DEGREE OF MASTER OF ENGINEERING

IN

STRUCTURAL ENGINEERING

Syllabus

2017-2018

Enable | Enlighten | Enrich

KARPAGAM

ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

CIVIL ENGINEERING

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act 1956)

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SEMESTER-I

17MEST101 ADVANCED MATHEMATICAL METHODS 3 1 0 4 100

OBJECTIVES:

- To teach the applications of Laplace and Fourier transforms.
- To study about Calculus of variations, correlation and regression
- To introduce theory of estimations.

INTENDED OUTCOMES:

The students will be able

- To understand the applications of Laplace and Fourier transforms.
- To solve problems of solving equations using Calculus of variations
- To apply theory of estimations.

UNIT I TRANSFORM METHODS (12)

Laplace transforms methods for one-dimensional wave equation – Displacements in a long string – Fourier transform methods for one-dimensional heat conduction problems in finite and semi-infinite rod.

UNIT II ELIPTIC EQUATIONS (12)

Laplace equation – Properties of harmonic functions – Fourier transform methods for Laplace equation.

UNIT III CALCULUS OF VARIATIONS (12)

Variation and its properties – Euler's equation – Functionals dependent on first and higher order derivatives – Functionals dependent on functions of several independent variables – Some applications – Direct methods: Rayleigh-Ritz and Kantorovich methods.

UNIT IV PROBABILITY AND RANDOM VARIABLES (12)

Probability - Random variables - Moments – Moment Generating Function – Standard Distributions – Functions of random variables – Two dimensional random variables – Correlation and Regression.

UNIT V ESTIMATION THEORY (12)

Principles of least squares – Multiple and partial correlation and regression – Estimation of parameters – Maximum Likelihood Estimates – Method of Moments.

Total : 60

TEXT BOOKS:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sankara Rao,K	Introduction to Partial Differential Equations	Prentice Hall of India Pvt. Ltd., New Delhi.	2010
2	Gupta, S.C. and Kapoor, V.K	Fundamentals of Mathematical Statistics	Sultan Chand and Sons, New Delhi.	2014
3	Gupta, A.S	Calculus of Variations with Applications	Prentice Hall of India Pvt. Ltd., New Delhi.	2011

REFERENCES:

S. NO.	AUTHOR(S) NAME	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Sneddon I.N.	Elements of Partial Differential Equations	Mc Graw Hill, New York.	2006
2	Montgomery, D.C. and Runger, G.C.	Applied Statistics and Probability for Engineers	Wiley Student Editionn publishers. New Delhi	2009
3	Walpole, Myers, Myers & Ye	Probability and Statistics for Engineers and Scientists	Pearson publisher, India	2012

WEBSITES:

1. www.mathworld.com
2. www.efunda.com
3. www.intmath.com

COURSE 1

COURSE 2

COURSE 3

17MEST_E-- ELECTIVE 1	**3**	**0**	**0**	**3**	**100**
17MEST_E-- ELECTIVE 2	**3**	**0**	**0**	**3**	**100**
17MEST111 ADVANCED COMPUTER APPLICATION LAB	**0**	**0**	**3**	**2**	**100**

Graphic primitives – Basics of 2D drafting – Modeling of curves and surfaces – Solid modeling Graphic standards – Drafting software packages and usage Computer methods of structural analysis – Finite element programming – Analysis and Design through application packages STAAD Pro.

1 Analysis of plane rigid jointed frame
2. Analysis of continuous Beams
3. Analysis of Trusses
4. Analysis and Design Of Structures

Reference Books:

1. STAAD PACKAGE MANUAL
2. ANSYS Package Manual

SEMESTER – II

COURSE 4

COURSE 5

COURSE 6

17MEST_E-- ELECTIVE 3	**3**	**0**	**0**	**3**	**100**
17MEST_E-- ELECTIVE 4	**3**	**0**	**0**	**3**	**100**
17MEST_E-- ELECTIVE 5	**3**	**0**	**0**	**3**	**100**
17MEST211 STRUCTURAL ENGINEERING LAB	**0**	**0**	**3**	**2**	**100**

LIST OF EXPERIMENTS

- Experiment on properties of concrete making materials
- Concrete Mix Design by IS method and ACI method
- Properties of fresh concrete –workability tests on concrete –slump, compaction factor & Vee-Bee Consistometer Test
- Properties of hardened concrete-under compression, and bending – stress Vs Strain behaviour -modulus of elasticity
- Strain gauges – Principles and applications, mechanical, optical and electrical strain gauges, Strain recording instruments.
- Beahaviour of structural elements (beams /slabs) in flexure ,shear.
- Non destructive tests on concrete –Rebound Hammer and Ultrasonic Pulse
- Velocity Concrete Test
- Study of load cell and its design
- Strain Recording instruments
- Cyclic loading of beams & frames, columns – beam junction
- Vibration measurements

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Experimental Stress Analysis	Dally J W, and Riley W F	McGraw-Hill, Inc. New York	1991
Concrete Technology Theory and Practice	M.S Shetty	S. Chand & Company Ltd	2005
Experimental Stress Analysis	Dr. Sadhu Singh	Khanna Publications, New Delhi	2000
Experimental Stress Analysis	L.S Srinath, M.R Raghavan, K. Lingaish, G. Gargesha, B. Paint, K.Ramachandra	Tata McGraw-Hill PublishingCompany Ltd, New Delhi	2003
Concrete Technology	Santhakumar A.R	Oxford Higher Education, New Delhi	2007

SEMESTER — III

17MEST_E—ELECTIVE 6	**3**	**0**	**0**	**3**	**100**
17MEST_E—ELECTIVE 7	**3**	**0**	**0**	**3**	**100**
17MEST_E—ELECTIVE 8	**3**	**0**	**0**	**3**	**100**
17MEST341 SUMMER INDUSTRIAL TRAINING	**0**	**0**	**0**	**2**	**100**
17MEST351 TECHNICAL SEMINAR	**0**	**0**	**3**	**2**	**100**
17MEST391 PROJECT WORK PHASE I	**0**	**0**	**12**	**6**	**100**

OBJECTIVE:

- At the end of the course the students will have a clear idea of his/her area of work and they are in a position to carry out the remaining phase II work in a systematic way.

SYLLABUS:

The student individually works on a specific topic approved by faculty member who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

SEMESTER - IV

17MEST491 PROJECT WORK PHASE II 0 0 24 12 300

OBJECTIVE:

- On completion of the project work students will be in a position to take up any research and challenging practical problem for finding better solutions.

SYLLABUS:

The student should continue the phase I work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated through based on the report and the viva-voce examination by a panel of examiners including one external examiner.

TOTAL: 360 PERIODS

LIST OF PROFESSIONAL CORE (PC)

17MEST--- THEORY OF ELASTICITY 3 1 0 4 100

OBJECTIVE:

- To impart knowledge on elastic and plastic behavior of bodies subjected to stresses and strain.
- To find out the stresses in bodies subjected to two-dimensional & three dimensional forces
- To develop a mathematical model for two-dimensional problems
- To understand the concept of 3D stress, strain analysis and its applications to simple problems.

UNIT – I ANALYSIS OF STRESS AND STRAIN 12

Analysis of stress (two and three dimension) - Body force, surface forces - Uniform state of Stress - Principal stresses - stress transformation laws - Differential equations of equilibrium.

Analysis of strain (two and three dimension) Strain displacement relations - Compatibility Equations - strain transformations - principal strain - principle of superposition.

Stress - strain relations - generalized Hook's law - St. Venants principle

UNIT - II TWO DIMENSIONAL PROBLEMS IN CARTESIAN COORDINATES 12

Plane stress and Plane strain problems - Airy's stress function - polynomials -

Application to:

a. Bending of a cantilever loaded at end.

b. Bending of a Beam by uniform load.

c. Bending of a cantilever with a moment at the end.

UNIT III: TWO DIMENSIONAL PROBLEMS IN POLAR COORDINATES 12

General equations in polar coordinates - stress distribution symmetrical about an axis - pure bending of curved bars - strain components in polar coordinates– Bending of a curved bar by force at the end - Effect of circular hole on stress distribution in a plate - concentrated force at a point of a straight boundary.

UNIT IV : TORSION OF PRISMATIC BARS 12

General solutions of the problem by displacement (St. Venant's warping function) and force (Prandtl's stress function) approaches - Membrane analogy-Torsion of shafts of circular and noncircular (elliptic) cross sectional shapes - Torsion of thin rectangular section and hollow thin walled single and multicelled sections.

