial

P:Practical



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System (CBCS)

Civil Engineering

Scheme of Examination w.e.f. 2016-17

Semester-IV/Year :II

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz					
1	CE-401	RCC Design-I	60	30	10				3	1		4	100
2	CE-402	Concrete Technology	60	30	10				3	1		4	100
3	CE-403	Highway&Airport Engineering	60	30	10	20	20	10	3	1	2	5	150
4	CE-404	Fluid Mechanics-I	60	30	10	20	20	10	3	1	2	5	150
5	CE-405	Surveying	60	30	10	20	20	10	3	1	2	5	150
6	CE-406	Auto Cad Lab				50	50	50			2	1	150
7	CE-407	Mental Ability					50	50			2	1	100
8	CE-408	Self Study &Seminar / Group Discussion (Internal Assessment)					50	50			2	1	100
TOTAL			300	150	50	110	210	180	15	5	12	26	1000

L: Lecture

T:Tutorial

P:Practical



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System (CBCS)

Civil Engineering

Scheme of Examination w.e.f. 2016-17

Semester-V/Year :III

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz					
1	CE-501	Steel Design-I	60	30	10				3	1		4	100
2	CE-502	Structural Design-I (TOS-I)	60	30	10				3	1		4	100
3	CE-503	Water Resources&Irrigation Engg.	60	30	10				3	1		4	100
4	CE-504	Fluid Mechanics-II	60	30	10	20	20	10	3	1	2	5	150
5	CE-505	Environmental Engg.-I	60	30	10	20	20	10	3	1	2	5	150
6	CE-506	3D-MAX				50	50	50			2	1	150
7	CE-507	Industrial Training				50	50	50			4	2	150
8	CE-508	Self Study &Seminar / Group Discussion (Internal Assessment)					50	50			2	1	100
TOTAL			300	150	50	140	190	170	15	5	12	26	1000

L: Lecture

T:Tutorial

P:Practical



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System (CBCS)

Civil Engineering

Scheme of Examination w.e.f. 2016-17

Semester-VI/Year :III

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz					
1	CE-601	RCC Design-II	60	30	10				4	3	1		100
2	CE-602	Structural Design-II (TOS-II)	60	30	10				4	3	1		100
3	CE-603	Geotech Engg.-I	60	30	10	20	20	10	5	3	1	2	150
4	CE-604	Quantity Surveying&Costing	60	30	10	20	20	10	5	3	1	2	150
5	CE-605	Environmental Engg.-II	60	30	10	20	20	10	5	3	1	2	150
6	CE-606	Engineering Design Project				50	50	50	1			2	150
7	CE-607	Eathics&Valuable					50	50	1			2	100
8	CE-608	Self Study &Seminar / Group Discussion (Internal Assessment)					50	50	1			2	100
TOTAL			300	150	50	110	210	180	26	15	5	12	1000

L: Lecture

T:Tutorial

P:Practical



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System (CBCS)

Civil Engineering

Scheme of Examination w.e.f. 2016-17

Semester-VII/Year :IV

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz					
1	CE-701	Steel Design-II	60	30	10				3	1		4	100
2	CE-702	Design of Hydraulic Structure	60	30	10				3	1		4	100
3	CE-703	Geotech Engg.-II	60	30	10	20	20	10	3	1	2	5	150
4	CE-704	Elective-I	60	30	10				3	1		4	100
5	CE-705	Elective-II	60	30	10				3	1		4	100
6	CE-706	Staad Pro Lab				50	50	50			2	1	150
7	CE-707	Major Project-I				50	30	20			4	2	100
	CE-708	Entrepreneurship					50	50			2	1	100
8	CE-709	Self Study & Seminar / Group Discussion (Internal Assessment)					50	50			2	1	100
TOTAL			300	150	50	120	200	180	15	5	12	26	1000

L: Lecture

T:Tutorial

P:Practical



SARVEPALLI RADHAKRISHNAN UNIVERSITY, BHOPAL

Grading System (CBCS)

Civil Engineering

Scheme of Examination w.e.f. 2016-17

Semester-VIII/Year :IV

S. No.	Subject Code	Subject Name	Maximum Marks Allotted						Hours/Week			Credit	Total Marks
			Theory			Practical			L	T	P		
			End Sem.	Mid Sem	Quiz, Assignment	End Sem	Lab work	Assignment / Quiz					
1	CE-801	Major Project-I				300	150	150				16	600
2	CE-802	Comprehensive Viva				100	50	50				6	200
3	CE-803	Self Study & Seminar / Group Discussion (Internal Assessment)					100	100			8	4	200
TOTAL						400	300	300				26	1000

L: Lecture

T:Tutorial

P:Practical



MA-112 - ENGINEERING MATHEMATICS-III

Unit I

Functions of complex variables : Analytic functions, Harmonic Conjugate, Cauchy- Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem , Application of Residues theorem for evaluation of real integrals

Unit II

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi , Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

Unit III

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

Unit IV

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

Unit V

Concept of Probability : Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution ,Gamma Distribution ,Beta Distribution ,Testing of Hypothesis |:Students t-test, Fisher's z-test, Chi-Square Method

Reference:

(i)Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.

(ii)Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication

(iii)Mathematical Methods by KV Suryanarayan Rao, SCITECH Publuication (

iv)Numerical Methods using Matlab by Yang,Wiley India (v)Pobability and Statistics by Ravichandran ,Wiley India

(vi)Mathematical Statistics by George R., Springer



CE- 302 Transportation Bridges and Tunnels

Unit-I

Tunnels: Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts, Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.

Unit-II

Bridge Site Investigation and Planning; Loading Standards & Component parts: Selection of site, alignment, Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges, Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system, choice of super structure collection of bridge design data: essential surveys, hydraulic design, scour, depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges.

Unit-III

Bridge Foundations, Construction, Testing and Strengthening of Bridges: Different types of foundation: piles and wells, sinking of wells, coffer-dams. Inspection and Data collection, strengthening of bridges, Bridge failure. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants.

Unit IV

Introduction, Tractive resistances & Permanent way: Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations, Route surveys and alignment, railway track, development and gauges, Hauling capacity and tractive effort. **Rails:** types, welding of rails, wear and tear of rails, rail creep. **Sleepers:** types and comparison, requirement of a good sleeper, sleeper density.

Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails. **Ballast:** various materials used as ballast, Requirement of good ballast, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track

Unit V

Geometric Design; Station & Yards; Points and Crossings & Signaling and interlocking: Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves. Types, locations, general equipments, layouts, marshalling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and inter-locking.

References

1. Chakraborty and Das; Principles of transportation engineering; PHI
2. Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3. Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4. Ponnuswamy; Bridge Engineering; TMH
5. Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons



CE- 303 Strength of Materials

Unit 1

Simple Stress and Strains: Concept of Elastic body, stress and Strain, Hooke's law, Various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses. Complex

Stress and Strains: Two dimensional and three dimensional stress system., Principal Planes, Principal Stresses and strains, Normal and tangential stresses, Mohr's circle of stresses, Combined Bending and Torsion, Theories of failure.

