



Dr.M.G.R
Educational and Research Institute
Univeristy
 (Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
M.Tech. Civil Engineering (Full Time)
Curriculum & Syllabus
2013 Regulation

M.Tech STRUCTURAL ENGINEERING

| I SEMESTER | | | | | | |
|-------------------|------------------|---|-----------|----------|----------|-----------|
| S.No. | Sub. Code | Subject Name | L | T | P | C |
| 1. | MMA130004 | Advanced Engineering Mathematics for Structural Engineers | 3 | 1 | 0 | 4 |
| 2. | MCE13S001 | Theory of Elasticity and Plasticity | 3 | 1 | 0 | 4 |
| 3. | MCE13S002 | Advanced Analysis of Structures | 3 | 1 | 0 | 4 |
| 4. | MCE13S003 | Structural Dynamics | 3 | 1 | 0 | 4 |
| 5. | MCE13S004 | Sustainable Concrete Technology | 3 | 0 | 0 | 3 |
| 6. | MCE13S005 | Prefabricated Structures | 3 | 1 | 0 | 4 |
| TOTAL | | | 18 | 5 | 0 | 23 |

| II SEMESTER | | | | | | |
|--------------------|------------------|---|-----------|----------|----------|-----------|
| S.No. | Sub. Code | Subject Name | L | T | P | C |
| 1. | MCE13S006 | Design of Concrete Structures | 3 | 1 | 0 | 4 |
| 2. | MCE13S007 | Experimental Stress Analysis | 3 | 1 | 0 | 4 |
| 3. | MCE13S008 | Theory of Elastic Stability | 3 | 1 | 0 | 4 |
| 4. | MCE13S009 | Theory of Plates and Shells | 3 | 1 | 0 | 4 |
| 5. | MCE13S010 | Repair and Rehabilitation of Structures | 3 | 0 | 0 | 3 |
| | | Elective I | 3 | 1 | 0 | 4 |
| 6. | MCE13SL01 | Structural Engineering Lab | 0 | 0 | 2 | 1 |
| TOTAL | | | 18 | 5 | 2 | 24 |



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING

| III SEMESTER | | | | | | |
|--------------|-----------|--|----------|----------|----------|-----------|
| S.No. | Sub. Code | Subject Name | L | T | P | C |
| 1. | MCE13S011 | Design of Steel Structures | 3 | 1 | 0 | 4 |
| 2. | MCE13S012 | Design of Seismic Resistant Structures | 3 | 1 | 0 | 4 |
| | | Elective II | 3 | 1 | 0 | 4 |
| 1. | MCE13SL02 | Computer Aided Structural Design Lab | 0 | 0 | 2 | 1 |
| 2. | MCE13SL03 | Project Phase I | 0 | 0 | 6 | 3 |
| | | TOTAL | 9 | 3 | 8 | 16 |

| IV SEMESTER | | | | | | |
|-------------|-----------|------------------|---|---|----|----|
| S.No. | Sub. Code | Subject Name | L | T | P | C |
| | MCE13SL04 | Project Phase II | 0 | 0 | 24 | 12 |

TOTAL CREDITS = 23+24+16+12=75



Dr.M.G.R
Educational and Research Institute
Univeristy
 (Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING

LIST OF ELECTIVE

| S.No | Sub. Code | Subject Name | L | T | P | C |
|-------------------|-----------|--|---|---|---|---|
| ELECTIVE I | | | | | | |
| 1. | MCE13SE01 | Prestressed Concrete Structures | 3 | 1 | 0 | 4 |
| 2. | MCE13SE02 | Finite Element Methods in Engineering | 3 | 1 | 0 | 4 |
| 3. | MCE13SE03 | Tall Structures | 3 | 1 | 0 | 4 |
| 4. | MCE13SE04 | Advanced construction management | 3 | 1 | 0 | 4 |
| 5. | MCE13SE05 | Probabilistic Methods in Civil Engineering | 3 | 1 | 0 | 4 |
| 6. | MMA13SE01 | Optimization Techniques | 3 | 1 | 0 | 4 |

