WITH EFFECT FROM THE ACADEMIC YEAR 2012 - 2013

SCHEME OF INSTRUCTION & EXAMINATION B.E. III -YEAR
(CIVIL ENGINEERING)

SEMESTER – I

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per week		Duration In Hours	Maximum Marks	
			L/T	D/P		Univ. Exam	Sessi-onals
THEORY							
1	CE 301	Reinforced Cement Concrete	4	2	3	75	25
2	CE 302	Fluid Mechanics – II	4	-	3	75	25
3	CE 303	Theory of Structures – I	4	2	3	75	25
4	CE 304	Building Technology and Services	3	2	3	75	25
5	CE 305	Transportation Engineering	4	-	3	75	25
6	CM 371	Managerial Economics & Accountancy	4	-	3	75	25
PRACTICALS							
1	CE 331	Hydraulics and Hydraulic Machinery Lab	-	3	3	50	25
2	CE 332	Transportation Engg. Lab	-	3	3	50	25
3	CE 333	Surveying Camp	-	-	-	-	50*
		Total	23	12	-	550	250

*Only Sessional marks

CE 301

REINFORCED CEMENT CONCRETE

Instruction	4 Theory + 2 Drawing
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

(Note: All relevant IS codes necessary for teaching this course may be introduced and referred in detail by the faculty concerned)

UNIT-I

Introduction to Reinforced Cement Concrete: Applications of Concrete- Need for Reinforcement in Concrete-Types and Properties of Concrete and Steel - Tests on concrete and steel – RCC as a material – Basic requirements of an RCC Structure – stability, strength, serviceability and durability.

Design Philosophies: Development of design philosophies- Working stress method (WSM), Ultimate load method, and limit state method (LSM) relative merits and demerits. Basic concepts and terminology of WSM and LSM – Working stress, limit state, characteristic loads and strengths, Partial safety factors. Stress strain relationship for concrete and steel; stress blocks (generalized, rectangular, parabolic and Whitney's)

Working stress method: Theory of bending in RCC beams; balanced, under reinforced and over reinforced sections; Analysis and design of singly and doubly reinforced rectangular sections.

UNIT-II

Limit State of Collapse (flexure):

Assumptions, Analysis and design for flexure failure in tension and compression singly reinforced, doubly reinforced rectangular and flanged beams. Anchorage and development length, Curtailment of reinforcement in beams.

UNIT-III

Limit State of collapse in shear and torsion: analysis and design for shear and torsion.

Limit State of Serviceability: Check for deflection and cracking. Limit State of Durability: Provisions made in the code. Detailing of reinforcement in beams.

UNIT-IV

Analysis and design of slabs: Definition of a Slab – Types of Slabs- one way, two way simply supported and Continuous rectangular slabs subjected to only uniformly distributed loads. IS Code method-Design of solid rectangular slabs as per IS 456; Detailing of reinforcement in slabs; Check for serviceability of Slabs.

Introduction to Yield line Theory for Slabs – Assumptions – Patterns of Yield lines – Analysis and design of a simply supported rectangular two- way slab using yield line approach. Design of Stairs: Design and detailing of dog legged stairs.

UNIT-V

Analysis and design of columns: Assumptions, Design of axially loaded circular, square and rectangular columns; Uniaxial and biaxial bending of columns - interaction diagrams. Design of

columns subjected to axial load & bending. Analysis and Design of Footings: Design of isolated square, rectangular and circular footings as per IS Code.

Suggested Reading:

1. Krishna Raju, N., Design of Reinforced Concrete Structures, CBS Publishers and Distributors, New Delhi, 1989.
2. Jain, A. K., Limit State Design of Reinforced Concrete,Nem Chand & Bros. 1998
3. Sinha N.C. and Roy S.K. Fundamentals of Reinforced Concrete, S.Chand & Co., 2001
4. Unnikrishnanpillai and Devadass Menon, Reinforced ConcreteDesign, Tata McGraw-Hill Publishing Co Ltd, 1998.
5. Varghese P.C., 'Limit State Design of Reinforced Concrete', Prentice Hall of India, New Delhi, 1999.
6. Sushil Kumar, Treasureof RCC Designs, Standard Book House, 1998.
7. Varghese P.C., Limit State Design of reinforced Concrete, Pre n-tice Hall of India, 2002.
8. Prakash Rao,D.S., Design Principles and Detailing of Concrete Structures, Tat Mc-Graw Hill, 1995.