UNIT - V INTRODUCTION TO PLASTICITY 12

Yield criteria - Rankine's theory - St.Venant's theory - Tresca's criterion - Von-mises criterion - Flow rule (plastic stress- strain relation) Prandtl Reuss equations - General relations - plastic torsion - perfect plasticity.

TOTAL HOURS:60

TEXT BOOKS:

Name of the Book	Author Name	Publisher	Year
Theory of Elasticity	Sadhu Singh	Khanna Publishers, N.Delhi	2013

REFERENCE BOOKS:

Name of the Book	Author Name	Publisher	Year
Elasticity, Tensor, Dyadic and Engg. approaches	Chow,P.C. and Pagano,N.J	D.Vannostrard Co., New York	2013
Theory of Plasticity	Sadhu Singh	Khanna Publishers, N.Delhi	2008.
Theory of Plasticity	Chakrabarthy, T	Mc Graw Hill Book Co., New Delhi	2006

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca

3 1 0 4 100

17MEST--- MATRIX STRUCTURAL ANALYSIS

OBJECTIVE:

- To educate the students to analyze the structures by flexibility and stiffness method.
- To apply this method to pin jointed trusses, continuous beams, grids and frames
- To study the energy principles, finite element concept, stress analysis, meshing, linear problems and applications.

UNIT-1 BASIC CONCEPTS : Indeterminacy (Static, Kinematic) – Generalized measurements – Degrees of Freedom – Behaviour of Structures – Principle of Superposition – Equilibrium, Compatibility and Force displacement relation.

UNIT -II MATRIX STIFFNESS METHOD : 12

Development of the method – relation with energy – stiffness solution of equations – Analysis of beam, truss and frame using stiffness method.

UNIT-III MATRIX FLEXIBILITY METHOD: 12

Flexibility method applied to statically determinate and indeterminate structures – Force transformation matrix - Solution of equations – beam, truss and frame applications.(Degree of Indeterminacy not more than two)

UNIT-IV FINITE ELEMENT METHOD : 12

Concept of an element - various element shapes - one, two and three dimensional elements - Finite Element procedure- Stiffness of an axial element, Two dimensional Truss problem. Displacement model - Convergence and compatibility requirements. Element formulation-Planar elements- triangular and rectangular elements

UNIT V ANALYSIS BY SUBSTRUCTURES & ITERATION 12

Analysis by substructures using the stiffness & the flexibility method with tridiagonalisation - Iteration method for frames with non-prismatic members – Iteration method applied to rigidly connected members – Computer program for the analysis of rigidly connected beams – Efficiency of the iteration method.

TOTAL HOURS:60

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Structural Analysis – a Matrix Approach	Pandit G.S and Gupta S.P	Tata McGraw Hill Publishing Company	2010

Introduction to Finite Elements in Engineering	Tirupathi R.Chandrupatla and Ashok D., Belegundu	Prentice Hall of India Pvt.Ltd., New Delhi	2003

REFERENCE BOOKS:

Name of the Book	Author Name	Publisher	Year
Introduction to the Finite Element method - A Numerical Method for Engg. Analysis	Chandrakant, S.Desai and John F.Abel	Affiliated East West press Pvt.Ltd., Madras	1972
Finite Element Method - Theory and Programming	Krishnamoorthy C.S	Tata Mc Graw Hill Publishing Company, New Delhi	2002
The Finite Element method Vol. 1 & 2	Zienkiewinz O.C	Mc Graw Hill Book Company,New York	2002
Matrix, Finite Element Computer and Structural Analysis	Mukhopadhyay.M	Oxford & IBH publishing Co., Pvt. Ltd., New Delhi	2000
The Finite Element Method in Engineering	Rao, S.S	Pergamon Press	2003
Finite Element Analysis	P.Seshu	Prentice Hall of India Pvt. Ltd., New Delhi	2004

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.civil.ubc.ca

17MEST--- DESIGN OF SUBSTRUCTURES 3 0 0 3 100

OBJECTIVE

- On completion of this course students will enable to select appropriate foundations type based on available soil conditions.
- They will be a position to determine the load carrying capacity of each type of foundation.

They will be through knowledge about the design of reinforced concrete shallow foundations, pile foundations, well foundations, and machine foundations.

UNIT I SUB SURFACE EXPLORATION 9

Purpose - Programme and Procedures – Interpretation of bore logs, soil data and exploration reports.

UNIT II SHALLOW FOUNDATIONS 9

Types of foundations and their specific applications – depth of foundation – bearing capacity and settlement estimates – structural design of isolated footings, strip, rectangular and trapezoidal combined footings – strap– raft foundation –Approximate flexible method of raft design.

UNIT III DEEP FOUNDATIONS 9

Types of Piles and their applications - Load capacity - Settlements - Group action - Design of piles and pile caps.

UNIT IV FOUNDATIONS FOR OTHER MISCELLANEOUS STRUCTURES 9

Caissons and Well foundations - Foundations for towers –Braced cuts-Coffer dams.

UNIT V MACHINE FOUNDATIONS 9

Types - General requirements and design criteria - General analysis of machine foundations- soil system - Stiffness and damping parameters - Tests for design parameters - Guide lines for design of reciprocating engines, impact type machines, rotary type machines, framed foundations.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year

Foundation Design and Construction	Thomlinson, M.J. and Boorman. R	ELBS Longman VI edition	2001
Foundation Design manual for Practicing Engineers	Nayak, N.V	Dhanpat Rai and Sons	2003

REFERENCE BOOKS:

Name of the Book	Author Name	Publisher	Year
Foundation Engineering Hand Book	Winterkorn H.F., and Fang H.Y	Van Nostrard – Reinhold	2011
Reinforced Concrete Foundations	Brain J Bell and M.J. Smith	George Godwin Ltd	2003
Principles of Foundations Engineering	Braja M. Das	Thomson Asia (P) Ltd	2002
Foundation Analysis and Design	Bowels J. E	McGraw-Hill International Book Co	2011

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST--- CONCRETE STRUCTURES 3 0 0 3 100

OBJECTIVE

- On completion of this course the students will have the confidence to design various concrete structures and structural elements by limit state design and detail the same for ductility as per codal requirements.

UNIT I OVERALL REVIEW 9

Design for Limit state of collapse- Design for limit state of serviceability- Calculation of deflection and crack width.-Design of beams for combined effect of shear, bending moment and torsion.-Analysis and design of beams curved in plan and spandrel beams.

UNIT II DESIGN OF SPECIAL RC ELEMENTS 9

Design of slender columns - Design of RC walls- Shear walls - Design of rectangular and flanged Shear walls - Design of Corbels - Design of Deep beams

UNIT III DESIGN OF FLAT SLAB AND GRID FLOORS 9

Yield line theory of slabs – Hillerberg's method of design of slab – Design of flat Slab Equivalent frame method of design - Approximate analysis and Design of grid floors.

UNIT IV INELASTIC BEHAVIOUR OF RC BEAMS 9

Inelastic behaviour of concrete beams – Moment Rotation curves – Moment redistribution – Baker's method of analysis and design – Design of cast in situ joints in frame.

UNIT V DETAILING REQUIREMENTS 9

Design and detailing of structural members using seismic design - Reinforcement detailing of structural members as pr SP:34 & IS:5525 – Earth quake Resistant Design – Detailing requirements for Ductility as per IS:13920 - Fire resistance of buildings.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year

Advanced Reinforced Concrete Design	Varghese, P.C	Prentice Hall of India	2002
Advanced Reinforced Concrete Design	KrishnaRaju .N.	CBS Publishers and Distributors	2005

Reference Books :

Name of the Book	Author Name	Publisher	Year
Reinforced Concrete Structural Elements – Behaviour Analysis and Design	Purushothaman .P	Tata Mcgraw Hill ,1986	2003
Reinforced Concrete Structures	Park..R and Pauly.T	John wiley & Sons	2006

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca

17MEST--- STRUCTURAL DYNAMICS 3 1 0 4 100

OBJECTIVE:

At the end of the course students are able to:

- formulate equations of motion for single and multiple-degree of freedom structures subjected to various dynamic loads
- solve these equations using analytical and computational methods
- model continuous structural systems using the Finite Element Method
- use and evaluate commercial dynamic analysis software.

UNIT -I INTRODUCTION AND PRINCIPLES OF DYNAMICS 12

Vibration studies and their importance to structural engineering problems - elements of vibratory systems and simple harmonic motion - D'Alembert's principle - Hamilton's principle - Single Degree of Freedom System: Equation of motion for S.D.O.F. - damped and undamped free vibrations - Critical damping - Logarithmic decrement - Response to support motion - Response of one degree freedom system to harmonic excitation, damped and undamped vibrations - force transmitted to foundation - vibration isolation.

