STRUCTURAL ENGINEERING

I - Semester

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 601	Higher Numerical Analysis	DC	4	3	0	1

Unit 1

Types of errors, General formula for errors, order of approximation. Nonlinear equations: Classification of Methods, Approximate values of roots, Bisection Method, RegulaFalsi Method, Newton Raphson Method, Fixed Point iteration, Mullers Method. Use built in functions in MATLAB software to solve problems.

Unit 2

Linear Systems of Equations: Direct Method - Matrix Inversion Method, Gauss Elimination Method, Gauss Jordan Elimination Method, Cholesky Method.

Iterative Methods- Jacobi Iteration Method, Gauss Seidel Method. Eigen value problem. Use built in functions in MATLAB software to solve problems.Interpolation and Approximation: Lagrange and Newton Interpolation, Finite difference operators.Use built in functions in MATLAB software to solve problems.

Unit 3

Numerical solution of Ordinary: Introduction, solution by Taylor's series, Picards method of successive approximations, Euler's method: Error estimates for the Euler method, modified Euler's method, Runge-Kutta methods, simultaneous and higher order equations using Taylor's series, Picards method of successive approximations, Euler's method, Boundary Value Problems: Finite Difference method.

Unit 4

Numerical solution of Partial Differential Equations: Introduction, Finite Difference Approximation to derivatives, Laplace's, Parabolic Equations and Hyperbolic Equation: Jacobi's method, Gauss Seidel method, Iterative methods for the solution of equations, Variational and weighted residual methods, Introduction of FEM.

Text Books and Reference Materials

1. Numerical Analysis: Goel & Mittal
2. Applied Numerical Analysis: Gerald & Wheatley
3. Numerical Methods for Engineers: Chapra & Canale
4. Introductory Methods of Numerical Analysis: Sastry, Numerical Methods: Jain and Jain

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 602	Theory of Elasticity and Plasticity	DC	4	3	0	1

UNIT 1

Theory of stresses, infinitesimal and finite strain, strain-displacement relationships, elastic constants

UNIT 2

Stress and displacements functions, plane problems in Cartesian and polar co-ordinates

UNIT 3

Elements of plasticity, failure and yield criteria, flow rule.

UNIT 4

Velocity field, plastic stress-strain relationships, incremental plasticity.

Text Books and Reference Materials

1. Theory of Elasticity by S.P. Timoshenko & J.N. Goodier, Tata McGraw Hill.
2. Plasticity: Theory and Applications by Alexander Mendelson, New York, MacMillan, 1970
3. Solid Mechanics by S.M.A. Kazimi, Tata McGraw Hill.
4. Advanced Mechanics of Solids by L.S. Srinath, Tata McGraw Hill.
5. Computational Elasticity by M. Ameen, Narosa Publishing House.
6. Introduction to Engineering Plasticity by G.K. Lal & N.V. Reddy, Narosa Publishing House.
7. Plasticity for Structural Engineers by Chen & Han, Cengage Learning.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 603	Plates and Shells	DC	4	3	0	1

Unit 1 Background and basic concepts

Basic concepts, governing equations and boundary conditions of plates.

Unit 2 Solution of Plates

Solution of rectangular and circular plates by classical methods: Navier's and Levy's methods.

Unit 3 Membrane theory of cylindrical shells

Introduction, types of shell surface, classification, basic concepts, equations of equilibrium, application of Fourier series for membrane stresses, numerical solutions, limitations of membrane theory.

Unit 4 Bending theory of cylindrical shells

Flugge's differential equation, Donnell's theory, D-K-J characteristic equation, Schorer's theory, shell analysis using tables, design consideration.