CE 302

FLUID MECHANICS - II

Instruction	4 Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Marks Sessional	25 Marks

UNIT-I

Steady uniform flow through open channels: Descriptions and definitions, difference between pipe flow and channel flow, velocity and pressure distributions in channel cross section, energy and momentum correction coefficients, friction to flow in open channels, uniform flow, Manning's and Chezy's formulae, most efficient channel cross-section, specific energy, concept and applications of critical depth.

UNIT-II

Gradually varied flow: Significance of Froude Number, dynamic equation of gradually varied flow, classification of gradually varied flow profiles, computation of flow profiles and characteristics of flow profiles. Hydraulic Jump-Momentum equation for a jump in horizontal rectangular channel, energy dissipation in hydraulic jumps and surges in open channels, elementary surge analysis.

UNIT-III

Unsteady flow in pipes: Water hammer phenomenon, pressure rise due to gradual and sudden valve closure, critical period of the pipeline. Boundary layer-Definition, laminar and turbulent boundary layers, boundary layer growth and separation, Drag and lift forces, Principle of stream lining.

UNIT-IV

Dimensional analysis and models studies: Dimensional analysis as a tool in experimental hydraulics, Buckingham's pi-theorem, applications, geometric, Kinematics and dynamic similarity, similarity laws; significance of Reynold's, Froude and Mach Numbers, Different types of models and their scale ratios.

UNIT-V

Hydraulic Turbines: Classification, specific speed, unit quantities velocity triangles and principles of design of reaction and impulse turbines, characteristics curves. Impact of jet vanes.

Centrifugal Pumps: Component work done and efficiency, minimum starting speed, Euler head equation, specific speed and characteristics curves of centrifugal pumps.

Suggested Reading:

1. Modi, P. N and Seth, S. M., "Fluid Mechanics", Standard Book House, 2001.
2. Mohanty, A. K., Fluid mechanics, PHI, 2000.
3. Som, S. K and Biswas, G., Introduction to Fluid Mechanics and Fluid Machines, TMH Publications, 2004.
4. Subramanya, K., "1000 Solved Problems in Fluid Mechanics" Tata McGraw-Hill Publications 2005.
5. Street, R. L., Watters, G. Z. and Vennerd, J. K., "Elementary Fluid Mechanics", 7th Edition, John Wiley International Publications, 1996.
6. Som, S. R, & Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill, 1998.

CE 303

THEORY OF STRUCTURES - I

Instruction	4 Theory + 2 Tutorial
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT – I

Unsymmetrical bending: Review-product of inertia, transformation laws for moment of inertia, and product of inertia. Principal axes and Stresses due to unsymmetrical bending. Determination of maximum stresses in rectangular, I and Channel section.

Shear Centre: Concept and importance of shear centre shear flow and determination of shear centre of simple sections such as T sections and Channel sections with one axis of symmetry.

Indeterminacy: Static indeterminacy and Kinematic indeterminacy. Determination of Static and Kinematic indeterminacies of beams, pin jointed and rigid jointed plane frames (2D problems only).

UNIT-II

Slope deflection method: Analysis of:

1) Continuous beams with and without sinking of supports;
2) Single bay – single storied portal frames with and without side sway;

- Loading on each span may be point load(s) or uniformly distributed load on whole span.
- Sketching of shear force and bending moment diagrams.

UNIT-III

Moment Distribution Method: Analysis of:

1 Continuous beams with and without sinking of supports;
2 Single bay – single storied portal frames with and without side sway;

- Loading on each span may be point load(s) or uniformly distributed load on whole span.
- Sketching of shear force and bending moment diagrams.

UNIT-IV

Kani's Method: Applied to continuous beams with and without sinking of supports; and single bay single storey portal frames with and without side sway:

- Loading on beam/portal frame shall be point load(s) and uniformly distributed load on whole span;
- Sketching of shear force and bending moment diagrams.

UNIT-V

Strain Energy: Castigliano's theorem-I and its application to simple problems. Determination ofdisplacements using Unit Load Method for statically determinate structures such as beams, Pin jointed trusses and frames (2D problems only).

Redundant pin jointed trusses: Castigliano's theorem-II. Analysis of plane trusses with one degree of redundancy (internal or external), Assembly and temperature effects.

Suggested Reading:

1. Junarkar, S. B and Shah, Mechanics of structures, Charotar Pub. Houses, 2001.
2. Praksh Rao, D. S., Structural Analysis – A Unified approach, Universities Press, 1996.
3. Punmia, B. C., Ashok K.Jain and Arun K.Jain, Strength of Materials and Theory of Structures, Laxmi Publications,2000.
4. Gupta, S. P and Pandit, G. S, Theory of Structures, Tata McGraw Hill, 1999.
5. Ramamrutham, S, Theory of Structures, Dhanpathi Rai Publishing Company (P) Ltd.