UNIT- II RESPONSE TO GENERAL DYNAMIC LOADING 12

Fourier series expression for loading-Response to general dynamic loading - (blast or earthquake) - Duhamel's integral - Numerical evaluation

UNIT – III DISTRIBUTED PARAMETER SYSTEM 12

Modelling- Free and forced vibrations of bars- Rayleigh's variational method - Flexural vibration of simply supported and cantilever beams- Modes and frequencies- Orthogonality properties of normal modes.

UNIT - IV MULTI DEGREE OF FREEDOM SYSTEM 12

Formulation of Structure, property matrices-Eigen value problems-Dunkerly's method-Holzer method-Stodola method-Rayleigh's method- Rayleigh- Ritz method- Mode shapes-orthonormality of modes

UNIT – V DYNAMIC RESPONSE OF MULTI DEGREE OF FREEDOM SYSTEMS 12

Mode superposition techniques - Problems on two degree of freedom for building Frames - Numerical Integration Techniques- Direct integration methods - Central Difference method - Houbolt method –Wilson method and Newmark method

TOTAL HOURS = 60

Text Books

Name of the Book	Author Name	Publisher	Year
Dynamics of Structures	Clough, R.,W., and Penzien	McGraw Hill Book Co Ltd	2003
Structural Dynamics - Theory and Computation	Mario Paz	CBS publishers	2002

Reference Books

Name of the Book	Author Name	Publisher	Year
Structural Dynamics - An Introduction to computer Methods	Craig,R.R	John Wiley & Sons	2011
Dynamics of Structures	Hurty W.C and Rubinstein, M.F	Prentice Hall	2003
Introduction to Structural Dynamics	Biggs, M	McGraw-Hill, Co	2008
Theory of Vibration	Thomson, W.T	Prentice Hall of India	1998
Elementary Structural Dynamics	Manickaselvam, V.K	Dhanpat Rai & Sons	2002

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca

17MEST--- STEEL STRUCTURES 3 0 0 3 100

OBJECTIVE:

- **At** the end of the course students are able to design the connections,towers, chimneys, tubular structures and light gauge steel structures.

UNIT I WELDED AND BOLTED CONNECTIONS 9

Types of connections – Welded – Beam to Beam connection and beam to column connection- Types of connections – bolted – Beam to Beam connection and beam to column connection. Stiffened seated connection and Unstiffened seated connection-Moment resistant connection.

UNIT II INDUSTRIAL STRUCTURES 9

Analysis and design of Industrial Buildings and bents, Sway and non-sway frames, Design of Purlins, Louver rails, Gable frame - Design of members subjected to axial and lateral loads - Design of Base Plates

UNIT III ANALYSIS AND DESIGN OF STEEL TOWERS 9

Analysis and Design of Microwave / Transmission Line Towers - Types of bracing patterns – design as per codal provisions.

UNIT IV ANALYSIS AND DESIGN OF CHIMNEY 9

Design of Self supporting Chimney – Introduction, types, joints, wind load acting on chimneys and Design

UNIT V DESIGN OF LIGHT GAUGE STEEL STRUCTURES 9

Behaviour of Compression Elements –local and post buckling - Effective width for load and deflection determination – Behaviour of Unstiffened and Stiffened Elements – Design of webs of beams – Design of Compression, tension and flexural members as per codal provisions- Lateral buckling of beams

TOTAL HOURS = 45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Design of Steel Structures – Vol. I & II	Ramachandra, S	Standard Publication, New Delhi	2002

Design of Steel Structures, Second edition	Dayaratnam, P	S. Chand &Company.	2003

REFERENCES

Name of the Book	Author Name	Publisher	Year
Design of Steel Structures by Limit State method first edition	Subramanian .N	Oxford university press	2011

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

LIST OF PROFESSIONAL ELECTIVES

17MEST-E01 ADVANCED CONCRETE TECHNOLOGY 3 0 0 3 100

OBJECTIVE:

- To impart knowledge on concrete mix design as per ACI and IS methods
- To impart knowledge on the understanding the properties of fresh and hardened concrete
- To make the students to identify the concrete properties through testing of materials.

UNIT – I INTRODUCTION 9

Concrete: Past, Present and Future- Constituent Materials --Strength of Concrete- Dimensional Stability of Concrete- Chemical and Mineral Admixtures-Properties of Fresh and hardened Concrete - Principles of Concrete Mix Design-Methods of Concrete mix design.

UNIT - II SPECIAL CONCRETES 9

Lightweight and Heavy Weight Concrete-High Strength Concrete-High Performance Concrete-Polymers in Concrete-Steel fiber Reinforced Concrete-Ferrocement Concrete -Vaccum Concrete-Shotcrete-Ready Mixed Concrete-SIFCON.

UNIT – III DURABILITY OF CONCRETE 9

Permeability-chemical attack-sulphate attack-Quality of water-marine conditions- Thermal properties of concrete-fire resistance-methods of making durable concrete - Mass Concrete-Formwork-Structural Concrete Block Masonry -Quality Control of Concrete Construction.

UNIT - IV FORMWORK AND QUALITY CONTROL 9

Types of Formwork - Formwork Materials and Systems-Specifications – Design - Recommendations of IS 456-2000 on Quality- Statistical Parameters and Variability-Errors in Concrete Constructions-Quality Management.

UNIT - V CONCRETING UNDER SPECIAL CIRCUMSTANCES 9

Underground Construction-Concreting in Marine Environment-Under water Construction- Hot weather and Cold weather concreting.

Tests on Concrete : Evaluation of Strength of existing structures-investigation Techniques- Tests on Hardened Concrete-Non Destructive Testing-Semi destructive testing techniques- Tests on fresh Concrete-Load Test on Structural Components.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Properties of Concrete	Neville, A.M	Pitman Publishing Limited, London	2014
Concrete Technology	Shetty M.S	S.Chand and Company Ltd,.New Delhi	2006

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Concrete Technology	Gambir,M.L	Tata McGraw Hill, Publishing Co,Ltd,New Delhi,	2013
Design of Concrete mixes	Krishnaraju.N	CBS publisher and distributors.	2015
Indian Standards Code of Practice for Plain and Reinforced Concrete	Raju N. Krishna -		2003
Recommended Guidelines for Concrete Mix Design	IS: 10262		
Concrete Technology	Santhakumar,A.R	Oxford University Press, New Delhi	2014

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E02 ADVANCED CONSTRUCTION TECHNOLOGY 3 0 0 3 100

OBJECTIVE:

- To impart knowledge on the limit state design of RCC Structural components.
- To enhance the confident level of students to design the special structural elements as per Indian standard code of practice.

UNIT - I **9**

Modern Construction Methods: Open Excavation, Shafts and Tunnels- Preparation of foundation, Cofferdams, Caisson, Piled Foundation, Prestressed Concrete Construction, Pre-cast Concrete Construction.

UNIT - II **9**

Construction Methods for: Bridges, Roads, Railways, Dams, Harbour, River Works Pipelines

UNIT - III **9**

Construction Equipment used for Earth Moving, Excavating, Drilling, Blasting, Tunneling and hoisting

UNIT - IV **9**

Construction Equipment used for Conveying, Hoisting, Dredging, Dewatering Systems, Paving and concreting Plant

UNIT - V **9**

Principles and Practices of Temporary structures, Shoring, and Strutting, Underpinning, Principles and Design of Formwork, Scaffolding, Operation and maintenance of construction equipment.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Construction Planning , Equipment	Peurifoyu , R. L., ,	Mc Graw Hill Co	2005

and Methods	Ledbette, W.B		
PWD, Civil Engineering Construction	Antill J.M	Mc Graw Hill Book Co.,	2001

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Construction Equipment and its Planning & Applications	Varma, M,	Metropoltian Book Co	2004
Construction Methods and Management	Nunnaly, S.W	Prentice – Hall	2006
Construction Technology	Ataev, S.S	MIR , Pub	2009
Handbook of Temporary Structures in Construction	Ratay , R.T	Mc Graw Hill Book Co.	2010
Construction & Geotechnical Methods in Foundation Engg,	Koerner. R.M	Mc Graw Hill Book Co	1999
Principles & Practice of Heavy Construction	Smith ., R.C., Andres, CK	Prentice Hall	2001

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca

17MEST-E03 ASEISMIC DESIGN OF STRUCTURES 3 0 0 3 100

OBJECTIVE:

- To impart knowledge on analysis of structures subjected to dynamic loading.
- To estimate the amplitude, frequency and vibration of the structures by various techniques.