Unit 2

Bending & Deflection: Theory of simple bending: Concept of pure bending and bending stress, Equation of bending. Neutral axis, Section-Modulus, Determination of bending stresses in Cantilever simply supported, and Overhanging beams subjected to point load and uniformly Distributed loading. Bending & shear stress distribution across a section in Beams. Deflection of beams: Double Integration Method. Conjugate Beam Method, Macaulay's Method Area Moment Method.

Unit 3

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts, Open and closed coil springs, Leaf Spring, Spiral Spring, Pressure Vessels: Thin and Thick walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume, Compound cylinders and shrink fittings.

Unit 4

Columns and Struts: Euler's buckling load for uniform section, various end conditions, slenderness Ratio, Stress in columns, Rankine formulae, Eccentric loading on columns.

Unit 5

Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

Reference

1. Nash; Strength of Materials (Schaum), TMH.
2. Rattan SS; strength of Materials; TMH
3. Negi; Strength of materials; TMH
4. Sadhu Singh; Strength of Materials, ,
5. Ramamrutham; Strength of Materials, ,
6. Subramaniam; Strength of Materials; R; Oxford
7. National Building Code of India, Part-IV

List of Experiments

The experimental work to cover tension, compression, bending and impact test etc. on steel, cast iron, RCC and timber, Fire Resistant Test of Structures and Combustibility of Building Materials Test as per I.S.I. and other experiments based on the syllabus.



CE- 304 Engineering Geology

Unit 1

Introduction and Physical Geology: Objects and scope of geology. The crust and the interior of the earth, origin and age of the earth, Sub-aerial and sub-terrain weathering, denudation and deposition, wind, river, glacial and marine erosion, volcanoes, soil formation, soil profile, geological classification of soil and concept of earthquake Plate- tectonics.

Unit 2

Mineralogy and Crystallography: Fundamentals of mineralogy, study of common rock forming minerals, ores and minerals of economic importance to civil engineering., elements of crystallography and introduction to crystal systems.

Unit 3

Structural Geology: Structures related to rocks, Dip, Strike and outcrops, Classification and detailed studies of geological structures i.e. folds, Faults, Joints, Unconformity and their importance in Civil Engineering.

Unit 4

(1) Petrology: Composition of earth's crust, study of igneous, sedimentary and Metamorphic rocks and their formation, characteristics classification, Rocks of civil engineering importance.

(2) Geology of India: Physical features of India, Brief geological history of India, occurrence of important ores and minerals in India.

Unit 5

Applied Geology: Introduction to applied geology and its use in civil engg. properties of rocks, selection of sites for roads, bridges, dams, reservoirs and tunnels. Prevention of Engineering structures from seismic shocks, stability of hill sides, water bearing strata, artesian wells, Use of remote-sensing techniques in selection of above sites.

Reference:

1. Prabin Singh – “Engineering and General Geology”
2. Gulati ; Geotechnical Engineering; TMH
3. P.K. Mukerjee – “ A text Book of Geology”
4. S.K. Garg – “ A text Book of Physical and Engineering Geology”

List of Experiment (Expandable)

1. Identification of simple rock forming minerals and important ores.
2. Identification of rock
3. Simple map Exercises.
4. Field Visit / Geological Excursion



CE - 305 Building Design & Drawing

Unit 1

Drawing of Building Elements – Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, stairs and staircase, trusses, flooring, roofs window and ventilator, lintels and arches, etc.

Unit 2

Building Planning – Provisions of National Building Code, Building bye-laws, open area, set backs, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

Unit 3 Building Services – Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

Unit 4

Design and Drawing of Building – Design and preparation of detailed drawings of various types of buildings like institutional buildings ,residential building, and commercial buildings, detailing of windows,doors, , ventilators and staircases etc.

Unit 5

Perspective Drawing – energy efficient buildings, Elements of perspective drawing involving simple problems, one point and two point perspectives,.

References

1. Nidhi Gupta, Rohit Sahu & Kundan Meshram; Building Design and Drawing; Ardent Publication
2. Malik & Meo; Building Design and Drawing
3. Shah, Kale & Patki; Building Design and Drawing; TMH
4. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling

List of Experiments (Expandable)

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to all student)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).
6. Use of AutoCAD for preparation of drawings.



CE- 306 Computer Programming

UNIT-I

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

UNIT-II

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

UNIT-III

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

UNIT-IV

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

UNIT-V

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

References:

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide to Java Programming", Techmedia.
5. Merlin Hughes, et al; Java Network Programming , Manning Publications/Prentice Hall



List of Program to be perform (Expandable)

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write a Program to show Inheritance
6. Write a program to show Polymorphism
7. Write a program to show Interfacing between two classes
8. Write a program to Add a Class to a Package
9. Write a program to demonstrate AWT.
10. Write a program to Hide a Class
11. Write a Program to show Data Base Connectivity Using JAVA
12. Write a Program to show "HELLO JAVA " in Explorer using Applet
13. Write a Program to show Connectivity using JDBC
14. Write a program to demonstrate multithreading using Java.
15. Write a program to demonstrate applet life cycle.



CE-307 Critical Thinking

CE-308 Self Study / Seminar / Group Discussion (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.



CE- 401 RCC DESIGN-I

Unit - I.

Basic Principles of Structural Design : Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design of singly reinforced beam, Partial load factors.

Unit - II.

Design of Beams: Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement: Redistribution of moments in continuous beams, Circular girders: Deep beams. Design of beam for shear and bond.

Unit -III

Staircases: Staircases with waist slab having equal and unequal flights with different support conditions, Slabless tread-riser staircase

Unit-IV

Design of Slabs: Slabs spanning in one direction. Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions, Flat slabs, Circular slabs, Yield line theory.

Unit -V

Columns & Footings: Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

NOTE: - All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)

Suggested Books: -

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
3. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
4. Plain & reinforced concrete - Rammutham
5. Plain & reinforced concrete – B.C. Punnia
6. Structural Design & Drawing by N.K.Raju.



CE- 402 Concrete Technology

Unit I

Introduction Classification, properties, grades, advantage & disadvantages of concrete, Ingredients of concrete, types of cement, aggregates, water, admixtures, Inspection & testing of materials as per Indian Standard Specifications.

Unit II

Properties of Fresh and Hardened Concrete : Introduction, Workability, Testing of concrete, Factors affecting, Rheology of concrete, Compressive & Tensile strength, Stress and strain characteristics, Shrinkage and temperature effects. Creep of concrete, Permeability, durability, thermal properties & micro-cracking of concrete.

Unit III

Design of Concrete Mix : Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Surkhi and other Pozzolanic materials, design of plastic concrete mix, computer aided design of concrete mix.

Unit IV

Production and Quality Control of Concrete: Production of crushed stone aggregate, batching equipments for production and concreting, curing at different temperatures, Concreting underwater, hot & cold weather condition, statistical quality control, field control, non-destructive testing, repair technology for concrete structures, Inspection & Testing of Concrete.

Unit V

Special Concretes : Ready mix concrete, Vacuum concrete, Ferrocement Light weight concrete, Fiber reinforced concrete, Polymer concrete composites, Shotcrete, Guniting, Rubble concrete, Resin concrete, Prestressed concrete, Heat resistant concrete, Mass concrete, Temperature control of mass concrete.