CE 304

BUILDING TECHNOLOGY AND SERVICES

Instruction	3 Theory + 2 Drawing
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Planning of building: Relevant building bylaws, site selection for buildings, common errors in planning. Principles to be considered in judging plans, circulation diagrams prop for common areas like corridors, stars, toilets etc. Study and design of small units. Data collection relating to different buildings.

Ventilation in buildings: General principles of ventilation (Natural and artificial). Properties of air, air movements, temperature, humidity and quality of air. Design considerations for comfort.

UNIT-II

Acoustics of buildings: Reverberation, determination of absorption coefficient, acoustic intensity, acoustic measurements. Factors affecting the acoustics of buildings. Sound distribution in an auditorium. Sound absorbent materials. Requisites for good acoustics.

UNIT-III

Building services: Lifts and Escalators. Communication services (Telephone and intercom facilities) fire protection (its importance, development of fire, reduced spread of fire, fire resistance in structural elements, means of escape). Water supply (Water quality, water treatment, water distribution and plumbing fixtures), power supply systems including preparation of all services drawings.

UNIT-IV

Green Building Technologies: Introduction- Necessity - Concept of Green building. Principles of green building – Selection of site and Orientation of the building – usage of low energy materials – effective cooling and heating systems – effective electrical systems – effective water conservation systems - Certification systems-GRIHA and LEED – case studies

UNIT-V

Introduction to AutoCAD 3D: Creating solids box, cylinder, cone, sphere, pyramid, wedge, torus: solid editing commands slice, interfere: Boolean commands union, subtract and intersect: views like conceptual, hidden, realistic shaded, 3D wireframe: orbit: Development of single and two storey building with 3D commands.

Suggested Reading:

1. Arora, S. P and Bindra, S. P, "A Text book on Building construction", Dhanpat Rai & Sons, 1993
2. Shahane, V. S, "Planning and Designing Building", Poona, Allies Book Stall, 3rd Edn.
3. Michael Bauer, Peter Mösle and Michael Schwarz (2010) "Green Building – Guidebook for Sustainable Architecture" Springer.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison (2001) "Green Building Handbook" Volume I, Spon Press.
5. Mili Majumdar, (2002) "Energy-efficient buildings in India" Tata Energy Research Institute.
6. TERI "Sustainable Building Design Manual- Volume I & II" Tata Energy Research Institute.

CE 305

TRANSPORTATION ENGINEERING

Instruction	4 Theory
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Highway Alignment and Geometric design: History of highway engineering, highway alignment, engineering surveys, obligatory points. Mobility and accessibility concepts, functional classification of Highways as per IRC. Geometric design: carriageways, shoulders, medians, right of way, footpaths, cycle tracks, service roads, frontage roads, sight distance, stopping sight distance, overtaking sight distance. Camber, horizontal curves, super – elevation, transition curves, extra widening, gradient, grade compensation and design of vertical curves.

UNIT-II

Traffic Engineering: Objectives of traffic studies, traffic characteristics, volume, speed, density, headways and relationship among them. Traffic volume studies, speed and delay studies, intersection delay studies, highway capacity and level of service concept as per HCM 2000, origin and destination studies, intersection improvement studies at grade, need of grade separated intersections, channalisation, rotary planning and design, concept of signal design, parking and accident studies.

UNIT-III

Highway Materials & Pavement Design: Various properties of highway materials. pavement types, factors to be considered for pavement design, structural difference between flexible and rigid pavement design. Flexible pavement design – concept of layer theory, design wheel load, ESWL, EALF, vehicle damage factor, design based on CBR developed by US corps of engineers, IRC cumulative standard axles method (IRC-37:2002). Rigid pavement design – concept, wheel load stresses analysis by Westergaard. Sub-grade, dry lean concrete, radius of relative stiffness. Modulus of sub grade reaction and other characteristics of concrete, critical wheel load and temperature stresses. Longitudinal and transverse joints, contraction joints, expansion joints, construction joints, dowel bars and tie bars functions.

UNIT-IV

Railway Engineering: Introduction to Railways, permanent way component parts and its functions. Rails – various types, functions, creep in rails, creep measurement, coning of wheels and rail fixations, Sleepers- various types, merits and demerits, ballast, various types and sub grade preparation. Railway alignment and geometric design – alignment. Super- elevation, negative super elevation, Cant deficiency. Example problems. Points and crossing. Layout of left and right hand turnouts. Construction and maintenance of permanent way.