| S.No | Sub. Code | Subject Name | L | T | P | C |
|--------------------|-----------|---|---|---|---|---|
| ELECTIVE II | | | | | | |
| 7. | MCE13SE06 | CAD in Civil Engineering | 3 | 1 | 0 | 4 |
| 8. | MCE13SE07 | Soil Structure Interaction | 3 | 1 | 0 | 4 |
| 9. | MCE13SE08 | Disaster Resistant Structures | 3 | 1 | 0 | 4 |
| 10. | MCE13SE09 | Design of Bridges | 3 | 1 | 0 | 4 |
| 11. | MCE13SE10 | Environmental Engineering Structures | 3 | 1 | 0 | 4 |
| 12. | MCE13SE11 | Experimental Techniques and Instrumentation | 3 | 1 | 0 | 4 |
| 13. | MCE13CE08 | Disaster Management | 3 | 1 | 0 | 4 |



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING

MMA130004 ADVANCED ENGINEERING MATHEMATICS FOR STRUCTURAL ENGINEERS 3104

UNIT I TRANSFORM METHODS

12 hrs

Laplace Transform methods for one dimensional wave equation – Displacements in a string – Fourier Transform methods – One dimensional heat conduction problems in infinite and semi- infinite rod.

UNIT II CALCULUS OF VARIATIONS

12 hrs

Variation and its properties – Euler’s equations – Functionals dependent on First and higher order derivatives – Functionals depend on functions of several independent variables – Problems with moving boundaries – Direct methods – Ritz and Kantorovich methods.

UNIT III ONE DIMENSIONAL RANDOM VARIABLES

12 hrs

Random variables – Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Exponential, and normal distributions – Functions of a Random variable.

UNIT IV TWO DIMENSIONAL RANDOM VARIABLES

12 hrs

Joint distributions – Marginal and conditional distributions – Functions of two dimensional random variables – Correlation – Regression.

UNIT V ESTIMATION THEORY

12 hrs

Unbiased estimators – Method of moments –Maximum likelihood estimation – Curve fitting by Principle of least squares.

Total no. of hrs: 60

Reference Books:

- 1 Sneddon I.N., Elements of Partial Differential Equations, Dover Publications, (2006).
- 2 Sankara Rao K., Introduction to Partial Differential Equations (3rd ed.), PHI, (2010).
- 3 Gupta A.S., Calculus of variations with applications, Prentice Hall of India, (2004).
- 4 Richard Johnson A., Miller & Freund’s Probability and statistics for Engineers (8th ed), Prentice Hall of India, (2009).
- 5 Richard Johnson A., Wichern .D.W, Applied Multivariate Statistical Analysis (6th ed), Prentice Hall of India, (2007).
- 6 Gupta S.C., Kapoor V.K., Fundamentals of Mathematical Statistics, S.Chand & Co., (2007).
- 7 Soong T.T., Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, (2004).



MCE13S001

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
THEORY OF ELASTICITY AND PLASTICITY

3 1 0 4

OBJECTIVE

- To understand the concept of 3D stress, strain analysis and its Applications to sim ple problems.

UNIT I: ANALYSIS OF STRESS AND STRAIN

12Hrs

Analysis of stress and strain, stress strain relationship. Generalized Hook's law. Plane stress and plane strain.

UNIT II: 2D PROBLEMS

12 Hrs

Two-dimensional problems in Cartesian and polar co-ordinates for simple problems.

UNIT III: TORSION

12 Hrs

Torsion of non-circular section - methods of analysis - membrane analogy – torsion of thin rectangular section and hollow thin walled sections.

UNIT IV: ENERGY METHODS

12 Hrs

Energy methods - principle of virtual work - energy theorem - Rayleigh Ritz methods - Finite Difference method.

UNIT V: INTRODUCTION TO PROBLEMS IN PLASTICITY

12 Hrs

Physical assumption - criterion of yielding, yield surface, Flow rule (plastic stress strain relationship). Elastic plastic problems of beams in bending - plastic torsion.