References:

6. Varshney RS; Concrete Technology; Oxford & IBH publishing co.
7. Gambhir ML; Concrete Technology – TMH
8. Sinha SN; Reinforced Concrete Technology; TMH
9. New Building Materials Published by B.M.T.P.C., New Delhi
10. Hand books on Materials & Technology - Published by BMTPC & HUDCO
11. Mohan Rai & M.P. Jai Singh; Advances in Building Materials & Construction



CE- 403 HIGHWAY & AIRPORT ENGINEERING

Unit - I

High way planning, Alignment & Geometric Design: Principles of highway planning, road planning in India and financing of roads, classification patterns. Requirements, Engg. Surveys for highway location.

Cross sectional elements- width, camber, super-elevation, sight distances, extra widening at curves, horizontal and vertical curves, and numerical problems.

Unit – II

Bituminous & Cement Concrete Pavements: Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance. Advantages and disadvantages of rigid pavements, general principles of design, types, construction, maintenance and joints, dowel bars, tie bars. Brief study of recent developments in cements concrete pavement design, fatigue and reliability.

Unit – III

Low Cost Roads, Drainage of Roads, Traffic Engg. & Transportation Planning: Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, quality control, macadam roads-types, specifications, construction, maintenance and causes of failures.

Surface and sub-surface drainage, highway materials: properties and testing etc. Channelised and unchannelised intersections, at grade & grade separated intersections, description, rotary-design elements, advantages and disadvantages, marking, signs and signals, street lighting. Principles of planning, inventories, trip generation, trip distribution, model split, traffic assignment, plan preparation.

Unit - IV

Airport Planning, Runway & Taxiway: Airport site selection. air craft characteristic and their effects on runway alignments, wind rose diagrams, basic runway length and corrections, classification of airports.

Geometrical elements: taxi ways and runways, pattern of runway capacity.

Unit - V

Airport, Obstructions, Lightning & Traffic control: Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar, VOR enroute traffic control.



List of Experiments:

1. Aggregate Crushing Value Test
2. Determination of aggregate impact value
3. Determination of Los Angeles Abrasion value
4. Determination of California Bearing Ratio values
5. Determination of penetration value of Bitumen
6. Determination of Viscosity of Bituminous Material
7. Determination of softening point of bituminous material
8. Determination of ductility of the bitumen
9. Determination of flash point and fire point of bituminous material
10. Determination of Bitumen content by centrifuge extractor
11. Determination of stripping value of road aggregate
12. Determination of Marshall stability value for Bituminous mix
13. Determination of shape tests on aggregate

Reference Books & Study Materials:

1. Highway Engineering by Gurucharan Singh
2. Principles of Pavement Design by E.J. Yoder & M.W. Witzech
3. Highway Engineering by O'Fleherly
4. Highway Engineering by S.K. Khanna & C.E.G. Justo
5. Airport Planning & Design by S.K. Khanna & M. G. arora
6. Foresch, Charles "Airport Planning"
7. Horonjeff Robert "The Planning & Design of Airports"
8. Sharma & Sharma, Principles and Practice of Highway Engg.
9. Haung, Analysis and Design of Pavements
10. Relevant IRC & IS codes
11. Laboratory Mannual by Dr. S.K. Khanna
12. Highway Engg. By Hews & Oglesby
13. Highway Material by Walker



CE- 404 Fluid Mechanics

Unit-I

Review of Fluid Properties: Engineering units of measurement, mass, density, specific weight, specific volume, specific gravity, surface tension, capillarity, viscosity, bulk modulus of elasticity, pressure and vapor pressure. Fluid Static's : Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems on gravity dams and Tainter gates); buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit-II

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, roto dynamic machines etc.)

Unit-III

Kinematics of Flow : Types of flow-ideal & real , steady & unsteady, uniform & nonuniform, one, two and three dimensional flow, path lines, streaklines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow nets- their utility & method of drawing flow nets.

Unit-IV

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. Fluid Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturimeter, weirs and notches).

Unit-V

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles.

**References: -**

1. Modi & Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechanics and machinery; TMH
3. Essential of Engg Hyd. By JNIK DAKE; Afrikan Network & Sc Instt. (ANSTI)
4. A Text Book of fluid Mech. for Engg. Student by Franiss JRD
5. Fluid Mechanics: RK Bansal
6. Fluid Mechanics; Gupta Pearson.

List of Experiment (Expandable):

1. To determine the local point pressure with the help of pitot tube.
2. To find out the terminal velocity of a spherical body in water.
3. Calibration of Venturimeter
4. Determination of C_c , C_v , C_d of Orifices
5. Calibration of Orifice Meter
6. Calibration of Nozzle meter and Mouth Piece
7. Reynolds experiment for demonstration of stream lines & turbulent flow
8. Determination of metacentric height
9. Determination of Friction Factor of a pipe
10. To study the characteristics of a centrifugal pump.
11. Verification of Impulse momentum principle.



CE- 405 Surveying

Unit-I

Traversing by theodolite, Field work checks, traverse computations, latitude and Departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements, Measurement EDM, Trigonometrical leveling.

Unit-II

Hydrographic Surveying: Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, remote sensing, simple equipments, elements of image interpretation, image-processing systems.

Unit-III

Tachometry: Tachometric systems and principles, stadia system, uses of anallatic lens, tangential system, sublense system, instrument constant, field work reduction, direct-reading tacheometers, use of tacheometry for traversing and contouring.

Unit-IV

Control Surveys: Providing frame work of control points, triangulation principle, co naissance, selection and marking of stations, angle measurements and corrections, baseline measurement and corrections, computation of sides, precise traversing.

Unit-V

Curves: Classification and use; elements of circular curves, calculations, setting out Curves by offsets and by theodolites, compound curves, reverse curves, transition curves, cubic spiral and lemniscates, vertical curves, setting out.

References

8. T.P. Kanetkar, Surveying & Leveling, Vol. I & II.
9. Duggal; Surveying vol I and II; TMH
10. Basak; Surveying and Leveling; TMH
11. R.E.Devis, Surveying theory & Practice, Mc.Graw Hill, New York
12. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co.
13. S.K. Roy, Fundamentals of surveying, prentice - Hall of India New Delhi
14. B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
15. K.R. Arora, Surveying Vol. I & II, standard book House, New Delhi



List of Experiments/ Field work (Expandable):

- (3) Theodolite traversing
- (4) Profile leveling, contouring & cross sectioning
- (5) Determination of tachometric constants & uses of tachometer in various field works
- (6) Curve setting by different methods.



CE-406 AUTO CAD

CE-407 MENTALABILITY

CE-408 Self Study / Seminar / Group Discussion (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.



CE 501 –STEEL DESIGN-I

Unit - I

Various loads and mechanism of the load transfer, partial load factors, structural properties of steel, Design of structural connections -Bolted and Welded connections.

Unit - II

Design of compression members, Tension members, Roof Trusses - Angular & Tubular

Unit - III

Effective length of columns, Design of columns-simple and compound, Lacings & battens. Design of footings for steel structures, Grillage foundation.