UNIT-V

Airport Engineering: Introduction to air transportation, history and international organizations role in development of airports, air craft types and its characteristics. General lay-out of an airport and its component parts including functions. Site selection of an airport as per ICAO, orientation of runway by wind rose diagrams, basic runway length determination including corrections, geometric design, types of airports as per landing & take-off and its dimensions.

Suggested Reading :

1. Khanna, S.K. and Justo, C.E.G.(1994), "Highway Engineering", Nemchand & Bros, New Delhi, India.
2. Mcshane, W.R. Roess, R.P. and Prassas, E.S. "Traffic Engineering", Prentice Hall, Englewood Cliffs, 1997.
3. Yang, H. and Huang., "Pavement Analysis and Design", Prentice Hall India Ltd-2004.
4. "Highway Capacity Manual", Transportation Research Board, national Research Council, Washington, D.C. 2010.
5. Khanna. S.K. Arora, M.G. and Jain. S.S. (1994) "Airport Planning and Design" Fifth edition. Nem Chand & Bros, Roorkee, India.
6. Chandra, S and Agarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press, New Delhi.
7. Saxena S.C and Arora, S, "Text book of railway Engineering" Dhanpat Rai and Sons., 1988.
8. Relevant IRC codes

CM 371

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Meaning and Nature of Managerial Economics: Managerial Economics its usefulness to Engineers, Fundamental Concepts of Managerial Economics, Scarcity, Marginalism, Equi-marginalism, Opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

UNIT-II

Consumer Behaviour: Law of Demand, Determinants, Kinds; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply, Concept of Equilibrium. (Theory questions and small numerical problems can be asked).

UNIT-III

Theory of Production and Markets: Production Function, Law of Variable Proportion, ISO quants, Economics of Scale, Cost of Production (Types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price – Output determination under Perfect Competition and Monopoly (theory and problems can be asked).

UNIT-IV

Capital Management: Its significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT-V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts Trial Balance, concept and preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.

(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

Suggested Reading:

1. Mehta P.L., "Managerial Economics – Analysis, Problems and Cases", Sulthan Chand & Son's Educational publishers, 2011.
2. Maheswari S.N. "Introduction to Accountancy", Vikas Publishing House, 2005.
3. Panday I.M. "Financial Management", Vikas Publishing House, 2009.

CE 331

HYDRAULICS AND HYDRULIC MACHINERY LAB

Instruction	3 Periods
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1	Open Channel coefficient	Determination of Manning's rugosity
2	Open Channel Bend	Determination of super elevation
3	Hydraulic Jump	Determination of force on waves
4	Impact of Jets	Determination of force on waves
5	Centrifugal pump	Determination of efficiency and performance characteristics.
6	Centrifugal pump	Determination of efficiency and performance Characteristics under varying loads
7	Pelton Wheel	Determination of efficiency and Performance characteristics
8	Francis Turbine	Determination of efficiency and Performance characteristics
9	Kaplan Turbine	Performance characteristics
10	Hele Shaw's Apparatus	Study of stream line patterns

CE 332

TRANSPORTATION ENGINEERING LAB

Instruction	3 Periods
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

A) Tests on bitumen

1. Penetration Test
2. Ductility Test
3. Softening point Test
4. Specific gravity Test
5. Viscosity Test
6. Flash and fire point Test

B) Tests on road aggregates

7. Aggregate crushing value test
8. Los Angeles abrasion test
9. Aggregate impact value test
10. Aggregate shape test (flakiness & elongation)
11. Water absorption & Specific gravity of Aggregate
12. Soundness

C) Traffic Studies

13. Traffic volume study
14. Spot Speed Study
15. O & D Study concepts
16. Speed and delay studies

D) Miscellaneous Tests (demonstration only)

17. Determination of C.B.R.
18. Preparation of representative sample by coning and quartering.
19. Bitumen extraction test
20. Marshal stability Concepts and Tests

WITH EFFECT FROM THE ACADEMIC YEAR 2012 - 2013

SCHEME OF INSTRUCTION & EXAMINATION B.E. III -YEAR
(CIVIL ENGINEERING)