Total No of Hours: 60

REFERENCES

1. Timoshenko, S. and Goodier T.N. "Theory of Elasticity", McGraw Hill Book Co., Newyork, II Edition 1988.
2. Chwo P.C. and Pagano, N.J. "Elasticity Tensor, Dyadic and Engineering applications", D.Van Nestrand Co., In Co., 1967.
3. Chenn, W.P. and Henry D.J. "Plasticity for Structural Engineers", Springer Verlag Newyork 1988.
4. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, New Delhi 1988.
5. Verma, PDS, "Theory of Elasticity", Vikas Publishing Pvt. Ltd. New Delhi -1997.
6. Sadhu Singh, "Theory of Plasticity", Khanna Publishers, New Delhi 1988.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING

MCE13S002

ADVANCED ANALYSIS OF STRUCTURES

3 1 0 4

OBJECTIVE

- To understand the concept of matrix methods and computer application Matrix methods

UNIT I: INTRODUCTION

12 Hrs

Introduction to matrix methods of analysis - statically indeterminacy and kinematics indeterminacy - degree of freedom - coordinate system - structure idealization stiffness and flexibility matrices - suitability element stiffness equations - elements flexibility equations - mixed force - displacement equations - for truss element, beam element and tensional element. Transformation of coordinates - element stiffness matrix - and load vector - local and global coordinates

UNIT II: FLEXIBILITY METHOD

12 Hrs

Matrix flexibility methods - general formulation - application to plane rigid frames - plane trusses.

UNIT III: FLEXIBILITY METHOD

12 Hrs

Direct Stiffness method and application to 3-D frames and trusses, and grids (with three members only)

UNIT IV: COMPUTER APPLICATION

12 Hrs

Computer Applications and use of Computer packages - Programming techniques and problems.

UNIT V: ANALYSIS BY SUBSTRUCTURE TECHNIQUE

12 Hrs

A special analysis procedure - static condensation and sub structuring - initial and thermal stresses. Shear walls- Necessity - structural behaviour of large frames with and without shear walls - approximate methods of analysis of shear walls.

[Total No of Hours: 60

TEXT BOOKS

1. Rajasekharan S. and Sankarasubramainian G., "Computational Structural Mechanics", Prentice Hall, India, 2001.
2. Manikaselvam – Elements of Matrix Analysis and Elastic Stability, Khanna Publishers, New Delhi Sixth Edition-2009.
3. Negi, "Structural Analysis" , Tata Mc Graw Hill Publishing Company 2007.

REFERENCES

1. Coates, R.C., Coutie. M.G., and Kong, F.K., Structural Analysis ,John Wiley and Sons, 1979.
2. McGuire, W., and Gallagher, R.H., Matrix Structural Analysis , John Wiley and Sons, 1979.
3. John L.Meek., Matrix Structural Analysis , Mc Graw Hill Book Company, 1971.



MCE13S003

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
STRUCTURAL DYNAMICS

3 1 0 4

OBJECTIVE

- To expose the students the principles and methods of dynamic analysis of structures and to prepare them for designing the structures for wind, earthquake and other dynamic loads.

UNIT I : PRINCIPLES OF DYNAMICS

15 Hrs

Formulation of equations of motion by different methods, single degree of freedom systems, free and forced response, effect of damping.

UNIT II: MULTIDEGREE OF FREEDOM SYSTEMS

15 Hrs

Formulation of structure property matrices, Eigen values problems, Modes shapes and ortho normality of modes, approximate methods of extraction of Eigen values.

UNIT III: DYNAMIC RESPONSE OF MDOF SYSTEMS

10 Hrs

Mode superposition techniques, Numerical integration procedures.

UNIT IV: CONTINUOUS SYSTEMS

10 Hrs

Modeling - free and forced vibration of bars and beams.

UNIT V: APPLICATIONS

10 Hrs

Idealization of structures to mathematical models, examples of wind, earthquake and impact.