Unit-IV

Design of simple beams, Built-up beams, Plate girders and gantry girders.

Unit - V

Design of Industrial building frames, multistory frames, Bracings for high rise structures, Design of transmission towers.

NOTE: - All the designs for strength and serviceability should strictly be as per the latest version of IS:800.

Reference Books :-

1. Design of steel structures by Arya & Azmani Nemchand & Bros, Roorkee
2. Design of steel structures by P.Dayaratnam
3. Design of steel structures Vol. I & II by Ramchandra
4. Design of steel structures by L.S. Negi
5. Design of steel structures by Ramammutham
6. iv) Design of steel structures by Punmia



CE- 502 STRUCTURAL DESIGN-I (TOS –I)

Unit. I

Indeterminate Structures-I : Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by theorem of three moments, Effect of sinking and rotation of supports, Moment distribution method (without sway)

Unit. II

Indeterminate Structures - II : Analysis of beams and frames by slope Deflection method,

Unit. III

Arches and Suspension Cables: Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and temperature effects.

Unit. IV

Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies, strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.

Unit. V

Rolling loads and Influence Lines: Maximum SF and BM curves for various types of Rolling loads, focal length, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches.

Reference Books:

6. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
7. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
8. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
9. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
10. Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill International, Tokyo



CE 503 – Water Resources and Irrigation Engineering

Unit-I

Hydrology : Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

Unit-II

Floods and Ground water: Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge-necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence-causes and effects. Reclamation of water logged and salt affected lands.

Unit-III

Water resources planning and management: Planning of water resources projects, data requirements, economic analysis of water resources projects appraisal of multipurpose projects, optimal operation of projects introduction to linear programming and its application to water resources projects. Role of water in the environment, rain water harvesting, impact assessment of water resources development and managerial measures.

Unit - IV

Irrigation water requirement and soil-water-crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development.

Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods-surface and subsurface, sprinkler and drip irrigation.

Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

Unit - V

Well irrigation: Types of wells, well construction, yield tests, specific capacity level and specific yield, hydraulic design of open wells and tube wells, methods of raising well water, characteristics of pumps and their selection, interference of wells, well losses, advantages and disadvantages of well irrigation.

Canal irrigation: Types of canals, alignment, design of unlined and lined canals, Kennedy's and Lacey's silt theories, typical canal sections, canal losses, linings-objectives, materials used, economics.

Canal falls & cross drainage works, - description and design, head and cross regulators. Escapes and outlets, canal transitions.



Suggested Books:-

1. Engg. Hydrology - J.NEMEC - Prentice Hall
2. Hydrology for Engineers Linsley, Kohler, Paulnus - Tata Mc.Graw Hill.
3. Engg. Hydrology by K. Subhramanya - Tata Mc Graw Hills Publ. Co.
4. Hydrology & Flood Control by Santosh Kumar - Khanna Publishers
5. Engg. Hydrology by H.M. Raghunath



CE- 504 Fluid Mech. – II

Unit-I

Turbulent flow : Laminar and turbulent boundary layers and laminar sublayer, hydrodynamically smooth and rough boundaries, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes.

Pipe flow problems : Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes.

Pipe Network : *Water Hammer (only quick closure case). Transmission of power.

*Hardy Cross Method

Unit-II

Uniform flow in open channels : Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity, Normal and critical slopes, Economical sections, Saint Venet equation.

Unit-III

Non uniform flow in open channels : Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow hydraulic

jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume.

Unit-IV

Forces on immersed bodies: Types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift, lifting vanes, magnus effect.

Pumps:

Centrifugal pumps : Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitation, principle of working and characteristic curves.

Reciprocating pumps: Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.

Unit-V

Fluid Machines:

Turbines : Classifications, definitions, similarity laws, specific speed and unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines: construction & settings, draft tube theory, runaway speed, simple theory of design and characteristic curves, cavitation.



List of Experiment

1. Study the performances characteristics of Pelton Wheel
2. Study the performances characteristics of Francis Turbine
3. Study the performances characteristics of Kaplan Turbine
4. Calibration of multistage (Two) Pump & Study of characteristic of variable speed pump
5. To study the performance & details of operation of Hyd. Ram
6. Determination of coefficient of discharge for a broad crested weir & to plot water surface Profile over weir
7. Study of the characteristic of the Reciprocating pump

Suggested Books & Study Material:

1. Fluid Mechanics - Modi & Seth - Standard Book house, Delhi
2. Open Channel Flow by Rangaraju - Tata Mc Graw - Hill Publishing Comp. Ltd., New Delhi
3. Fluid Mechanics - A.K. Jain - Khanna Publishers, Delhi
4. Fluid Mechanics, Hydraulics & Hydraulic Machanics - K.R. Arora - Standard Publishers Distributors 1705- B, Nai Sarak, Delhi-6
5. Hyd. of open channels By Bakhmetiff B.A. (McGraw Hill, New York)
6. Open Channel Hyd. By Chow V.T. (McGraw Hill, New York)
7. Engineering Hydraulics By H. Rouse
8. Centrifugal & Axial Flow Pump By Stemanoff A.J. New York
9. Relevant IS codes.



CE 505 – Environmental Engg. - I

Unit - I

Estimation of ground and surface water resources. quality of water from different sources, demand & quantity of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

Unit - II

Impurities of water and their significance, water-borne diseases, physical, chemical and bacteriological analysis of water, water standards for different uses. Intake structure, conveyance of water, pipe materials, pumps - operation & pumping stations.

Unit - III

Water Treatment methods-theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment.

Unit - IV

Layout and hydraulics of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection, maintenance of distribution systems, service reservoir capacity and height of reservoir.

Unit - V

Rural water supply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing.

Suggested Books and Reading Materials:-

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi
3. Water & Waste Water Technology by Mark J.Hammer - Prentice - Hall of India, New Delhi
4. Environmental Engineering - H.S. Peavy & D.R.Rowe-Mc Graw Hill Book Company,New Delhi
5. Water Supply & Sanitary Engg. by S.K. Husain
6. Water & Waste Water Technology - G.M. Fair & J.C. Geyer
7. Relevant IS Codes

List of Experiments:

1. To study the various standards for water
2. To study of sampling techniques for water
3. Measurement of turbidity
4. To determine the coagulant dose required to treat the given turbid water sample
5. To determine the conc. of chlorides in a given water samples
6. Determination of hardness of the given sample
7. Determination of residual chlorine by “Chloroscope”
8. Determination of Alkalinity in a water samples
9. Determination of Acidity in a water samples
10. Determination of Dissolved Oxygen (DO) in the water sample



CE 601 – RCC DESIGN-II

Unit I

Earth Retaining Structures: Cantilever and counter fort types retaining walls.

Unit - II

Water Tanks: Tanks on ground and underground tanks: Square, rectangular, circular tanks, Overhead tanks: square, rectangular, circular & intze tanks.

Unit - III

Silos and Bunkers

Unit - IV

T-beam & Slab bridges- for highway loading (IRC Loads).