Text Books and Reference Materials

1. Timoshenko S.P. &Woinowsky-Krieger S., Theory of Plates and Shells. McGraw-Hill, (1964).
2. Szilard R.,Theories and applications of plate analysis: classical, numerical, and engineering methods, John Wiley, (2003).
3. Ramaswamym, G. S., Design and Construction of Concrete Shell Roofs, C.B.S. Publisher's, (1986).
4. Ventsel E. & Krauthammer, T.,Thin Plates and Shells: Theory, Analysis, and Applications, (e book) (2001).

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 604	Advanced Structural Analysis	DC	4	3	0	1

Unit 1

Introduction to Matrix methods in skeletal structural analysis: force and displacement methods.

Unit 2

Application of force method to plane and space frames problems.

Unit 3

Application of displacement method to plane and space frames problems.

Unit 4

Analysis of Frames, Organization of computation, programming considerations. Non-linear analysis due to plasticity in frames.

Text Books and Reference Materials

1. Pundit and Gupta, "Structural Analysis- A Matrix Approach", 'Tata McGrawHill Publishing Company Limited. New Delhi
2. C.S. Reddy,"Basic Structural Analysis" 'Tata McGrawHill Education Publishing Company Limited. New Delhi
3. DevdasMenon, "Advanced Structural Analysis", Narosa Publishing House, 2009.
4. AsslamKassimali, "Matrix Analysis of Structures", Brooks/Cole Publishing Co., USA, 1999.
5. Amin Ghali, Adam M. Neville and Tom G. Brown, "Structural Analysis: A Unified Classical and Matrix Approach", Sixth Edition, 2007, Chapman & Hall.
6. DevdasMenon, "Structural Analysis", Narosa Publishing House, 2008.
7. R.C. Hibbeler, Structural Analysis, Prentice Hall, 1999.
8. Web links to e-learning:nptel
9. Web based learning, Journal papers, etc.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE605	Advanced Concrete Design	DC	4	3	0	1

Unit 1

Limit state design: Basic concepts and philosophies, design of RC members in flexure, shear and torsion, members subjected to combined stresses, slender column, safety and serviceability, control of cracks and deflections, design of RC framed structures with ductile detailing.

Unit 2

Yield line analysis of slabs, yield line mechanism, equilibrium and virtual work methods, Hillerberg's strip method.

Unit 3

Prestressed Concrete, Design of pre-stressed members for bending, shear, torsion and bond, End blocks.

Unit 4

Prestressed continuous beams and frames, slab and grid floor, tension and compression members, circular pre-stressing, pipes, tanks and special structures.

Text Books and Reference Materials

1. Karve and Shah "Limit State Theory and Design of reinforced Concrete" VGP, Pune, India.
2. Pillai and Menon "Reinforced Concrete Design" TMH, New Delhi, India.
3. Verghese, P. C. "Advanced Reinforced Concrete Design" PHI, Delhi, India.
4. Winter, G. "Design of Concrete Structures" McGraw Hill, Tokyo, Japan.
5. Evans and Cook "Reinforced and Pre- stressed Concrete" TN, London, U.K.
6. Lin, T. H. and Burns, H. N., "Design of Pre-Stressed Concrete Structures", Wiley, Canada.
7. Jain, A. K. "Reinforced concrete-limit State Design" NCB, Roorkee, India.
8. Raju, N.K. "Pre-Stressed Concrete" TMH, Delhi, India.

Selected B. I .S Codes

1. I. S.:456-2000-Code of Practice for Plain and Reinforced Concrete, BIS, New Delhi, India.
2. I. S.:875 -1987(Part I & II)-Code of Practice for Design Loads(other than earthquake) for Building and Structures, BIS, New Delhi, India.
3. I.S.:1893-1984-Criteria for Earthquake Resistant Design of Structures, BIS, New Delhi, India.
4. I.S.:4326-1993-Code of Practice for Earthquake Resistant Design and Construction of Buildings, BIS, New Delhi, India.
5. I.S.:13920- Ductile detailing of reinforced Concrete Structures subjected to Seismic forces, BIS, New Delhi, India.
6. S.P.:16 -Design Aids for Reinforced Concrete to IS: 456-2000, BIS, New Delhi, India.
7. S.P.:24 -Explanatory Hand Book of I.S. Code for Plain and Reinforced Concrete, BIS, New Delhi, India.
8. S.P.:34 - Hand Book of Concrete Reinforcement and Detailing, BIS, New Delhi, India.
9. I.S.:1343-1980-Code of Practice for Pre-Stressed Concrete, BIS, New Delhi, India.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE641	Advanced Soil Mechanics and Foundation Engineering	DC	4	3	0	1