UNIT I INTRODUCTION: 9

Elements of engineering seismology-causes of earthquakes, seismic waves, magnitude, intensity and energy release-Indian seismology-Earthquake history-Seismic zone Map of India-seismographs-seismogram-accelerograph-strong motion characteristics-initiation into vibration of structures.

UNIT II IS CODE PROVISIONS : 9

Modal response contribution-modal participation factor-response history-spectral analysis-approximate methods for lateral load analysis-IS 1893-2002 provisions-IS 4326 provisions-behavior and design of masonry structures-discussion of codes IS 13827 and 13828. Ductile detailing of reinforcement in RC Building as per IS 13920.

UNIT III SEISMIC ANALYSIS OF BUILDINGS: 9

Introduction to methods of seismic analysis-Equivalent static analysis IS 1893 provisions-Design horizontal seismic coefficient-design base shear-distribution-idealization of building frames-seismic analysis and modeling-determination of lateral forces-equivalent static lateral force method-response spectrum method-time history method-push over analysis-mathematical modeling of multistory RC Building.

UNIT IV SEISMIC DESIGN CONCEPTS: 9

Concept of earthquake resistant design-concept of ductility-lateral force resisting systems-strong column weak beam concept-guidelines for seismic resistant construction-beam column joints-effect of structural irregularities-Earthquake Resistant Design for multi storey RC frames, shear wall, braced frames and their combinations-capacity based design

UNIT V MODERN CONCEPTS: 9

Soil performance-Liquefaction-Modern concepts-base isolation-adaptive system-seismic evaluation-retrofiting and strengthening of structures-seismic retrofitting strategies.

COMPUTER AIDED ANALYSIS AND DESIGN: (For internal assessment only-not for theory examination) Computer aided analysis and design of building systems for earthquake loads-response spectrum-time history analysis-capacity based design-hands on session using computer software.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Dynamics of Structures-Theory and Applications to earthquake Engineering	Chopra A.K	Prentice-Hall of India Pvt. Ltd., New Delhi	2011
Earthquake Resistant Design of Structures	Pankaj Agarwal and Manish Shrikhande	Prentice-Hall of India Pvt. Ltd., NewDelhi	2006

REFERENCES:

Name of the Book	Author Name	Publisher	Year
Dynamics of Structures	Clough R.W., and Penzien J	McGraw Hill, INC	2011
Wind and Earthquake Resistant Buildings-structural Analysis & Design	Taranath B.S., Marcell Decker	NewYork	2005
Earthquake Engineering Hand book	Chen W.F., & Scawthorn	CRC Press	2003
Earthquake Resistant Design of Structures	. Duggal	Oxford University Press	2007

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.aboutcivil.com

17MEST-E04 CADD FOR STRUCTURES 3 0 0 3 100

OBJECTIVE:

- To impart basic knowledge on the Behavior analysis and design of structural components.

UNIT - I COMPUTER GRAPHICS 9

Graphic primitives - Transformations - Basics of 2-D drafting - Modeling of curves and surfaces – Solid modeling - Graphic standards - Drafting software packages and usage.

UNIT - II STRUCTURAL ANALYSIS 9

Computer methods of structural analysis - Finite Element programming – Analysis through application packages.

UNIT - III STRUCTURAL DESIGN 9

Computer aided design of steel and RC Structural elements - Detailed drawing – Bill of materials.

UNIT - IV OPTIMIZATION 9

Linear programming - Simplex algorithm - Post-optimality analysis – Project scheduling - CPM and PERT applications Genetic algorithm and applications.

UNIT - V ARTIFICIAL INTELLIGENCE 9

Introduction - Heuristic search - knowledge based expert systems - Architecture and applications of KBES - Expert system shells - Principles of neural network.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Computer Aided Design	C.S. Krishnamoorthy and S.Rajeev	Narosa Publishing House, New Delhi	2012
Structural Analysis and Design	H.B. Harrison	Pergamon Press	2003

Vol. I & II			

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Finite Element Programming	E.Hinton and D.R.J.Owen	Academic Press	2002
Introduction to Operations Research	Billy E.Gillet	Tata McGraw-Hill	2008
Expert System Principles and Case studies	Richard Forsyth (Ed.	Chapman & Hal	1989

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E05 DESIGN OF BRIDGES 3 0 0 3 100

OBJECTIVE:

- To impart knowledge on design different types of reinforced concrete bridges
- To impart knowledge on the design of steel bridges and pre stressed concrete bridges along with the sub structures and foundation.

UNIT - I INTRODUCTION 9

Classification, detailed investigations, choice of type, I.R.C.specifications for road bridges, standard live loads, other forces acting on bridges, general design considerations.Design of solid slab bridges

UNIT - II R.C. GIRDER BRIDGES 9

Load distribution theories, Design of Tee beam and Slab bridges using Pigeauds Method, Courbon's theory-Balanced cantilever bridges-design of articulation

UNIT - III LONG SPAN GIRDER BRIDGES, PLATE GRIDER BRIDGES 9

Box girder bridges -Design principles of Continuous Bridges- Design of Plate Girder Railway bridges.

UNIT - IV DESIGN OF PRESTRESSED CONCRETE BRIDGES 9

Prestressed Concrete Bridges- types – Preliminary Dimensions- Design of Prestressed concrete slab bridge deck- Design of Post Tensioned T beam bridge.

UNIT - V BEARINGS, SUBSTRUCTURES AND FOOTINGS FOR BRIDGES 9

Design of Bridge bearing-Types of Bridge substructures-Design of Piers and Abutments.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Design of Bridges	Krishnaraju, N	Oxford and IBH Publishing Co., Bombay	2015

Design of Bridge Structures	Jagadeesh .T.R, Jayaram. M.A	Prentice – Hall India , New Delhi	2004

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Concrete Bridge Practice	Raina V.K	Tata McGraw-Hill Publishing Company, New Delhi,	2014
Bridge Analysis Simplified	Bakht, B. and Jaegar, L.G	McGraw-Hill	2002
Bridge Engineering	Ponnuswamy, S	Tata McGraw-Hill	2008
An introduction to Structural Design of Concrete Bridges	Derrick Beckett	Surrey University Press, Henley Thomes, Oxford Shire	2003
Reinforced Concrete Bridges	Taylor, F.W., Thomson, S.E., and Smulski E	John Wiley and Sons, New York	2003

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E06 DESIGN OF SHELL AND SPATIAL STRUCTURES 3 0 0 3 100

OBJECTIVE:

- To impart knowledge on analysis of different types of plates and shells under different boundary conditions
- To impart knowledge on two design philosophy of RCC folded plates and shell roof structures.

UNIT - I MEMBRANE THRORY OF SHELLS 9

Classification of shells - Types of shells - Structural action - Membrane theory – Shells of revolution and shells of translation - Examples - Limitations of membrane theory.

UNIT - II DESIGN OF FOLDED PLATES 9

Folded Plate structures - structural behaviour - Types - Design by ACI - ASCE Task Committee method.

UNIT - III SPACE FRAME - DESIGN PHILOSOPHY 9

Space frames - configuration - types of nodes - general principles of design Philosophy – Behaviour

UNIT - IV ANALYSIS OF SPACE FRAMES 9

Analysis of space frames - Formex Algebra, FORMIAN - Detailed design of Space Frames

UNIT - V OPTIMASATION 9

Optimization by structural theorems - Maxwell, Mirchell and Heyman's Theorems for trusses and frames – Fully stressed design with deflection constraints – Genetic Algorithm.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Stresses in shells	Wilhelm Flügge	Springer - Verlag	2001

Theory of Plates and Shells	Timoshenko, S	McGraw Hill	2010

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Design and Construction of Concrete Shells Roofs	Ramasamy, G.S	CBS Publishers	2005
Principles of Space Structures	Dr.N.Subramanian	Wheeler Publishing Co.	2008
Optimum Structural Design	Uri Krish	McGraw Hill Book Co	2003

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

3 0 0 3 100

17MEST-E07 DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES

OBJECTIVE:

- To impart Knowledge on design of composite beams, columns, trusses and box girder bridges including the related connections.
- They will get exposure on case studies related to steel-concrete composite construction of buildings

UNIT - I INTRODUCTION 9

Introduction to Steel - Concrete Composite Construction - Theory of composite structures - Introduction to steel -Concrete - Steel Sandwich Construction

UNIT - II DESIGN OF COMPOSITE MEMBERS 9

Behaviour of composite beams - Columns - Design of composite beams - Steel - Concrete composite columns -Design of composite trusses.