Prestressing concepts materials, systems of prestressing & losses Introduction to working & limit State Design.

Unit - V

Design of Multistory Buildings - Sway and nonsway buildings, Shear walls and other bracing elements.

Suggested Books: -

1. Advanced R.C.C. Design by Nidhi Gupta & Rohit Sahu, Ardent Publication
2. R.C.C. by B.C. Punmia
3. Essentials of Bridge engineering – D.J. Victor
4. Bridge Engineering - Ponnuswamy
5. Advanced R.C.C. Design by N.K. RAJU
6. N.Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill, New Delhi.
7. Pre stresses concrete – T.Y. Lin



CE 602– STRUCTURAL DESIGN-II (TOS-II)

Unit. I

Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads.
Approximate analysis of multistory frames for vertical and lateral loads.

Unit. II

Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members, analysis of beams and frames by Kani's method.

Unit. III

Plastic analysis of beams and frames.

Unit. IV

Matrix method of structural analysis: force method and displacement method..

Unit. V

Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.

Reference Books:-

- (i) Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
- (ii) Kinney Sterling J. Indeterminate structural Analysis, Addison Wesley.
- (iii) Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
- (iv) Norris C.H., Wilbur J.B. and Utkys. Elementary Structural Analysis, McGraw Hill International, Tokyo.
- (v) Weaver W & Gere JM, Matrix Methods of Framed Structures, CBS Publishers & Distributors, Delhi



CE 603 – Geo Tech Engg. I

Unit - I

Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on engineering behavior. Soil structure. Three phase system. Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.

Unit - II

Soil Water and Consolidation: Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flownet, uses of a flownet, Effective, neutral and total stresses.

Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of preconsolidation pressure, settlement analysis. Calculation of total settlement.

Unit - III

Stress Distribution in Soils and Shear Strength of Soils:

Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

Stress distribution beneath loaded areas by Boussinesq and water gaurd's analysis. Newmark's influence chart. Contact pressure distribution.

Unit - IV

Stability of Slopes: Infinite and finite slopes. Types of slope failures, Rotational slips. Stability number. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth dams.

Unit - V

Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cohesionless and cohesive soils. Effect of surcharge, water table and wall friction. Arching in soils. Reinforced earth retaining walls.

LABORATORY WORK : Laboratory work will be based on the above course as required for soil investigators of engineering projects.



List of Experiments:

1. Determination of Hygroscopic water content
2. Particle - size analysis
3. Determination of Specific gravity of soil particles
4. Determination of plastic limit
5. Determination of liquid limit
6. Determination of shrinkage limit
7. Permeability tests
8. Direct shear test
9. Consolidation test

Suggested Books: -

1. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi.
2. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
3. Modern Geotech Engg. by Dr. I Aram Singh - IBT Publishers, Delhi.
4. Geotech Engg. by C. Venkatramaiah - New Age International Publishers, Delhi
5. Soil Mech. & Found. Engg. by S.K. Garg- Khanna Publishers, Delhi.
6. Soil Testing for Engg. by T.W. Lambe - John Wiley & Sons. Inc.
7. Relevant I.S. Codes



CE 604 – Quantity surveying & Costing

Unit – I

Introduction: Purpose and importance of estimates, principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, cubical content rate, plinth area rate, preliminary, original, revised and supplementary estimates for different projects.

Unit – II

Rate Analysis: Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

Unit – III

Detailed Estimates: Preparing detailed estimates of various types of buildings, R.C.C. works, and earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.

Unit – IV

Cost of Works: Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

Unit – V

Valuation: Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

Suggested Books:

1. Quantity Surveying & Costing – B.N. Datta
2. Estimating & Costing for Civil Engg. – G.S. Birdi
3. Quantity surveying & costing – Chakraborty
4. Estimating & Costing – S.C. Rangawala

Practical & Sessional Works:

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.



CE 605 – Environmental Engg. - II

Unit - I

Sewerage schemes and their importance, collection & conveyance of sewage, storm water quantity, fluctuation in sewage flow, flow through sewer, design of sewer, construction & maintenance of sewer, sewer appurtenances, pumps & pumping stations.

Unit -II

Characteristics and analysis of waste water, recycles of decomposition, physical, chemical & biological parameters. Oxygen demand i.e. BOD & COD, TOC, TOD, ThOD, Relative Stability, population equivalent, instrumentation involved in analysis, natural methods of waste water disposal i.e. by land treatment & by dilution, self purification capacity of stream, Oxygen sag analysis.

Unit -III

Unit operations for waste water treatment, preliminary treatment such as screens, grit chamber, floatation tank, sedimentation and chemical clarification, role of micro-organism in biological treatment, Sewage filtration- theory & design.

Unit - IV

Methods of Biological Treatment (Theory & Design) - Activated Sludge process, Oxidation ditch, stabilization ponds, aerated lagoon, anaerobic lagoons, septic tank & imhoff tank, sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal.

Unit - V

Advanced Waste Water treatment - Diatomaceous earth filters, ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Physico chemical waste water treatment, Solid waste disposal - classification, composition, collection, & disposal methods. Rural sanitation - collection & disposal of refuse, sullage & night soil

Laboratory work shall be based on the topics of environmental engineering I & II and consist of experiments of water and waste water quality as per facility available in the institution.



List of Experiment

1. To study the various standards for waste water
2. To study the sampling techniques for waste water
3. To determine the alkalinity in water sample
4. To determine the acidity in water sample
5. Determination of Dissolved Oxygen in the water and waste water sample
6. Determination of Biological Oxygen demand of a waste water sample
7. Determination of Chemical Oxygen demand of a waste water sample
8. Determination of various types of solids in the waste water sample
9. Determination of bacterial number by membrane filter Technique
10. Determination of bacterial colonies by standard plat count method

Reference Books:-

1. Water Supply & Sanitary Engg. - G.S. Birdie - Dhanpat Rai Publishing Company, (P) Ltd. New Delhi
2. Waste Water Engg. by B.C. Punmia - Laxmi Publication (P) Ltd. New Delhi
3. Environmental Engg. - M.L. Davis & D.A. Cornwell - Mc Graw Hill Company
4. Chemistry for Environmental Engg. - Sawyer & Mc Carty - Mc Graw Hill Book Company New Delhi
5. Water & Waste Water Technology - Mark J Hammer - Prentice - Hall of India, New Delhi
6. Waste Water Engineering - Metcalf & Eddy - Mc Graw Hill Book Company New Delhi



CE-606 ENGINEERING DESIGN PROJECT

CE-607 ETHICS

CE-608 Self Study / Seminar / Group Discussion (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.



CE 701 – Steel Design -II

Unit - I

Chimneys: Guyed and self supporting steel stacks.

Unit – II

Bunkers, Silos & Towers

Unit – III

Plate girder bridges (Riveted and welded)

Unit – IV

Trussed girder bridges for railways and highways (IRC & IRS holding). Bearings for bridges.

Unit – V

Water Tanks: Pressed steel tanks, tanks with ordinary plates, square, rectangular, circular with hemispherical bottom and conical bottom.