Unit 1

Soil Investigation: Soil exploration for hydraulic and buildings structures, SPT, Dynamic and Static cone penetration tests and Geophysical exploration techniques.

Unit 2

Shallow Foundations: Bearing capacity and Settlement of foundations. Design of shallow foundations, Spread, Strip and Combined footing (conventional and elastic line methods), Raft foundations, Design of Machine foundation.

Unit 3

Deep Foundations: Design of deep foundations, Pile and pile groups, Pile caps.

Unit 4

Earth Retaining Structures: Lateral earth pressure, Design of retaining walls and sheet pile walls, Principles of design of cofferdams and diaphragm walls

Text Books and Reference Materials

1. Ranjan, G. and Rao, ASR. "Basic and Applied Soil Mechanics." New Age International Publishers, New Delhi.
2. Braja M. Das. "Principles of Geotechnical Engineering.", Thomson Learning.
3. Raj, P.P. "Soil Mechanics and Foundation Engineering." Pearson Education.
4. Kaniraj, S.R. "Design Aids in Soil Mechanics and Foundation Engineering." TATA McGraw Hill, New Delhi.
5. BIS 2911 (Part 1 - 5), Bureau of Indian Standards for Pile Foundations.
6. BIS 2131, Bureau of Indian Standards for Soil Exploration.
7. BIS 1888, Bureau of Indian Standards for Plate Load Tests.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 606	Finite Element Analysis	DC	4	3	0	1

Unit 1 Introduction

Finite element method and other classical methods, historical background, advantages & disadvantages, finite element modeling – discretisation, nodes, elements types and shapes. Basic equations in elasticity – stress and strain vectors, Hooke's law, strain-displacement relationship, equilibrium equations, generalized compatibility equations.

Unit 2 Finite element analysis of one dimensional problem

Generation of stiffness matrix by displacement and energy method, energy and variational approaches (Rayleigh-Ritz method), numerical solutions.

Unit 3 Iso-parametric elements and shape functions

Co-ordinate systems, Element shapes, Strain displacement matrix, Higher order elements: 1D, 2D and 3D.

Unit 4 Finite element analysis of two dimensional problems

Symmetry, Plane stress and plane strain problems, Bending of thin plates, Introduction to nonlinear FE analysis.

Text Books and Reference Materials

1. David Hutton. Fundamentals of Finite Element Analysis. Tata McGraw - Hill Publishing Company, 2005.
2. Robert D. Cook, Concepts and Applications of Finite Element Analysis, Wiley, John & Sons, 1999.
3. Chandrupatla&Belagundu, Finite Elements in Engineering, Prentice Hall of India Private Ltd., 1997.
4. C. S. Krishnamoorthy, Finite Element Analysis – Theory and Programming, Tata McGraw Hill, 1995.
5. K. J. Bathe, Finite Elements Procedures in Engineering analysis, Prentice Hall Inc., 1995.
6. J. N. Reddy, An Introduction to the Finite Element Method, McGraw Hill, International Edition, 1993.
7. O. C. Zienkiewicz, and R. L. Taylor, The Finite Elements Methods, McGraw Hill, 1987.
8. Timoshenko, S., Theory of Elasticity and Plasticity, McGraw Hill Book company.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 607	Structural Dynamics	DC	4	3	0	1

Unit 1

Types of Vibration and Ground motions, Undammed and Damped Single Degree of Freedom System,

Response of SDOF System to Harmonic Loading.