UNIT - III DESIGN OF CONNECTIONS 9

Types of Connections - Design of connections in the Composite Structures – Shear connections - Design of connections in Composite Trusses.

UNIT - IV COMPOSITE BOX GRIDER BRIDGERS 9

Introduction - Behaviour of Box Girder Bridges - Design concepts.

UNIT - V GENERAL 9

Case studies on Steel - Concrete Composite Construction in buildings – Seismic behaviour of composite structures.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Composite structures of steel and concrete	Johnson R.P	Blackwell Scientific Publications(Second Edition), UK	2001

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Steel Designers manual (Fifth edition)	Owens, G.W. and Knowels.P	Oxford Blackwell Scientific Publications	2002

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E08 DESIGN OF STRUCTURES FOR DYNAMIC LOADS **3 0 0 3 100**

OBJECTIVE:

- to understand the causes and effects of earthquake
- to design beams and frames subjected to earth quake forces as per the recommendations of IS code of practice

UNIT - I INTRODUCTION **9**

Factors affecting design against dynamic loads - Behaviour of concrete, steel, masonry and soil under impact and cyclic loads - Recap of Structural dynamics with reference to SDOF, MDOF and continuum systems – Ductility and its importance

UNIT - II DESIGN AGAINST EARTHQUAKES **9**

Earthquake characterisation - Response spectra - seismic coeffcient and response spectra methods of estimating loads - Response of framed, braced frames and shear wall buildings - Design as per BIS codes of practice - Ductility based design

UNIT - III DESIGN AGAINST BLAST AND IMPACT **9**

Displacement method for three dimensional Structure - Coordinate transformations - Analysis of space trusses and space frames

UNIT - IV DESIGN AGAINST WIND **9**

Characteristics of wind - Basic and Design wind speeds - Effect of permeability of the structure – pressure coefficient - Aero elastic and Aerodynamic effects - Design as per BIS code of practice including Gust Factor approach - tall buildings, stacks and chimneys.

UNIT - V SPECIAL CONSIDERATIONS **9**

Energy absorption capacity - Ductility of the material and the structure - Detailing for ductility - Passive and active control of vibrations - New and favourable materials

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Design of Building to withstand abnormal loading	Bela Goschy	Butterworths	2003

A seismic Design of Reinforced Concrete and Masonry building	Paulay, .T. and Priestly, .M.N.J	John Wiley and Sons	2009

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Blast vibration - Monitoring and control	Dowling, .C.H	Prentice Hall Inc., Englewood Cliffs	2009
Wind effects on Civil Engineering Structures	Kolousek, .V. et al	Elsevier	2003
Concrete Structures under Impact and Impulsive Loading	Synthesis Report CEB,Lousanne	Germany	2003

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca

3 0 0 3 100

17MEST-E09 DESIGN OF TALL BUILDINGS

OBJECTIVE:

- To study the behaviour, analysis and design of tall structures.
- To impart Knowledge on behavior of tall multistoried structures.
- to analyze and design such structures taking into account the effect of creep, Shrinkage and p-delta effect

UNIT - I DESIGN CRITERIA **9**

Design Philosophy, Materials – Modern concepts – High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete.

UNIT - II LOADING **9**

Gravity Loading – Dead load, Live load, Impact load, Construction load, Sequential loading. Wind Loading – Static and Dynamic Approach, Analytical method, Wind Tunnel Experimental methods. Earthquake Loading – Equivalent lateral Load analysis, Response Spectrum Method, Combination of Loads,

UNIT - III BEHAVIOUR OF STRUCTURAL SYSTEMS **9**

Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, In filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT - IV ANALYSIS AND DESIGN 9

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis. Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

UNIT - V STABILITY ANALYSIS 9

Overall buckling analysis of frames, wall – frames, Approximate methods, Second order effect of gravity loading, P – Delta Effects, Simultaneous first order and P-Delta analysis, Translational instability, Torsional Instability, Out of plumb effects, Effect ofstiffness of members and foundation rotation in stability of structures.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Tall Building Structures	Bryan Stafford Smith and Alex Coull	John Wiley and Sons	2007
Structural Analysis and Design of Tall Buildings	Taranath B.S	McGraw-Hill	2013

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Tall Buildings	Mir M. Ali	Pergamon Press, London	2012
Structural Concepts and Systems forArchitects and Engineers	LinT.Y. and Burry D.Stotes	John Wiley	2000
Lynn S.Beedle, Advances in Tall Buildings	Dr. Lynn S. Beedle	CBS Publishers and Distributors, Delhi	2003

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
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17MEST-E10 DISASTER RESISTANT STRUCTURES 3 0 0 3 100

OBJECTIVE:

- To study the behavior of structures.
- To impart Knowledge on behavior of disaster resistant structures.

UNIT - I BEHAVIOUR OF LIFE-LINE STRUCTURES 9

Philosophy for design to resist earthquake, cyclone and flood, tsunami ,National and International codes of practice ,By-Law of urban and semi-urban areas – Traditional and modern structures.

UNIT - II COMMUNITY STRUCTURES 9

Response of dams, bridges, buildings ,Strengthening measures , Safety analysis and rating – Reliability assessment

UNIT - III REHABILITATION AND RETROFITTING 9

Testing and evaluation - Classification of structures for safety point of view – methods of strengthening for different disasters - qualification test.

UNIT - IV DETAILING OF STRUCTURES AND COMPONENTS 9

Use of morden materials and their impact on disaster reduction, Use of modern analysis, design and construction techniques optimisation for performance.

UNIT - V DAMAGE ASSESSMENT OF STRUCTURES 9

Damage surveys - Maintenance and modifications to improve hazard resistance - Different types of foundation and its impact on safety - Ground improvement techniques.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Concrete and Reinforced Concrete - Deterioration and Protection	V.Moskvin, et.all	Mir Publishers - Moscow	2002
Repair of Concrete Structures	R.T.Allen and S.C.Edwards	Blakie and Sons, U.K	2004

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Concrete and Reinforced Concrete - Deterioration and Protection	V.Moskvin, et.all	Mir Publishers - Moscow	2002
Repair of Concrete Structures	R.T.Allen and S.C.Edwards	Blakie and Sons, U.K	2004
Civilisation through Civil Engineering	Proceedings IABSE 14th Congress	New Delhi	May 1992
Learning from failures Deficiencies in Design, Construction and Service	Raiker R.N. ,R & D Center	Raiker Bhavan, Bombay	2001
Concrete Technology	Santhakumar A .R	Oxford Higher Education , New Delhi	2014

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E11 ENVIRONMENTAL ENGINEERING STRUCTURES 3 0 0 3 100

OBJECTIVE:

- To study the analysis and design of pipes and water tanks using the codal provisons.

UNIT – I DESIGN OF PIPES 9

Structural design of a)Concrete b) pre stressed concrete and c)steel piping mains- anchorage for pipes-massive outfalls-structural design and laying hydrodynamic considerations. Advance in the manufacture of pipes

UNIT - II ANALYSIS ROOFING SYSTEM 9

Analysis of a concrete roofing systems a)Cylindrical b)Spherical and c)Conical shapes using membrane theory and design of various types of folded plates for roofing with concrete.

UNIT – III DESIGN OF WATER TANKS 9

IS Codes for the design of water retaining structures. Design of underground and overhead tank -Circular, rectangular, spherical and intze type of tanks using concrete (excluding staging). Design of pre stressed concrete cylindrical tanks- Economic analysis.

UNIT - IV DESIGN OF SPECIAL PURPOSE STRUCTURES 9

Intake towers, Structural design including foundation for water retaining structures such as settling tanks , clarifloculators, aeration tanks - effect of earth pressure - uplift considerations- selection of materials for construction.

UNIT V STRUCTURES USED IN WATER AND SEWERAGE WORKS 9

Exposure on steel, lattice structures used in water and sewerage works. Design of hydraulic structures-Selection of types of dams- Development of storage dams in India-Design of hydropower installation- Intake structures- Water conductor structures- tunnels – surge tanks- Penstocks- Values – anchor blocks- type of power house.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
REINFORCED concrete	P.Dayarathnam	Oxford & IBH publications	2010
Prestressed Concrete	Krishna Raju	Tata MCGeaw Hill Publishing Co	2012

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Design and construction of concrete Shell Roofs	Ramaswamy, G.S.	CBS Publishers, India	2009
Concrete Liquid Retaining Structures	Green, J.K., and Perkins, P.H	Applied Science Publishers	2012

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E12 INDUSTRIAL STRUCTURES 3 0 0 3 100

OBJECTIVE:

- To plan engineering, chemical and textile industries
- To design folded plate and shell structures and other structures such as silos, bunkers and chimneys.

