

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
1.	CE 301	THEORY 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 (Th) + 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 Concrete Design*, 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, *Treasure of RCC Designs*, Standard Book House, 1998.
7. Varghese P.C., *Limit State Design of reinforced Concrete*, Prentice Hall of India, 2002.
8. Prakash Rao, D.S., *Design Principles and Detailing of Concrete Structures*, Tata McGraw Hill, 1995.

CE 302

FLUID MECHANICS - II

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	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	(Th) + 2 Tutorials
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 of displacements 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 (Th) + 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 for common areas like corridors, stairs, 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	Periods per week
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 per week
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 per week
Duration of University Examination	3	Hours
University Examination	50	Marks
Sessional	25	Marks

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|-----------------------------|---|
| 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 of 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 per week
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

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	D/P		Univ. Exam	Sessionals
		THEORY					
1.	CE351	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. & 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 Engg. Lab	-	3	3	50	25
3.	CE 383	Industrial Visit/ Study	-	-	-	-	Gr*
		Total	24	12	-	550	200

* Excellent / Very Good / Good / Satisfactory / Unsatisfactory