Unit 2

Response to General Dynamic and Impulsive Loading, Duhamel's Integration, Fourier Analysis and Response in the Frequency Domain.

Unit 3

Free Vibration of Lumped Multi Degree of Freedom System. Approximate Methods For Obtaining Natural Frequencies and Mode Shapes. Frequency Domain Analysis Of Lumped Multi Degree Of Freedom System Using Normal Mode Theory, Time Domain Analysis Using Numerical Integration Scheme.

Unit 4

Principle of Virtual Work, Rayleigh's and Modified Rayleigh's Method, Dynamic Analysis of Systems with Distributed Properties.

Text Books and Reference Materials

1. Structural Dynamics: Theory and Computation byMario Paz, Kluwer Academic Publisher Group, Netherland.
2. Dynamics of Structures: Theory and Application to Earthquake Engineering by A. K. Chopra, Pearson Education, Inc.
3. Elements of Earthquake Engineering and Structural Dynamics by Andre Filiatrault, Presses Inter Polytechnic.
4. Structural Dynamics: Vibrations and Systems by MadhujitMukhopadhaya, Ane Book Private Limited.
5. Fundamentals of Structural Dynamics by Roy R. Craig, Andrew J. Kurdila, John Wiley Publications.
6. Web links to e-learning: *nptel*
7. Web based learning, Journal Papers, etc.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE608	Advanced Steel Design	DC	4	3	0	1

Unit 1Steel Bridges

Loads, classification and design procedures,plate girder bridges and truss girder bridges.

Unit 2 Steel Chimneys

Analysis and design of steel chimneys and elevated steel water tanks.

Unit 3 Towers

Analysis and design of transmission line and microwave towers.

Unit 4 Tubular Sections

Structural behavior of tubular sections,analysis and design of tubular sections,brittle fracture and fatigue
in steel structures,plastic design of steel structure.

Text Books and Reference Materials

1. Design of Steel Structures Vol - II, Dr. Ram Chandra and V. Gehlot, Scientific Publishers, India.
2. Unified Design of Steel Structures, Luis F. Greschwindner, John Wiley and Sons.
3. Ductile design of Steel Structures, Michel Bruneau, Chia-Ming Uang, Rafael E. Sabelli, McGraw Hill Professional.
4. Design of Steel Structures, A. S. Arya & J. L. Ajmani, NemChand & Bros., Roorkee.
5. Design of Steel Structures, M. Raghupati, TMH Pub., New Delhi.
6. Design of Steel Structures, S. M. A. Kazmi& S. K. Jindal, Prentice Hall, New Delhi.
7. Design of Steel Structures, S. K. Duggal, TMH Pub, New Delhi.
8. IS: 800 - 2007, General Construction in Steel - Code of Practice.
9. IS: 802 - 1995, Use Of Structural Steel In Overhead Transmission Line Towers - Code Of Practice, Reaffirmed in 2006
10. IS: 6533 - 1- 1989, Code Of Practice for Design and Construction of Steel Chimneys, Part 1: Mechanical Aspects, Reaffirmed in 2010.
11. IS: 6533 - 2 -1989, Code Of Practice for Design and Construction of Steel Chimneys, Part 2: Structural Aspects.
12. IS: 805 - 1968, Code of Practice for Use of Steel in Gravity Water Tanks
13. Web links to e-learning: nptel
14. Web based learning, Journal Papers, etc.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE609	Construction Planning and Management	DC	4	3	0	1

Unit 1Construction organization

Overview of construction, development and organization of projects, Construction organization structure,Construction finance management, scope of financial management, working capital management, capital investment decision.

Unit 2 Construction materials management

Economy in material management, inventory management and control, purchase and store management, specialized buying and vendors management.

Unit 3Construction equipment management

Equipment performance characteristics, selection, planning and matching of construction equipment, equipment management, construction human resources management; introduction to human resource management, labor legislation, industrial relations, women in construction.