UNIT - I PLANNING AND FUNCTIONAL REQUIREMENTS 9

Classification of Industries and Industrial structures –planning for lay out Requirements regarding Lighting, Ventilation and Fire safety- Protection against noise and vibration- guide lines from factories Act.

UNIT - II INDUSTRIAL, BUILDING 9

Roofs for Industrial Buildings- Steel and RC- folded plates and shell roofs- Gantry Girders- Design of Corbels and Nibs- Machine Foundations

UNIT - III POWER PLANT STRUCTURES 9

Bunkers and Silos - Chimney and cooling Towers – Design of steel storage tanks- Nuclear containment structures

UNIT - IV POWER TRANSMISSION STRUCTURES 9

Cables- Transmission Line Towers – Substation structures- Tower Foundations – Testing towers.

UNIT – V CURRENT DESIGN TRENDS 9

Concepts of shear walls,Walls-frames,tubular,Cores,outrigger,buindled tubes, diagobal tubes, mega tubes Environmental control structures for industries-concept of Electro static precipitators-functioning and components.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Procs. Of advanced course on Industrial Structures	Structural Engineering Research Centre	Allied publisher	1992
Handbook of Machine Foundations	P.Srinivasulu and C.V. Vaidyanathan	Tata and McGraw –Hill	2009

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Tall chimneys – Design and Construction	S.N.Manohar	Tata McGraw –Hill	2010
Transmission Line structures	A.R.santhakumar and S.S.Murthy	Tata MCGraw-Hill	2011
Storage Structures	Dr. K.Rajagopalan	Oxford IBH Publishing Company Ltd	2009

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E13 MAINTENANCE AND REHABILITATION OF STRUCTURES 3 0 0 3 100

OBJECTIVE:

- To emphasize the importance of maintenance and inspection of structures
- To impart fundamental knowledge on various repairing strategies

UNIT - I MAINTENANCE AND REPAIR STRATEGIES 9

Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance - importance of Maintenance Preventive measures on various aspects - inspection, Assessment procedure for evaluating a damaged structure causes of deterioration.

UNIT - II QUALITY ASSURANCE 9

Quality assurance for concrete construction - concrete properties - strength, permeability, thermal properties and cracking. Effects due to climate change. Design and construction errors.

UNIT - III DURABILITY OF STRUCTURES 9

Corrosion mechanism – diagnosis- causes and effects - cover thickness and cracking, measurements for corrosion - methods of corrosion protection - corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection - testing techniques

UNIT - IV MATERIALS FOR REPAIR 9

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete.

UNIT - V TECHNIQUES FOR REPAIR OF STRUCTURES 9

Rust, Shotcrete , Epoxy injection, repair for cracks, shoring and underpinning. Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure - demolition techniques for Dilapilated structures - case studies

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Concrete Structures	Denison Campbell, Allen and Harold Roper	oxford & IBH publications	2001
Materials, Maintenance and Repair	-	Longman Scientific and Technical UK	1991

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Repair of Concrete Structures	R.T.Allen and S.C.Edwards	Blakie and Sons, UK	2013

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E14 OPTIMIZATION IN STRUCTURAL DESIGN 3 0 0 3 100

OBJECTIVE:

- To impart knowledge on the recent advances in the area of met heuristics
- To create awareness among students to generate cost effective designs

UNIT - I INTRODUCTION 9

Basic concepts of minimum weight, minimum cost design, objective function, constraints, classical methods

UNIT - II OPTIMIZATION TECHNIQUES AND ALGORITHMS 9

Linear programming, Integer Programming, Quadratic Programming. Dynamic Programming and geometric Programming methods for optimal design of structural elements.

UNIT - III COMPUTER SEARCH METHODS 9

Linear Programming methods for plastic design of frames. Computer search for univariate and multivariate Minimization

UNIT - IV OPTIMIZATION THEOREMS 9

Optimization by structural theorems, MAXwell, Mitchell and Heyman's Theorems for trusses and frames, fully stressed design with deflection constraints, optimality criterion methods.

UNIT - V NON-TRADITIONAL OPTIMIZATION TECHNIQUES 9

Methods land on national evolution – Genetic Algorithm – simulated annealing – Truss problem – Hand simulation for simple problems.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
optimum Structural design, Civil Engineering and Mechanics Services	Spunt	Prentice –Hall , New Jersey	1971
Optimization theory and Applications	S.S.Rao	Wiley Eastern Limited, New Delhi	1977

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Optimum Structural design	Uri Krisch	McGraw-Hill Book Co	1981
Operation Research, Schaum's Outline series	Richard Bronson	McGraw-Hill book Co, Singapore	1983

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E15 PREFABRICATED STRUCTURES 3 0 0 3 100

OBJECTIVE:

- To impart Knowledge on pre fabricated elements and the technologies used in fabrication and erection
- To know the applications of Pre-Engineered Buildings in construction

UNIT - I INTRODUCTION 9

General Civil Engineering requirements, specific requirements for planning and layout of prefabrication plant. IS Code specifications.

UNIT - II DESIGN PRINCIPLES 9

Modular co-ordination, standardization, Disuniting, of Prefabricates, production, transportation, erection, stages f loading and codal provisions, safety factors, material properties, Deflection control, Lateral load resistance, Location and types of shear walls

UNIT - III REINFORCED CONCRETE 9

Prefabricated structures - Long wall and cross-wall large panel buildings, one way and two way prefabricated slabs, Framed buildings with partial and curtain walls, single storey industrial buildings with trusses and shells, Crane-gantry systems.

UNIT - IV FLOORS, STAIRS AND ROOFS 9

Types of floor slabs, analysis and design example of cored and panel types and two-way systems, staircase slab design, types of roof slabs and insulation requirements, Description of joints, their behaviour and reinforcement requirements, Deflection control for short term and long term loads, Ultimate strength calculations in shear and flexure.

UNIT - V WALLS 9

Types of wall panels, Blocks and large panels, Curtain, Partition and load bearing walls, load transfer from floor to wall panels, vertical loads, Eccentricity and stability of wall panels,Design Curves, types of wall joints, their behaviour and design, Leak prevention, joint sealants, sandwich wall panels.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Building with Large Prefabricates	B.Lewicki	Elsevier Publishing Company, New York	2006
Manual of Precast Concrete Construction	Koncz.T	Bauverlag, GMBH	1971

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Structural Design Manual, Precast Concrete Connection Details	Society for the Studies in the use of Precase Concrete	Netherland Betor Verlag	2012
Prefabricated Concrete for Industrial and Public Sectors	Lasslo Mokk, , Akademiai Kiado,Budapest	IBM Publications	2002
Design of Reinforced Concrete Structures	Murashev.V., Sigalov.E., and Bailov.V	MirPublishers	2002
Knowledge Based Process Planning for Construction and Manufacturing	Gerostiza. C.Z., Hendrikson, C., Rehat D.R	Academic Press, Inc	2009

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E16 PRESTRESSED CONCRETE 3 0 0 3 100

OBJECTIVE:

- To impart knowledge on the basic principles of Prestress concrete structures
- To impart the design philosophy of prestressed beams, tanks, pipes, poles etc.

UNIT - I INTRODUCTION **9**

Principles of Prestressing-Types and Systems of prestressing-Need for High Strength materials-Analysis-Load Balancing Concept-Methods-Losses-Deflection- Camber-Cable Layouts -Behaviour under flexure-Codal Provisions(IS,British,ACI andDIN),Ultimate Strength.

UNIT - II FLEXURAL MEMBER **9**

Design of flexural members - Design for shear, bond and torsion. Design of end blocks

UNIT - III AXIAL LOADED MEMBERS **9**

Design of Compression members –Design of Tension members - Design of prestressed pipes and poles

UNIT -IV CONTINUOUS BEAMS **9**

Applications of Prestressing in Continuous beams-Concept of linear Transformation-Concordant Cable Profile and cap cables.

UNIT - V COMPOSITE MEMBERS **9**

Composite beams-Analysis and design-ultimate strength-their application-Partial prestressing-its advantages and applications.