SEMESTER – II

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per week		Duration In Hours	Maximum Marks	
			L/T	D/P		Univ. Exam	Sessi-onals
THEORY							
1	CE 351	Soil Mechanics	4	---	3	75	25
2	CE 352	Steel Structures	4	2	3	75	25
3	CE 353	Theory of Structures-II	4	2	3	75	25
4	CE 354	Structural Engg. Design & Detailing - I (RCC)	3	2	3	75	25
5	CE 355	Water Resources Engg. and Management-II	4	---	3	75	25
6	CE 356	Water & Waste Water Engineering	4	---	3	75	25
PRACTICALS							
1	CE 381	Soil Mechanics Lab.	---	3	3	50	25
2	CE 382	Environmental Engineering Lab.	---	3	3	50	25
3	CE 383	Industrial Visit/Study	---	---	-	-	Gr*
		Total	23	12	-	550	200

*Excellent / Very Good / Good / Satisfactory / Unsatisfactory

CE 351

SOIL MECHANICS

Instruction	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-1

Origin & Classification of Soils – Soil as a pseudo-elastic three phase particulate medium.

Physical Properties of Soils: Weight ratios (Water content, Density, Unit weights, Specific Gravity); Volume ratios (void ratio, porosity, degree of saturation, relative density); Inter-relationships. Laboratory tests for determination of Index properties.

Classification and Identification of soils for general and Engineering purposes as per IS: 1498-1970. Field identification of soils.

UNIT-II

Soil moisture states.

Capillarity in Soils: Surface tension and capillary rise in soil, Capillary tension, Capillary pressure. PF value

Permeability of Soils : Darcy's law for flow through soils- validity of Darcy's Law- Factors affecting permeability – Laboratory tests for determination of co-efficient of permeability (constant head, variable head permeability tests)- Field tests(Pumping in and pumping out tests)- Equivalent permeability of stratified soils.

Seepage in Soils: Seepage flow, seepage pressure – Flow nets- Locating phreatic line in a homogeneous earthen dam using Kogeny's parabola – computation of seepage quantity.

Stress in Soils: Total effective and neutral stress

Quick Sand phenomena: Critical Hydraulic gradient, Remedial measures.

UNIT-III

Compaction Process: Compaction Mechanism; factors affecting compaction. Laboratory determination of compaction characteristics- standard and modified Proctor tests- IS Light and Heavy compaction tests; Field surface compaction : compaction equipment, procedure, quality control

Consolidation Process: Spring analogy - Void ratio and effective stress (e Vs logP) relationship – Terazaghi's theory of one dimensional consolidation - assumptions and derivation of GDE – Computation of magnitude of settlement and time rate of settlement.

UNIT-IV

Shear Strength: Significance of Shear strength in soils – Mohr-Coulomb equation – shear parameters-Laboratory tests for determination of shear strength – Direct shear test, Tri-axial compression tests (UU, CU and CD), Un-confined compression test, Vane shear test. Factors affecting shear strength of cohesion-less and cohesive soils. Determination of elastic modulii.

UNIT-V

Earth Pressure: States of earth pressure-Active, passive, at rest condition; Rankine's theory: computation of active and passive earth pressure in c-less and c-Ö soils; Coulomb's Wedge theory; Rehbhan's graphical solution; stability of earth retaining gravity wall.

Slope stability: Definition and classification of slopes-types of slope failures-Factors of safety with respect to cohesion, angle of shearing resistance, Height – Analysis of stability of slope using Swedish slip circle method and Taylor's stability number.

Suggested Reading:

1. Scott, R.F., "Principles of Soil Mechanics", Addison Wesley, Massauchusetts.
2. Lambe, T.W. and Whitman, R.V., "Soil Mechanics", John Wiley & Sons Inc., NY,1969.
3. Venkatramaiah, C., "Geo-technical Engineering", New Age Publishers, revised third edition, 2006.
4. Shashi K.Gulhati and Manoj Datta, "Geotechnical Engineering", Tata Mc-Graw Hill, 2005.
5. Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers Distributors revised and enlarged sixth edition, 2007.
6. Gopal Ranjan and A S Rao, "Basic and Applied Soil Mechanics", Wiley. Eastern Limited, 1996.
7. Relevant IS Codes.

CE352

STEEL STRUCTURES

Instruction	4 Theory + 2 Drawing
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

(Note: All relevant IS codes necessary for teaching this course may be introduced and referred in detail by the Faculty concerned)

UNIT-I

Materials and Specifications: Chemical composition of Steel, Types of Structural Steel, Residual Stresses, Stress Concentration.

Basis of Structural Design: Codes and Specifications, Design Philosophies, Working Stress Method, Limit State Method.

Loading and Load Combinations: Characteristic Loads, Dead Loads, Imposed Loads, Earthquake Loads, Wind Loads and Load Combinations. Partial safety factors for materials and loads.