Unit 4 Construction contract management

Legal aspects of contract, contract procedures and document, important contract clauses, quality control during construction; Construction accounting; nature and role of accounting, accounting process and book of accounts, accounting conventions and final account, inventory valuation and depreciation

Text Books and Reference Materials

1. **Antill, James M., Woodhead, Ronald W.**, "Critical path methods in construction practice", John Wiley, NY, USA.
2. *Peurifoy*, Schexnayder and Shapira, "Construction planning, equipments and methods", McGraw Hill, Tokyo, Japan.
3. B. Sengupta and H. Guha, "Construction management and planning", Tata McGraw Hill, New Delhi, India.
4. Patil B. S., "Civil engineering contracts and estimates (vol-1 and vol-2)", Orient Longman limited, New Delhi, India.
5. P. K. Joy, "Hand book of construction management", Macmillan India limited, New Delhi, India.
6. Mark Saunders, "Research methods for business students", Pearson Education limited.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 642	Advanced Construction Materials	DE	4	3	0	1

Unit 1

Timber: Definition, Classification, Growth and Structure of timber, Characteristics, Defects, Seasoning, Preservation, Veneers, Plywood, Boards, IS Codes

Steel: Types, Composition and Properties of Structural Steel, Advantages and Disadvantages of Steel Structures, IS Codes

Gypsum: Occurrence, Physical Properties, Resources in India, Alabaster, Uses. Glass, Ceramic Tiles

Unit 2

Plastics: Definition, History, Classification, Polymerization, Properties of Plastics, Applications in Building Industry, IS Codes

Paints: Classification, Composition of Oil Paints, Characteristics of Good Paints, Defects in Painting, Enamel Paints, Distempers

Varnishes: Composition, Qualities of Good Varnish, Different Kinds of Varnish, French Polish or Spirit Polish, IS Code.

Unit 3

Fibre reinforced concrete: Fibres used in FRC, advantages and disadvantages of FRC over conventional reinforced concrete, factors effecting properties, relative fibre matrix stiffness, volume of fibres, aspect ratio of fibres, orientation of fibres, workability, size of coarse aggregate, mixing, application, Glass fibre reinforced cement: current developments in FRC, high fibre volume micro fibre system, slurry infiltrated fibre concrete, polymer concrete, behavior of FRC under Tension, compression and shear.

Unit 4

Ferrocement : Definition of ferrocement, applications of ferrocement, materials used in ferrocement, parameters and properties of materials used in ferrocement, cement mortar mix, skeletal steel, steel mesh reinforcement, fibre reinforced polymeric meshes, advantages of FRP, disadvantages of FRP, behavior of ferrocement in tension, advantages of ferrocement, difference between ferrocement and reinforced cement concrete: Physical and Mechanical properties, Concrete and other cementitious composite materials.

Text Books and Reference Materials

1. Santha Kumar, A.R.,"Concrete Technology", Oxford, University Press.
2. Duggal, S.K.,"Building Materials", New Age International Publishers.
3. Shetty, M.S., "Concrete Technology", SCC Ltd., New Delhi.
4. Neville, A.M., "Properties of Concrete", Longman, India.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 644	Tall Buildings	DE	4	3	0	1

Unit 1 Structural Systems

Types of structural systems; types of loads; methods of analysis; stability of tall structures; selection of foundation for tall buildings

Unit 2 Wind Effects on Tall Structures

Bluff body aerodynamics; aero-elastic phenomena; wind directionality effects; structural response and design considerations; standard provisions for wind loading.

Unit 3 Earthquake Effects on Tall Structures

Introduction to earthquake engineering and earthquake resistant design of buildings; earthquake motion and response; general principles and design criteria for buildings; codal provisions; aseismic design of structures; dynamic analysis; effect of torsion; design of stack like structures; earthquake forces in tall buildings.