Reference Books:-

5. Advance Steel Structures – Nidhi Gupta & Rohit Sahu, Ardent Publication
6. Design of Steel Structures – Ramammutham
7. Design of Steel Structures – Punia
8. Steel Str. by Ramchandra Vol II
9. Steel Str. by Arya & Ajmani
10. Design of steel structures – L.S. Negi



CE 702 – Design of Hydraulic Structure

Unit - I

Gravity dams: Design Criteria, forces acting on gravity dams, elementary profile, low and high gravity dams, stability analysis, evaluation of profile by method of zoning, practical profile, foundation treatment, construction joints, galleries in gravity dams.

Unit - II

Earth Dams: Types, causes of failure and design criteria, soils suitable for earth dam construction, construction methods, foundation requirements, typical earth dam sections, estimation of seepage through and below the dam, seepage control, stability of slopes by slip circle method of analysis, pore pressures, sudden draw down, steady seepage and construction pore pressure condition.

Rock fill dams: Types, merits and demerits, conditions favorable for their adoption.

Unit - III

Spillways : Ogee spillway and its design, details of syphon, shaft, chute and side channel spillways, emergency spillways.

Unit - IV

Energy dissipations and gates : Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles and details. Design of canal regulating structures, detailed design of Sarda Falls, design of cross drainage works, sphypon aquaduct.

Unit - V

Hydropower Plants: Introduction of Hydropower development, assessment of power potential, types of hydropower plants, general features of hydro-electric schemes, selection of turbines, draft tubes, surge tanks, penstocks, power house dimensions, development of micro hydel stations, tidal plants, pumped storage plants and their details.

Reference Books: -

- (vi) Engineering for Dams (Volumes I, II & III) by Creager, Justin & Hinds
- (vii) Hydroelectric Hand Book by Creager
- (viii) Hydraulic Structures by Varshney
- (ix) Irrigation & Water Power Engg. by Punmia & Pandey
- (x) Water Power Engineering by Dandekar



CE 703– Geo. Technical Engg.II

Unit - I

Shallow Foundations: Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I.S. code on B.c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

Unit - II

Deep Foundation: Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

Unit - III

Soil Improvement Techniques: Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness.

Soil stabilisation : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical-stabilisation and sabilisation by grouting. Geo-synthetics, types, functions, materials and uses.

Unit - IV

Soil Exploration and Foundations on Expansive and Collapsible soils: Methods of soil exploration. Planning of exploration program for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

Unit - V

Sheet piles/Bulkheads and Machine foundation: Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications.

Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

LABORATORY WORK: Laboratory work will be based on the course of Geotech. Engg. I & II as required for soil investigations of engineering projects and not covered in the lab. Work of Geotech. Engg. I.



LIST OF EXPERIMENTS

1. Indian Standard Light Compaction Test/Std. Proctor Test
2. Indian Standard Heavy Compaction Test/Modified Proctor Test
3. Determination of field density by Core Cutter Method
4. Determination of field density by Sand Replacement Method
5. Determination of field density by Water Displacement Method
6. The corifiled Compression Test
7. Triaxial compression test
8. Lab. Vane Shear test
9. CBR Test
10. Demonstration of Plate Load Test SPT & DCPT

Reference Books:--

16. Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
17. Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publiscations Delhi
18. Modern Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.
19. Geotech. Engg. by C.Venkatramaiah-New AGE International Publishers, Delhi
20. Found. Engg. by GALEonards McGraw Hill Book Co. Inc.
21. Relevant IS Code



Elective- I CE- 7041 (Computational Methods in Structural Engineering)

Unit - I.

Matrix formulation for the principle of virtual work and energy principles, principle of contragradience, stiffness and flexibility matrices, Degree of Freedom. Axial, bending, shear and torsional deformations.

Local and Global Element stiffness matrices for bar, beam, shaft, grid, shear wall, beamcolumn, beam with rigid ends, beam on elastic foundation and elements with special boundary conditions. no prismatic and curved elements, forces and displacements in general coordinate axes, structure stiffness matrix.

Unit - II.

Basics of the Direct Stiffness method - Analysis of pin jointed frames, rigid jointed structures, plane grids and composite structures for different loads including temperature, shrinkage, prestressing forces. Elastic stability analysis of 2-D rigid jointed frames, (Sway & Nonsway)

Unit - III.

Concepts of Bandwidth, various storage schemes & equation solvers; Reduction in order of stiffness matrix - use of substructures, static condensation method, Exploiting symmetry, skew symmetry and cyclic symmetry in structures, Imposition of Constraints – Lagrange Multiplier and Penalty Methods.

Unit - IV.

Analysis of continuum structures - Fundamental equations of theory of elasticity (2D), basic concepts of Finite Element Analysis, derivation of generalised element stiffness matrix and load vectors, convergence requirements, stiffness matrices for various elements using shape functions, Triangular and Rectangular elements. (PSPS)

Unit - V.

Two Dimensional Iso parametric elements, shape functions for Simplex. Lagrangian and Serendipity family elements in natural coordinates, computation of stiffness matrix for isoparametric elements, degrading of elements, plate bending elements.

Reference Books :-

5. Ghali A & Neville M., Structural Analysis - A Unified Classical and Matrix Approach, Chapman and Hall, New York.
6. Weaver William & Gere James M., Matrix Analysis of Framed structures, CBS Publishers and Distributors, New Delhi.
7. Cook R.D., Concepts and Applications of Finite Element Analysis, Wiley, New York.
8. Gallagher R., Finite Element Analysis Fundamentals, Prentice-Hall, Englewood Cliffs, NJ.
9. Rubenstein M.F., Matrix Computer Analysis of structures, Prentice Hall, Englewood Cliffs, N.J.
6. Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London



Elective- I CE- 7042 (Industrial Waste Treatment)

Unit - I.

Problem of Water Pollution: Effects of wastes on streams and sewage treatment plant. Natural purification of streams. oxygen sag curve. allowable organic load on streams classification of stream, stream standards and effluent standards. requirement of water for different purposes.

Unit - II.

Measurement of Waste Water Volume: Sampling of waste waters, grab and composite samples. analysis of waste water. biochemical oxygen demand. chemical oxygen demand and pH value of waste, toxicity of waste by bioassay method. Pretreatment of Wastes: Volume and strength reduction, salvage of materials, recovery of by products, reuse of waste water.

Unit - III.

Conventional Methods of Treatment of Waste Water: Removal of suspended solids, removal of inorganic and organic dissolved solids, sludge disposal, advance methods of treatment, such as reverse osmosis, ion exchange, electro dialysis, algal harvesting etc. low cost treatment plants. common effluent treatment plant, design and operation.

Unit - IV.

Combined Treatment of Waste Water Sewage: Energy requirement optimization and budget, municipal regulation, sewer rental charge, instrumentation in waste water treatment plants, collection of data, operation and maintenance of plants, water pollution control board.

Unit - V.

Brief study of industrial processes and treatment methods of waste water from common industries, such as textile, dairy, paper and pulp, tannery, distillery. Hazardous wastes- Impact handling and disposal.