TOTAL HOURS:45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Design of Prestressed Concrete Structures	T.Y.Lin	John Wiley and Sons,Inc	2010
Prestressed Concrete, design and Construction	Leonhardt F., ,	Wilhelm Ernst and Shon	2012

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Code of Practice for Prestressed Concrete-IS 1343-1980	Dennis C.K. Poon P.E., Thornton Tomasetti	Dennis C.K. Poon P.E., Thornton Tomasetti	2012
Prestressed Concrete	Krishna Raju	Tata McGraw Hill Publishing Co,New Delhi	2008
Fundamentals of Prestressed Concrete	N.C.Sinha & Roy	S.Chand and Co	2003

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1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E17 SOIL STRUCTURE INTERACTION 3 0 0 3 100

OBJECTIVE:

At the end of this course the students will learnt about the behavior of soil, Analysis of pile and its interaction

UNIT - I SOIL-FOUNDATION INTERACTION 9

Introduction to soil-foundation interaction problems – Soil behaviour, Foundation behaviour, Interface behaviour, Scope of soil foundation interaction analysis, Soil response models, Winkler, Elastic continuum, two parameter elastic models, Elastic plastic behaviour, Time dependent behaviour.

UNIT - II BEAM ON ELASTIC FOUNDATION- SOIL MODELS 9

Infinite beam, two parameters, Isotropic elastic half-space, Analysis of beams of finite length, Classification of finite beams in relation to their stiffness.

UNIT - III PLATE ON ELASTIC MEDIUM 9

Infinite plate, Winkler, Two parameters, Isotropic elastic medium, Thin and thick plates, Analysis of finite plates, rectangular and circular plates, Numerical analysis of finite plates, Simple solutions.

UNIT - IV ELASTIC ANALYSIS OF PILE 9

Elastic analysis of single pile, Theoretical solutions for settlement and load distributions, Analysis of pile group, Interaction analysis, Load distribution in groups with rigid cap.

UNIT - V LATERALLY LOADED PILE 9

Load deflection prediction for laterally loaded piles, Sub grade reaction and elastic analysis, Interaction analysis, Pile raft system, Solutions through influence charts.

TOTAL HOURS:45

Text Books

Name of the Book	Author Name	Publisher	Year
Principles of Structural Stability Theory	Chajes, A	", Prentice Hall	2012
Structural Stability of columns and plates	Iyengar, N.G.R	Affiliated East West press Pvt. LTD, New Delhi	2013

Reference Books

Name of the Book	Author Name	Publisher	Year
Elastic Stability of Structures	Smitses	Prentice Hall	2003
Buckling of Bars, Plates and Shells	Brush, D.O., and Almorth,B.O	McGrawHill,	2013
Theory of Elastic Stability	Timoshenko, S.P., and Gere,J.M	2nd Ed. McGraw-Hill	2012
Stability and Chaos in Structural Engineering: An Energy Approach	El Naschie M.S	McGraw Hill International Editions	2011
Stability of Structures	Ashwini Kukar	Allied Publishers LTD, New Delhi	2012

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E18 STABILITY OF STRUCTURES 3 0 0 3 100

OBJECTIVE:

At the end of this course the students will learnt about the concept of stability and its behavior to the structure.

UNIT I : CONCEPT OF STABILITY **9**

Introduction: Stability Criteria - Equilibrium, Energy and Dynamic approaches- - Stability of Link models**.**
Buckling of Column: Higher order Differential equations - analysis for Various boundary conditions- behaviour of imperfect column - eccentrically loaded column-Inelastic buckling of column

UNIT – II APPROXIMATE METHODS

Energy method –Rayleigh Ritz method- numerical method- Experimental study of column behaviour – Southwell Plot, - Effect of shear on buckling

UNIT – III BEAM - COLUMN **9**

Beam-column theory, Beam column with concentrated loads – distributed loads; Effect of axial loads on bending stiffness - Application to buckling of simple frames – Stability functions

UNIT - IV TORSIONAL BUCKLING AND LATERAL BUCKLING **9**

Torsional buckling of thin walled open sections. Introduction - torsional buckling - torsional flexural buckling - Equilibrium and energy approaches
Lateral Buckling of Beams Differential equation for lateral buckling - Lateral buckling of beams (cantilever and simply supported) in pure bending.

UNIT V STABILITY OF PLATES 9

Governing Differential Equation – Equilibrium and Energy approaches -Buckling of thin rectangular plates of various edge conditions, Finite Difference method, Post buckling strength.

TOTAL HOURS:45

Text Books

Name of the Book	Author Name	Publisher	Year
Principles of Structural Stability Theory	Chajes, A	", Prentice Hall	2010
Structural Stability of columns and plates	Iyengar, N.G.R	Affiliated East West press Pvt. LTD, New Delhi	2000

Reference Books

Name of the Book	Author Name	Publisher	Year
Elastic Stability of Structures	Smitses	Prentice Hall	2003
Buckling of Bars, Plates and Shells	Brush, D.O., and Almorth,B.O	McGrawHill,	Feb 6, 2011
Theory of Elastic Stability	Timoshenko, S.P., and Gere,J.M	2nd Ed. McGraw-Hill	2009
Stability and Chaos in Structural Engineering: An Energy Approach	El Naschie M.S	McGraw Hill International Editions	2001
Stability of Structures	Ashwini Kukar	Allied Publishers LTD, New Delhi	Jan 25, 2013

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E19 GEOINFORMATICS IN CIVIL ENGINEERING 3 0 0 3 100

OBJECTIVE:

- For students and professionals in Environmental Sciences, this course explores an integrated GIS and remote sensing approach to solve real-world environmental problems.

UNIT-I INTRODUCTION 9

Remote sensing systems, multi concept of remote sensing, Remote sensing in India Photogrammetry : terrestrial, aerial, satellite, terminology, scale, flight planning, stereo photogrammetry, relief displacement, ground co ordinates, field applications, uses, comparison of aerial photo and satellite image, digital photogrammetry.

UNIT-II ELECTROMAGNETIC RADIATION: 9

Introduction, energy interaction in the atmosphere, earth surface feature, resolution, pixel

SENSORS AND PLATFORMS:

classification, land observation satellites, high resolution sensors, weather satellites and sensors, marine observation satellites. Satellite data products: introduction, data reception, transmission, and processing, remote sensing data products, digital data products.

UNIT-III IMAGE INTERPRETATION: 9

Procedure,elements,strategies,keys,equipments.

DIGITALIMAGEPROCESSING: overview of digital analysis steps, image enhancement, spatial filtering, image transformation, classification and analysis.

UNIT-IV 9

GIS: Introduction, component of GIS, input data for GIS, types of out data products
GIS Data: Data representation, data sources, data acquisition, verifications, geo referencing of GIS data, spatial data structures, modeling surfaces, networks, GIS data base management systems. Spatial data analysis: terminology, reclassification, data integration, spatial interpolation, surface analysis, network analysis, digital terrain visualization. Global Positioning System

UNIT-V APPLICATION OF GEOINFORMATICS IN CIVIL ENGINEERING 9
Landuse and land cover mapping, Transportation studies, crop inventory studies, ground water mapping, urban growth studies, flood plain mapping, waste land mapping, Waste disposal facility in urban areas and disaster management

TOTAL HOURS:45

Text Books

Name of the Book	Author Name	Publisher	Year
Principles of Geographical Information Systems	P.A. Burrough and R.A. McDonnell	Oxford University Press	2nd edition 2011
Remote Sensing and Image Interpretation	T.M. Lillesand, R.W. Kiefer and J.W. Chipman	John Wiley and Sons, India	5th edition 2003

Reference Books

Name of the Book	Author Name	Publisher	Year
Remote Sensing and GIS	B. Bhatia	Oxford University Press, New Delhi	2008
Introductory Digital Image Processing	.R. Jensen - Prentice	J -Hall, New Jersey	2005
Remote Sensing of Environment: An Earth Perspective	J.R. Jensen	Pearson Education, Delhi	2004

WEB ITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E20 WIND AND CYCLONE EFFECTS ON STRUCTURES 3 0 0 3 100

OBJECTIVE:

To study the concept of wind effects, analysis and design of structures.

UNIT I INTRODUCTION 9
Introduction, Spectral studies, Gust factor, Wind velocity, Method of measurement, variation of speed with height, shape factor, aspect ratio, drag effects.

UNIT II WIND TUNNEL STUDIES 9
Wind Tunnel Studies, Types of tunnels, Modeling requirements, Interpretation of results, Aero-elastic models.

UNIT III EFFECT OF WIND ON STRUCTURES 9
Wind on structures, Rigid structures, Flexible structures, Static and dynamic effects, Tall buildings, chimneys.

UNIT IV IS CODES AND SPECIAL STRUCTURES 9
Application to design, IS 875 code method, Buildings, Chimneys, Roofs, Shelters

UNIT V CYCLONE EFFECTS 9
Cyclone effect on structures, cladding design, window glass design.