Unit 4 Shear Walls

Shear in buildings; need of shear walls; location of shear walls in buildings; analysis and design of shear walls.

Text Books and Reference Materials

1. Wind Effects on Structures, Emil Simiu and R. H. Scanlan, John Wiley & Sons, Inc.
2. Wind Forces in Engineering, Peter Sachs, Pergamon Press, Oxford.
3. Elements of Earthquake Engineering, Jai Krishna and A. R. Chandrasekaran, SaritaPrakashan, Meerut.
4. Advanced Reinfirced Concrete Design, P.C. Verghese, PHI Learning Pvt. Ltd., New Delhi.
5. Reinforced Concrete: Limit State Design, A.K. Jain, Nem Chand & Bros., Roorkee.
6. Analysis of Shear-walled Buildings, S. M. A. Kazimi and R. Chandra, Tor Steel Research Foundation in India, Calcutta.
7. IS: 875- 1987 Part 1 Dead Load – Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures, BIS.
8. IS: 875- 1987 Part 2 Imposed Load – Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures, BIS.
9. IS: 875- 1987 Part 3 Wind Load – Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures, BIS.
10. IS: 1893- 1984 – Criteria for Earthquake Resistant Design of Structures, BIS.
11. IS: 1893 (Part 1) - 2002 – Criteria for Earthquake Resistant Design of Structures, BIS.
12. IS: 13920- 1993 – Code of Practice for Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces, BIS.
13. Structural Analysis and Design of Tall Buildings, B.S. Taranath, McGraw Hills.
14. Structural Design of Multistoreyed Buildings, U.H. Varyani, South Asian Publishers Pvt. Ltd., New Delhi.
15. Design of Building Frames, J. S. Gero and H. J. Cowan, Applied Science Publishers, London.

16. Structural Design of Tall Concrete and Masonry Buildings, Eds. J. G. Mac Gregor and I. Lyse, Council on Tall Buildings and Urban Habitat, ASCE.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 701	Earthquake Resistant Design of Structures	DC	4	3	0	1

Unit 1 Structural Systems

Types of structural systems; types of loads; methods of analysis; stability of tall structures; selection of foundation for tall buildings

Unit 2 Wind Effects on Tall Structures

Bluff body aerodynamics; aero-elastic phenomena; wind directionality effects; structural response and design considerations; standard provisions for wind loading.

Unit 3 Earthquake Effects on Tall Structures

Introduction to earthquake engineering and earthquake resistant design of buildings; earthquake motion and response; general principles and design criteria for buildings; codal provisions; aseismic design of structures; dynamic analysis; effect of torsion; design of stack like structures; earthquake forces in tall buildings.

Unit 4 Shear Walls

Shear in buildings; need of shear walls; location of shear walls in buildings; analysis and design of shear walls.

Text Books and Reference Materials

1. Wind Effects on Structures, Emil Simiu and R. H. Scanlan, John Wiley & Sons, Inc.
2. Wind Forces in Engineering, Peter Sachs, Pergamon Press, Oxford.
3. Elements of Earthquake Engineering, Jai Krishna and A. R. Chandrasekaran, SaritaPrakashan, Meerut.
4. Advanced Reinfirced Concrete Design, P.C. Verghese, PHI Learning Pvt. Ltd., New Delhi.
5. Reinforced Concrete: Limit State Design, A.K. Jain, Nem Chand & Bros., Roorkee.
6. Analysis of Shear-walled Buildings, S. M. A. Kazimi and R. Chandra, Tor Steel Research Foundation in India, Calcutta.
7. IS: 875- 1987 Part 1 Dead Load – Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures, BIS.
8. IS: 875- 1987 Part 2 Imposed Load – Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures, BIS.
9. IS: 875- 1987 Part 3 Wind Load – Code of Practice for Design Loads (Other Than Earthquake) for Buildings and Structures, BIS.
10. IS: 1893- 1984 – Criteria for Earthquake Resistant Design of Structures, BIS.
11. IS: 1893 (Part 1) - 2002 – Criteria for Earthquake Resistant Design of Structures, BIS.
12. IS: 13920- 1993 – Code of Practice for Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces, BIS.
13. Structural Analysis and Design of Tall Buildings, B.S. Taranath, McGraw Hills.
14. Structural Design of Multistoreyed Buildings, U.H. Varyani, South Asian Publishers Pvt. Ltd., New Delhi.
15. Design of Building Frames, J. S. Gero and H. J. Cowan, Applied Science Publishers, London.