Bolted Connections (Limit State Method): Bolted Connections, Behavior of Bolted Joints, Design Strength of Ordinary Black Bolts, Design Strength of High Strength Friction Grip Bolts, Pin Connections, Simple Connections and Eccentric Connections.

Welded Connections (Limit State Method): Types and Properties of Welds, Types of Joints, Effective areas of Welds, Design of Welds, Simple Connections and Eccentric Connections.

UNIT-II

Working Stress Method: Permissible Stresses, Slenderness Ratio, Net Area of Cross Section, Design of tension members, Design of Simple Compression Members.

Design of Tension Members (Limit State Method): Types of Tension Members, Design of Strands, Slenderness Ratio, Modes of Failure, Factors Effecting Strength of Tension Members, Design of Tension Members (Angles, Other Sections and Rods).

UNIT-III

Design of Beams (Limit State Method): Types of Beams, Section Classification, Lateral Stability of Beams, Design of Laterally Supported Beams, Design of Laterally Unsupported Beams, Shear Strength of Beams, Maximum Deflection, Web Buckling and Web Crippling, Biaxial Bending and Unsymmetrical Bending.

UNIT-IV

Design of Compression Members (Limit State Method): Introduction, Possible Failure Modes, Behavior of Compression Members, Elastic Buckling of Slender Compression Members, Behavior of Real Compression Members, Sections used for Compression Members, Effective Length of Compression Members, Design of Compression Members with Single Section and Built-up Sections (Symmetric in both directions), Lacing and Battening, Column Splices.

Design of Slab Bases: Design of Slab and Gusset Base for Columns.

UNIT-V

Design of Roof Trusses (Limit State Method): Types of Trusses, Kinds of End Supports, Estimation of Loads for Different Roof Coverings, Self Weight of Truss, Wind effects, Design of Purlins for Dead Loads, Imposed Loads and Wind Loads. Detailed Design of a Roof Truss including Joints and Supports for Angular Trusses only.

Suggested Reading:

1. Subramanian, N, "Design of Steel Structures", Oxford University Press, 2008.
2. Duggal, S. K., "Design of Steel Structures", Tata McGraw-Hill Publications, 2009.
3. Bhavikatti, S. S., "Design of Steel Structures", I. K. International Publishing House Pvt. Ltd., 2010.

CE 353

THEORY OF STRUCTURES-II

Instruction	4 Theory + 2 Tutorial/drawing
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Moving Loads: Influence line for support reactions, bending moment and shear force at any location for a simple beam. Determination of maximum support reactions, maximum bending moment and shear force at any location for moving load systems on simply supported girders. Curves of maximum bending moment and shear force for simply supported girders traversed by (i) single point load, (ii) two point loads, (iii) uniformly distributed load longer than span and (iv) uniformly distributed load shorter than span. Enveloping parabola and EUDLL.

UNIT-II

Elastic Theory of Arches: Eddy's theorem, three hinged parabolic and segmental arches, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading, influence lines for horizontal thrust, bending moment, normal thrust and radial shear.
Two Hinged Arches: Parabolic and segmental, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading and temperature effects.

UNIT-III

Moving loads on trusses: Influence lines for forces in members of statically determinate pin jointed plane trusses under moving loads for Warren girder, Pratt truss and curved flange truss;
Suspension Bridges: Stresses in suspended loaded cables, length of cable for simple suspension bridge with 3 hinged stiffening girders for static loading. Influence lines for support reactions, tension in the cable, bending moment and shear force.

UNIT-IV

Flexibility method of Analysis: Analysis of continuous beams, pin jointed plane trusses and rigid jointed plane frames with static indeterminacy not exceeding two.

UNIT-V

Stiffness method of Analysis: Analysis of continuous beams, pin jointed plane trusses and rigid jointed plane frames with kinematic indeterminacy not exceeding three. Direct formulation of stiffness matrix for plane frames with number of bays and stories not exceeding two.

Suggested Reading:

1. Junarkar, S. B. and Shah, "Mechanics of structures", Charotar Pub. House, 2001.
2. Prakash Rao, D. S., "Structural Analysis- a unified approach", Universities Press, 1996
3. Punmia, B. C., Jain, A. K. and Jain, A. K., "Strength of Materials and Theory of Structures", Laxmi Publications, 2000.
4. Gupta, S. P. and Pandit, G. S., "Theory of Structures", Tata McGraw Hill, 1999.
5. Weaver and Gere, "Matrix Analysis of Framed Structures", CBS Publisher, 2004
6. Ramamrutham, S., "Theory of Structures, Dhanpathi Rai Publishing Company (P) Ltd.
7. Gupta, S. P and Pandit, G. S., Structural analysis A Matrix approach, Tata McGraw Hill

CE 354

STRUCTURAL ENGINEERING DESIGN & DETAILING – I (RCC)

Instruction	4 Theory + 2 drawing
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

(Note: All relevant IS codes necessary for teaching this course may be introduced and referred in detail by the Faculty concerned)

UNIT-I

Combined Footing and Retaining walls: Limit state design & detailing of combined rectangular and trapezoidal footings and retaining walls – cantilever and counter fort types.