Reference Books :-

11. "Liquid Waste of Industries - Theories, Practice and Treatment" - N.L. Nemerow, Wesley Publishing Co.
12. Treatment of Industrial Waste - E.B. Besselièvre & Max Schwartz - Mc Graw Hill Book Company
13. "Waste Water Engg. - Treatment Disposal & Reuse" - Metcalf & Eddy - Tata Mc Graw Will, New Delhi
14. Waste Water Treatment - Arceivala - Tata Mc Graw Will, New Delhi
15. Industrial Pollution Control, hand book - Lund H.F. Tata Mc Graw Will, New Delhi



Elective- I CE- 7043 Cost Effective & ECO-Friendly Construction

UNIT-I

Concepts of energy efficient & environment friendly materials and techniques.

Cost effective materials :- Soil, Fly ash, Ferrocement, Lime, Fibres, Stone Dust, Red mud, Gypsum, Alternate Wood, Polymer.

Energy Efficient & Environment friendly building material products :-

Walls - Stabilised and sun dried, soil blocks & bricks, Solid & Hollow concrete blocks, stone masonry blocks, Ferrocement partitions.

Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferrocement shells, Filler Slab, Seasal Fibre roof, Improved country tiles, Thatch roof, M.C.R. tile.

UNIT-II

Cost effective construction techniques and equipments :-

16. Techniques :- Rat trap bond construction, Energy Efficient roofings, Ferrocement technique, Mud Technology.

17. Equipments :- Brick moulding machine, Stabilised soil block making machine and plants for the manufacturing of concrete blocks, M.C.R. tile making machine, Ferrocement wall panel & Roofing channel making machine, R.C.C. Chaukhat making m/c.

UNIT-III

Cost effective sanitation :-

- (a) Waste water disposal system
- (b) Cost effective sanitation for rural and urban areas
- (c) Ferrocement Drains

UNIT-IV

Low Cost Road Construction :-

Cost effective road materials, stabilization, construction techniques tests, equipment used for construction, drainage, maintenance.

UNIT-V

Cost analysis and comparison :-

- (a) All experimental materials
- (b) All experimental techniques



Elective- I CE- 7044 Environmental Impact Assessment

UNIT-I

Concept of EIA : Introduction of EIA, Utility and scope of EIA, Significant Environmental Impacts, Stage of EIA, Environmental Inventory, Environmental Impact Statement (EIS)

UNIT-II

Methods of Impact Identification : Environmental Indices and indicators for describing the affected environment, matrix methodologies, network, checklist, and other method.

UNIT-III

Impact analysis : Framework, statement predication and assessment of impact of air, water, noise and socio-economic environment.

UNIT-IV

Preparation of written documentation : Initial planning phase, detailed planning phase, writing phase, organizing relevant information, co-ordination of team writing effort.

UNIT-V

Public Participation in Environmental Decision making : Basic definitions, Regulatory requirements, Advantages & disadvantages of Public Participation, Selection of Public participation techniques, Practical considerations for implementation.



Elective- I (CE- 7045) Energy Efficient & Green Building

UNIT-I

Energy efficient Green Buildings - The green Building concept, rating systems in India and world, GRIHA, LEED, etc. , green building rating agencies and some top green buildings in the world, sustainable practices used in the design and construction phases of Energy Efficient Green Buildings. Green Rating for Integrated Habitat Assessment (GRIHA), Energy Efficient Solar Homes & Buildings, Energy Savings in Homes, IGBC certification.

UNIT-II

Energy Conscious Buildings - climate and buildings in india, Introduction ,Factors affecting climate, Climatic zones and their characteristics, Implications of climate on building design ,Urban climate ,Microclimate, Tools for analyzing weather data, Illustrative example, References.

Codes: National Building Code, Energy Conservation Building Codes, Key barriers to 'building green in India, Overcoming the barriers, implementation approach, etc.

UNIT-III

Principles Of Energy Conscious Design Of Buildings In India – Introduction Building Envelope, Site, Orientation, Building Configuration, Building Components, Passive Heating, Direct Gain ,Indirect Gain, Thermal storage wall, Roof top collectors, Isolated Gain, Solarium (Attached greenhouse / sunspace), Passive Cooling, Ventilation Cooling, Cross ventilation, Wind tower, Induced ventilation, Nocturnal cooling ,Evaporative Cooling ,Passive downdraft evaporative cooling (PDEC) ,Roof surface evaporative cooling (RSEC) ,Direct evaporative cooling using drip-type (desert) coolers 3.4.3 Nocturnal ,Radiation Cooling, Desiccant Cooling, Earth Coupling, Earth-air pipe system ,Daylighting ,Basic Principles of Daylighting ,Daylighting Systems, Building Materials ,Embodied Energy of Building Materials ,Alternative Building Materials

UNIT -IV

Thermal Performance Of Buildings - Introduction, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation ;Example Computer-based Tools

Design Guidelines: Description of Buildings, Methodology, General Recommendations, Specific Guidelines.

UNIT-V

Zero Energy Buildings - Opportunities and challenges in designing a Net zero building ,Energy efficient solar homes/buildings, Design aspects ,Climatic zones ,Passive design features and , their advantages, Orientation of building, Sunshades, Window design, Double glazed windows Building insulation, Roof treatment ,Evaporative cooling ,Landscaping ,Surface to volume ratio Passive heating ,Earth air tunnel ,Solar chimney, Wind tower, Applicable passive features for various climatic zones, Energy-efficient lighting, Indoor lighting ,Outdoor lighting ,Energy-efficient air conditioners, Selecting the right size, Selecting an efficient AC ,Installing an AC, Renewable energy devices/systems, Solar water heating system Building integrated PV system, Other renewable energy devices/systems.



Elective- II CE- 7051 (Structural Dynamics & Earthquake Engineering)

Unit - I.

Single DOF systems - Undamped and Damped, Response to Harmonic and periodic excitations, Response to Arbitrary, Step, Ramp and Pulse Excitations.

Unit - II.

Numerical Evaluation of Dynamic Response - Time stepping methods, methods based on Interpolation of Excitation, New mark's and Wilson - α method, Analysis of Nonlinear Response, Introduction to frequency domain analysis.

Unit - III.

Elements of seismology - Definitions of the basic terms related to earthquake (magnitude, intensity, epicenter, focus etc.), seismographs Earthquake Response of structures - Nature of dynamic loading resulting from earthquake, construction of Response spectrum for Elastic and Inelastic systems.

Unit - IV.

Multiple DOF systems: Stiffness and Flexibility matrices for shear buildings, free and forced vibrations-undamped and damped, Modal and Response History Analysis, Systems with distributed mass & elasticity.

Unit - V.

Earthquake Resistant Design of Structures, Design of structures for strength & servicability, Ductility and energy absorption, Provisions of IS : 1893 and IS : 4326 for aseismic design of structures, Code for ductile detailing IS : 13920.

Reference Books :-

5. Chopra A.K., Dynamics of structures - Theory and Applications to Earthquake Engineering, Prentice Hall of India, New Delhi.
6. Berg G.V. Elements of Structural Dynamics, Prentice Hall of India, Englewood Cliffs, NJ
7. Paz Mario, Structural Dynamics, CBS Publishers, Delhi
8. Clough R.W. & Penzien J., Dynamics of structures McGraw Hill, New York.