16. Structural Design of Tall Concrete and Masonry Buildings, Eds. J. G. Mac Gregor and I. Lyse, Council on Tall Buildings and Urban Habitat, ASCE.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 780S	General Seminar	DC	2	0	0	2

Topics related to general interest of Civil Engineering particularly new inventions and new techniques used in modern construction. For instance,Green House Buildings in India, Techniques to Curb Landslides, New Runway Pavement Materials, Design of Containment Shell of Nuclear Power Plant, New Construction Techniques involved in Tunneling, Rocket Launching Pad, Use of Tuned Mass Dampers in High-rise Construction, Construction of Bunkers and Silos

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 791S	Lab/Project	DC	3	3	0	0

1. To calculate the depth of the vertical crack in a beam with the help of Portable Ultra Sonic Non-destructive Testing Indicator (PUNDIT).
2. To calculate the length of the inclined crack in a beam with the help of Portable Ultra Sonic Non-destructive Testing Indicator (PUNDIT).
3. To calculate the strength of the cube by testing under destruction and non-destructive testing by PUNDIT.
4. To calculate the Poison's ratio and modulus of elasticity of the concrete.
5. To study the behavior of timber section under pure bending.
6. To calculate stiffness, damping and logarithmic decrement of the spring system both in series and parallel.
7. Analyze a three span continuous beam (i) By moment redistribution method (ii) Analytically with the help of a software. Also compare the results.
8. Analyse a multi- storey building considering earthquake and wind also.

Text Books and Reference Materials

1. Lab manual.

Web based learning

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 781S	Preliminary Dissertation Seminar	DC	4	3	0	1

Any suitable research topic relevant to structural engineering from the following thrust areas such as:

Offshore Structures, Structural Dynamics, Computational Fluid Dynamics, Fibre Reinforced Concrete, Durability and Corrosion Resistance, Polymer Concrete Composites, Self

Compacting Concrete, Permeable Concrete, Fire Resistance of High Strength Concrete, Performance Based Design, Reliability Based Design, Seismic Strengthening of Heritage Buildings, soil-structure interaction, recycled concrete, etc.To study the behavior of timber section under pure bending.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 782S	Final Dissertation Seminar	DC	2	0	2	0

Any suitable research topic relevant to structural engineering from the following thrust areas such as:
Offshore Structures, Structural Dynamics, Computational Fluid Dynamics, Fibre Reinforced Concrete, Durability and Corrosion Resistance, Polymer Concrete Composites, Self Compacting Concrete, Permeable Concrete, Fire Resistance of High Strength Concrete, Performance Based Design, Reliability Based Design, Seismic Strengthening of Heritage Buildings, soil-structure interaction, recycled concrete, etc.

Course No.	Course Title	Course Type	Credits	Contact Hours		
				L	P	G
CE 798S	Dissertation	DC	2	0	2	0

Any suitable research topic relevant to structural engineering from the following thrust areas such as:
Offshore Structures, Structural Dynamics, Computational Fluid Dynamics, Fibre Reinforced Concrete, Durability and Corrosion Resistance, Polymer Concrete Composites, Self Compacting Concrete, Permeable Concrete, Fire Resistance of High Strength Concrete, Performance Based Design, Reliability Based Design, Seismic Strengthening of Heritage Buildings, soil-structure interaction, recycled concrete, etc.