UNIT-II

Water Tanks: Elastic Design & Detailing for RCC circular land rectangular ground level and over-head tanks-Design of staging. Design of Intze tanks.

UNIT-III

Bridges: IRC loadings; Elastic design and detailing of (i) RC bridge deck slab using effective width methods and Pigeaud's method, (ii) Slab Bridges, and (iii) T-beam bridges.

Suggested Reading:

1. Ramamrutham, S., "Design of Reinforced Concrete Structures", Dhanpat Rai & Sons, 2002.
2. Vazirani and Ratwani, "Concrete Structures", Khanna Publishers, 1998.
3. Krishna Raju, N., "Structural Design and Drawing: Reinforced Concrete", Universities Press, 1992.
4. Prakash Rao, D.S., "Design principles and Detailing of Concrete Structures", Tata McGraw-Hill Publishing Co. Ltd. 1995.
5. Johnson Victor, D., "Essentials of Bridge Engineering", Oxford & IBH Publishing Co., New Delhi, Fourth Edition, 1991
6. Ponnuswamy, S., "Bridge Engineering", Tata McGraw Hill, New Delhi, 1986.

CE 355

WATER RESOURCES ENGINEERING AND MANAGEMENT-I

Instruction	4. Theory
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Hydrology: Scope of hydrology in Civil Engineering, hydrologic cycle, rainfall, measurement of rainfall and estimation of mean rainfall over a catchment, infiltration, evaporation, runoff, factors affecting runoff, peak flow estimation, unit hydrograph method, Gumbel's method.

Aquifers: Types aquifer parameters, steady radial flow into confined and unconfined aquifers, yield of an open well.

UNIT-II

Irrigation: Duty, delta and base period of crops, methods of irrigation, irrigation efficiencies depth of irrigation, wilting point, consumptive use, types of canals, canal sections, balancing depth of cutting, Kennedy's and lacey's theories, design of lined and unlined canals.

UNIT-III

Diversion head works: Components, causes of failures, difference between weir and barrage, Bligh's creep theory, Khosla's theory and method of independent variables, design principles of vertical drop weir.

UNIT-IV

Regulation works: Canal falls, types, design principles of trapezoidal notch fall, types of regulators, functions of cross regulator and head regulator , Cross drainage works, types, selection and design principles, types of outlets, flexibility, sensitivity and proportionality of outlets.

UNIT-V

Water resources development and Management: Types of water resources development projects, functional requirements of multipurpose projects, project formulation, project evaluation, management strategies, water management problems, systematic canal operation, Warabandhi system, farmers' participation in water management, integrated water management.

Suggested Reading:

1. Murthy, V.S., Watershed Management - New Age International Publishers, New Delhi, 1998
2. Ghanshyam Das, Hydrology and Soil Conservation Engineering, Prentice-Hall of India Pvt. Ltd., New Delhi. 2000.
3. Tideman E. M., Watershed Management. Omega Scientific Publishers, New Delhi. 1996.
4. Subramanya, K., Engineering Hydrology, Third edition, McGraw Hill Education Publishers 2008.
5. Patra, K. C., Hydrology and water resources Engineering, 2nd edition, Narosa Publishing Company -2008.
6. G J Young, J C I Dooge and J C Rodda, Global Water Resources Issues, Cambridge University Press, Cambridge, UK, 1994.

CE 356

WATER AND WASTE WATER ENGINEERING

Instruction	4 Periods
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessional	25 Marks

UNIT-I

Introduction: Necessity of protected water supply and sanitation. Water demand and per capita consumption, factors affecting population forecasts.

Water Supply: Sources of water and quality parameters, standards of potable water, infiltration pipes & galleries, intake structures pipes, joints, valves & pumps. Water distribution systems and solution of a simple network using hardy cross method.

UNIT-II

Treatment of Water: Clarification sedimentation – Principles. Design of sedimentation tanks, coagulation and flocculation, design of a clariflocculator. Filtration – Types of filters and filter media. Design principles of slow and rapid sand filters. Backwash mechanisms. Pressure filters. Disinfections – Necessity and methods, Chlorination of water supplied, action of chlorine, break point chlorination. Ozone and U-V radiations, Removal of hardness, tastes & odor control.