TOTAL HOURS:45

Text Books

Name of the Book	Author Name	Publisher	Year
The Designer's Guide to Wind Loading of Building Structures	Cook.N.J	Butterworths	2000
Wind Effects on Civil Engineering Structures	Kolousek.V, Pirner.M, Fischer.O and Naprstek.J	Elsevier Publications	2007

Reference Books

Name of the Book	Author Name	Publisher	Year
Wind Forces in Engineering	Peter Sachs	Pergamon Press, New York	2010
Wind Effects on Building Vol. I and II	Lawson T.V	Applied Science Publishers, London	2007

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E21 OFFSHORE STRUCTURES 3 0 0 3 100

OBJECTIVE:
To study the concept of wave theories, forces and design of jacket towers, pipes and cables.

UNIT I WAVE THEORIES 9
Wave generation process, small and finite amplitude wave theories.

UNIT II FORCES OF OFFSHORE STRUCTURES 9
Wind Loads; Wave and Current Loads; Calculation based on Maximum base Shear and Overturning Moments; Design Wave heights and Spectral Definition; Hydrodynamic Coefficients and Marine growth; Fatigue Load Definition and Joint Probability distribution; Seismic Loads.

UNIT III OFFSHORE SOIL AND STRUCTURE MODELLING 9
Different types of offshore structures, foundation modeling, structural modeling.

UNIT IV ANALYSIS OF OFFSHORE STRUCTURES 9
Static method of analysis, foundation analysis and dynamics of offshore structures.

UNIT V DESIGN OF OFFSHORE STRUCTURES 9
Design of platforms, helipads, Jacket tower and mooring cables and pipe lines.

TOTAL HOURS:45

Text Books

Name of the Book	Author Name	Publisher	Year
Hydrodynamics of Offshore Structures	Chakrabarti, S.K	Computational Mechanics Publications	2001
Offshore Structural Engineering	Dawson.T.H	Prentice Hall Inc Englewood Cliffs, N.J	2000
Dynamic Analysis of Offshore Structures	Brebia, C.A and Walker, S	New Butterworths, U.K	2011

Reference Books

Name of the Book	Author Name	Publisher	Year
Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms	RP2A, Dalls, Tex	American Petroleum Institute Publication	2000
Offshore Structures	Reddy, D.V. and Arockiasamy, M	Vol.1 and Vol.2, Krieger Publishing Company, Florida	2001

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
4. www.civil.ubc.ca
5. www.aboutcivil.com

17MEST-E22 ADVANCED STRENGTH OF MATERIALS 3 0 0 3 100

OBJECTIVE:

- Upon completion of this course the students can able to apply mathematical knowledge to calculate the deformation behaviour of structures
- Critically analyse problem and solve the problems related to mechanical elements and analyse the deformation behaviour for different types of loads**.**

UNIT I: 9

Stress-Strain Relationship Generalized Hook's law for Isotropic, Orthotropic, Transversely Isotropic materials, plane stress, plane strain and axisymmetric problems, Analysis of Stress and Strains Concept in Cartesian coordinate system, Airy's stress function, derivation of stress equilibrium equations, transformation of stresses, stress invariants

UNIT II: 9

Polar Coordinate System Relationship between Cartesian and Polar coordinate system, Equilibrium equations, Strain displacement relations, Stress-strain relationship, Strain-displacement relationship for plane stress and plane strain conditions, Bending of curved bar, Stress concentration problems.

UNIT III: 9

Axisymmetric Problems Equilibrium equations, Strain displacement relations, Stress-strain relationship, Stress compatibility equations, Plane stress and Plane strain conditions. Cylinders subjected to internal and external pressure.

UNIT IV: **9**

Torsion Assumptions and Torsion equation for general prismatic solid bars, Warping of Non-circular sections and St. Venant's theory. Prandtle's stress function approach. Torsion of Circular, Elliptical and Triangular cross-section bar. Torsion of thin-walled structures by membrane analogy, Torsion of rolled sections and shear flow.

UNIT V: **9**

Beams on Elastic Foundation Differential equation, Infinite beams with concentrated load, concentrated moment, and finite uniformly distributed load. Semi-Infinite beams with free end subjected to finite uniformly distributed load, hinged end. Finite beams with free end and hinged end.

TOTAL HOURS- 45

Text Books

Name of the Book	Author Name	Publisher
Theory of Elasticity	Timoshenko and Goodier	Tata McGraw-Hill Publications
Mechanics of Solids	S. Crandall, N. Dahl and T. Lardner	Tata McGraw-Hill Publications

Reference Books

Name of the Book	Author Name	Publisher
Applied Elasticity	Wang	Dover Publications
Mechanics of deformable solids	Irving Shames	Prentice Hall
Advanced Mechanics of Solids	L.S.Sreenath	Tata McGraw-Hill Publications
Theory of Elasticity	Sadhu Singh	Khanna Publishers
Elasticity in Engineering	Scholer	Tata McGraw-Hill Publications
Solid Mechanics	S M A Kazimi	Tata McGraw-Hill Publications

WEB SITES:

1. www.springer.com
2. www.nptel.com
3. www.wikipedia.com
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17MEST-E23 FINITE ELEMENT TECHNIQUES 3 0 0 3 100

OBJECTIVE:

At the end of this course the students will learnt about the analysis of finite elements of one dimensional and two dimensional problems and applications to field problems.

UNIT I Variational Formulation: 9

General field problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus – Variational formulation of VBPS. The method of weighted residuals – The Ritz method.

UNIT II Finite Element Analysis of One Dimensional Problems : 9

One dimensional second order equations – discrimination of domain into elements – Generalised coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time dependant problems and their solutions – example from heat transfer, fluid flow and solid mechanics.

UNIT III Finite Element Analysis of Two Dimensional Problems : 9

Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalised coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices – boundary conditions – solution techniques.

UNIT IV Isoparametric Elements and Formulation: 9

Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoperimetric elements in 1,2 and 3 dimensional – Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.

UNIT V Applications to Field Problems in Two Dimensionals : 9

Equations of elasticity – plane elasticity problems – axisymmetric problems in elasticity – Bending of elastic plates – Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow.

TOTAL HOURS:45

Text Books

Sl.No	Title of Book	Author of Book	Publisher	Year
1	Introduction to Finite Element in Engineering, Third Edition	Chandrupatla, T.R., and Belegundu, A.D	Prentice Hall, India	2010

Reference Books

Sl.No	*Title of Book*	*Author of Book*	*Publisher*	*Year*
1	An Introduction to Finite Element Method	Reddy J N	McGraw-Hill, Intl. Student Edition	2009
2	The finite element method, Basic formulation and linear problems, Vol.1	Zienkiewics	McGraw-Hill, Book Co	2000
3	The Finite Element Method in Engineering	Rao. S.S	Pergaman Press.New Delhi.	2010

WEB SITES:

1. http://www.icivilengineer.com
2. http://www.engineeringcivil.com/
3. http://www.aboutcivil.com/
4. http://www.engineersdaily.com
5. http://www.asce.org/

17MEST-E24 EXPERIMENTAL METHODS AND MODEL ANALYSIS

3 0 0 3 100

OBJECTIVE:

At the end of this subject students know about awareness on experimental method of finding the response of the structure to different types of load.

UNIT - I **9**

Basic Concept in Measurements, Measurement of displacement, strain pressure, force and torque- Type of strain gauges.

UNIT - II **9**

Strain gauge circuits – Potentiometer and Wheatstone bridge – Use of lead wires switches- Use of electrical resistance strain gauges in transducer applications.

UNIT - III **9**

Indicating and recording devices - Static and dynamic data recording –Data (Digital and Analogue) acquisition and processing systems - Strain analysis methods – Rosette analysis - Static and dynamic testing techniques - Equipment for loading - Moire's techniques

UNIT - IV **9**

Non destructive testing techniques - Photoelasticity – optics of photoelasticity – Polariscope – Isoclinics and Isochromatics - methods of stress separation.

UNIT - V **9**

Laws of similitude - model materials – model testing – testing large scale structures –holographic techniques.

TOTAL HOURS = 45

TEXT BOOKS

Name of the Book	Author Name	Publisher	Year
Instrumentation – Devices and Systems	Rangan C S et al	Tata McGraw Hill Publishing Company, New Delhi	2005
Experimental Stress Analysis	Sadhu Singh	Khanna Publishers, New Delhi	2007

REFERENCE BOOKS

Name of the Book	Author Name	Publisher	Year
Experimental stress Analysis	Dally J W and Riley W.F	McGraw-Hill, Inc.NewYork	2008
Experimental Stress Analysis	Srinath L S et al	, Tata McGraw-Hill Publishing Co., Ltd., New Delhi	2007

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1. www.springer.com
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