Elective- II CE-7052 Construction Planning & Management

Unit -I

Preliminary and detailed investigation methods: Methods of construction, form work and centering.

Schedule of construction, job layout, principles of construction management, modern management techniques like CPM/PERT with network analysis.

Unit -II

Construction equipments: Factors affecting selection, investment and operating cost, output of various equipments, brief study of equipments required for various jobs such as earth work, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting.

Unit -III

Tenders & Contracts: Different types of Tenders & Contracts, notice inviting tenders, contract document, departmental method of construction, rate list, security deposit and earnest money, conditions of contract, arbitration, administrative approval, technical sanction.

Unit -IV

Specifications & Public Works Accounts: Importance, types of specifications, specifications for various trades of engineering works.

Various forms used in construction works, measurement book, cash book, materials at site account, imprest account, tools and plants, various types of running bills, secured advance, final bill.

Unit-V

Site Organization & Systems Approach to Planning: Accommodation of site staff, contractor's staff, various organization charts and manuals, personnel in construction, welfare facilities, labour laws and human relations, safety engineering.

Problem of equipment management, assignment model, transportation model and waiting line models with their applications, shovel truck performance with waiting line method.

Reference Books :-

- (7) Construction Equipment by Peurify
- (8) CPM by L.S. Srinath
- (9) Construction Management by S. Seetharaman
- (10) CPM & PERT by Weist & Levy
- (11) Construction, Management & Accounts by Harpal Singh
- (12) Tendering & Contracts by T.A. Talpasai



Elective- II CE- 7053 : Design Of Prestressed Concrete Structures

Unit – 1.

Introduction, Principles of prestressing, Different methods of prestressing – post tensioning and pre-tensioning.

Prestressed concrete materials. Need for high strength concrete and High concrete tensile steel. Creep and shrinkage of concrete, relaxation of steel. Losses of prestress friction and anchorage of steel.

Unit – 2.

Flexural strength of prestressed concrete section. Analysis of prestress, Resultant stress at a section, Line of Thrust, Load Balancing. Cracking moments.

Shear strength and torsional strength of prestressed concrete section. Principle stresses and principal shear stresses, Ultimate shear resistance.

Unit – 3.

Stress-pattern in anchorage zones. Transmission length. End zone reinforcement. Stress distribution in end block.

Unit – 4.

Design of members for flexure. Code recommendations. Rectangular and I-section. Working out of section dimensions for concrete and prestressing forces for steel. Application to design of slabs and continuous beams and Bridge girders. Design for concordant table and tendon profiles.

Unit – 5.

Design of tension and compression members, Design for combined bending and compressive, Different approaches for design, Introduction to design of transmission poles, roof truss members, purlin, railway sleepers.

Books & References Recommended:

16. Lin T.Y., *Design of Prestressed Concrete Structures*.
17. Varatnam P., *Prestressed Concrete Structures*.
18. Ramarathan S., *Prestressed Concrete*.
19. Graduate I.I., *Prestressed Concrete*.
20. Krishna Raju, *Prestressed Concrete*.
21. Evans R.H. and Bennett R.S., *Prestressed Concrete*.
22. *IS-1343*.
23. Mullick S.K. and Rangaswamy R.S., *The Mechanics of Prestressed Concrete Design*.
24. Sinha and Raj, *Prestressed Concrete*.



Elective- II CE- 7054: Air Quality Monitoring & Control

Unit - I

Air pollution problem: Economics and social aspects, historical episodes of air pollution.

Sources of Air

pollution, effects of air pollution on health, animal, plants and materials

Unit - II

Role of meteorological condition, properties of typical air pollutants, air diffusion and concentration pollutants.

general diseases caused by air pollutants. toxicity of various pollutants. Plumes patterns and height of chimneys.

Unit - III

Atmospheric chemistry, formation of secondary pollutants – PNN, PBN, Photolytic cycles, general diseases and

toxicity of pollutants

Unit - IV

Sampling and Analyzing of Air Pollutants: Instruments pollution survey, standards of air pollution.

Principle of air pollution control, site selection and zoning, various control methods, process and equipment changes, design and operation of various air pollution control equipments.

Unit - V

Air pollution control legislation, public education pollution standards, status of air pollution control in various countries.

Industrial Hygiene: Concept and importance, factory Involved in environmental hazards, industrial ventilation occupational diseases, control methods.

Reference Books :-

1. "Air Pollution" - Faith W.L, John Wiley & Sons
2. "Air Pollution" - Mc Cabe L.C., Mc. Graw Hill, International
3. Air Pollution - Stern A.C., Academic Press N. York
4. Fundamentals of Air Pollutions - Raju BSN Oxford & IBH Publishing Co. Pvt. Ltd.
5. "Air Pollution" - Rao M.N. & Rao HVN - Tata Mc Graw Hill
6. Air Pollution – Wark and Warner



Elective- II CE- 7055) Advance Water Resources Engg

Unit - 1

Optimal Rain gauge Network Design, Adjustment of Precipitation Data, Depth Area-Duration Analysis, Design Storm, Probable Maximum Precipitation, Probable Maximum Flood, Flood Frequency Analysis, Risk Analysis,

Unit - 2

Flood Management, Flood Routing through Reservoirs, Channels Routing Muskingum Method, Introduction to Stochastic Models in Hydrology like AR, ARMA, ARIMA etc. Concept of Correlogram.

Unit - 3

System Analysis: Need, Water Resources Systems, Optimisation Techniques, Linear Programming, Feasible Solutions, Graphical Method, Simplex Method, Use of LP in Water Resources, Introduction to Reservoir Operation, Rule curves, Linear Decision Rule

Unit - 4

Dynamic Programming, its utility in Resource Allocation and other Decision Making Problems, Optimal Operating, Policies, Use of D. P. in Reservoir, Operation.

Unit-5

Network Methods, Project Optimality Analysis. Updating of Network, Utility in Decision Making.

Book Recommended:

Test Books

1. Subramany K., *Engg. Hydrology*.
2. Philipps & Ravindran: *Operations Research*
3. Hire D.S. & Gupta: *Operation Research*

Reference Books

1. Loucks D.P., Stedinger I.R. & Haith D.A : *Water Resources Systems Engg.*
2. Kottegoda N. T., *Stochastic Water Resources Technology.*
3. Singh V.P. : *Elementary Hydrology*



CE 706 STADD PRO

CE-707 MAJOR PROJECT-I

CE-708 ENTREPRENEURSHIP



CE 709 Self Study / Seminar / Group Discussion (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.



CE 801 – Major Project-II

Each candidate shall work on an approved Civil Engg. Project and shall submit design and a set of drawings on the project.

CE 802 – COMPREHENSIVE VIVA

CE-803 Self Study / Seminar / Group Discussion (Internal Assessment)

Objective of Self Study: is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

Evaluation will be done by assigned faculty based on report/seminar presentation and viva.

Objective of GD and seminar is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

Evaluation will be done by assigned faculty based on group discussion and power point presentation.