UNIT-III

Domestic sewage: Quantity estimation, quality parameters – BOD, COD and TOC. Sewerage systems, ultimate disposal of sewage. Land and water bodies. Sewage conveyance – Sewer types and appurtenances. Velocity in sewers, Design of a simple sewerage system. Storm water sewers – Storm water estimation by rational method.

UNIT-IV

Waste Water Treatment: Preliminary treatment, screens, grit chambers. Primary treatment – Sedimentation – rectangular and circular sedimentation tanks. Secondary treatment – sewage filtration – trickling design. Activated sludge process – design parameters, secondary clarifier. Design aspects of a sewage treatment facility.

UNIT-V

Sludge: Sludge digestion and disposal methods – septic tanks – design parameters and working principles. Low cost waste treatment – oxidation ponds, RBC.

Solid Waste: Types, source and composition of solid waste.. Methods of collection, transportation and disposal

Suggested Reading:

1. Birdi, G. S, "Water Supply and Sanitary Engineering, Dhanpat Rai & Sons; 2002.
2. Garg, S. K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi, 1994.
3. Punmia B.C., "Environmental Engineering Vol. I & II", Lakshmi Publications (P) Ltd.,New Delhi, 2002.
4. Peavy H.S, Rowe D.R. and Tchobanoglous G ,"EnvironmentalEngineering" Tata McGraw Hills, New Delhi, 1985
5. Metcalf & Eddy, M.C., "Wastewater Engineering – Treatment & Reuse", Tata cGraw Hill Publications, New Delhi, 2003
6. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development, GoI, New Delhi, 1993.
7. G.M. Fair, J.C. Geyer and D. Okun, "Water and WasteEngineering", Vol. II, John Wiley &sons, Inc., New York. 1968

CE 381

SOIL MECHANICS LABORATORY

Instruction	3 Periods
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

DETERMINATION OF INDEX PROPERTIES:

1. Determination of Specific Gravity of soil solids using "Density bottle" method.
2. Determination of Specific Gravity of soil solids using "Pycnometer"method.
3. Determination of water content using "Pycnometer" method.
4. Determination of Liquid limit using Casgrande's standard LL device.
5. Determination of Liquid limit using Cone Penetration apparatus.
6. Determination of Plastic limit
7. Sieve Analysis for plotting Particle size distribution curve.
8. Determination of Field Density using Sand Replacement Method

DETERMINATION OF ENGINEERING PROPERTIES

9. Determination of Compaction Characteristics.
10. Determination of Co-efficient of Permeability by "Constant Head Permeameter test"
11. Determination of Co-efficient of Permeability by "Variable Head Permeameter test"
12. Determination of shear strength parameters by "Direct Shear Test"
13. Determination of Shear Strength of Cohesive soils by "Unconfined Compression Test"
14. Determination of Shear Strength by conducting "Vane Shear Test"

DEMONSTRATION OF TEST PROCEDURES:

15. Consolidometer test
16. Tri-axial Shear Test
17. Laboratory Plate Load Test
18. Reverse Osmosis Test
19. Quick Sand Model
20. Cyclic Tri-axial Shear Apparatus

Suggested Reading:

1. Relevant IS Codes of Practice.
2. Lambe, T.W., "Soil Testing for Engineers", Wiley Eastern Ltd., New Delhi, 1969.
3. Relevant ASTM Codes of Practice.

CE 382

ENVIRONMENTAL ENGINEERING LABORATORY

Instruction	3 Periods
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks

1. Determination of Alkalinity.
2. Determination of Hardness.
3. Determination of Chlorides.
4. Determination of Calcium.
5. Determination of Variation of PH.
6. Determination of B.O.D.
7. Determination of total solids, total inorganic solids, & total volatile solids.
8. Determination of residual chlorine.
9. Determination of turbidity
10. Determination of coagulant dose – Jar test.
11. Determination of C.O.D
12. Determination of Sodium & Potassium present in water using flame photometer.
13. Disinfection Dosage

CE 383

INDUSTRIAL - VISIT/STUDY

Instruction	4 x 6 = 24 hours
Sessional	Grade*

Students are expected to visit at least two works of Civil Engineering importance in and around Hyderabad and submit a detailed report on the same to the department. The Department should evaluate the reports through a Committee consisting of Head of the Department and two more members of the senior faculty.

* Excellent/ Very Good / Good / Satisfactory/ Unsatisfactory.