Total No of Hours: 60

TEXT BOOK

1. Roy R.Craig, Jr., Structural Dynamics - An Introduction to computer methods , John Wiley & Sons, Los Angeles.1981.

***Note: (Use of approved data books permitted)**

REFERENCES

1. Clough R.W and Penzien,J., Dynamics of Structures , Mc Graw Hill, New Delhi 1975.
2. Paz Mario, Structural Dynamics, Academic Press, Los Angeles 1985.
3. Anderson R.A., Fundamentals of vibration, Amerind Publishing Co. New Delhi, 1972.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
SUSTAINABLE CONCRETE TECHNOLOGY

MCE13S004

3 1 0 3

OBJECTIVE

- To study the properties of materials, tests and mix design for concrete.

UNIT I : CONCRETE MAKING MATERIALS

9 Hrs

Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified grading, Testing of aggregates, Fibers. Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, Special cements

UNIT II: CONCRETE

9 Hrs

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage, Variability of concrete strength.

UNIT III: MIX DESIGN

9 Hrs

Principles of concrete mix design, Methods of concrete mix design, Testing of concrete.

UNIT IV: SPECIAL CONCRETE

9 Hrs

Light weight concrete, Fly ash concrete, Fibre reinforced concrete, Polymer Concrete, Super plasticised concrete, Epoxy resins and screeds for rehabilitation - Properties and Applications - High performance concrete.

UNIT V: WASTE MATERIALS

Waste materials used in concrete structures, E- Waste – Solid hazardous waste – Plastics – GGBS – Fly Ash – Rice husk ash - Quarry dust.

9 Hrs

Total No of Hours: 45

REFERENCES

1. Neville, A.M., Properties of Concrete , Pitman Publishing Limited, London.
2. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi.
3. Rudhani G., Light Weight Concrete Academic Kiado, Publishing Home of Hungarian Academy of Sciences, New Delhi 1963.
4. SanthaKumar A.R.Oxford university press.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING

MCE13S005

PREFABRICATED STRUCTURES

3 1 0 4

OBJECTIVE

- To Study the design principles, analysis and design of elements.

UNIT I: INTRODUCTION

5 Hrs

Concept of planning and layout of prefabricated plant. IS Code specification. Modular co-ordination, standardization, production, transportation, erection, stages of loading and coal provisions, safety factors, material properties, Deflection control, Lateral load resistance, Location and types of shear walls.

UNIT II: REINFORCED CONCRETE

8 Hrs

Prefabricated structures - Long wall and cross-wall large panel buildings, one way and two way prefabricated slabs, Framed buildings with partial and curtain walls

UNIT III: FLOORS, STAIRS AND ROOFS

12 Hrs

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

UNIT IV: WALLS

12 Hrs

Types of wall panels, Blocks and large panels, Curtain, Partition and load bearing walls, types of wall joints, Leak prevention, joint sealants, sandwich wall panels.

UNIT V: ACCESSORIES AND PLUMPING

7 Hrs

Folded plate and hyper-prefabricated shells, Erection and jointing, joint design, Water leakage, damp proofing

Total No of Hours: 60

***Note: (Use of approved data books permitted)**

REFERENCES

1. B.Lewicki, Building with Large Prefabricates, Elsevier Publishing Company, Amsterdam/ London/ New York, 1966.
2. Koncz.T., Manual of Precast Concrete Construction, Vol.I II and III, Bauverlag, GMBH, 1971.
3. Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the use of Precase Concrete, Netherland Betor Verlag, London 1978.
4. Lasslo Mokka, Prefabricated Concrete for Industrial and Public Sectors, Akademiai Kiado, Budapest, 1964.
5. Murashev.V., Sigalov.E., and Bailov.V., Design of Reinforced Concrete Structures, Mir Publishers, London 1968.
6. CBRI, Building Materials and Components, 1990, India.
7. Gerostiza. C.Z., Hendrikson, C., Rehat D.R., Knowledge Based Process Planning for Construction and Manufacturing, Academic Press, Inc., London 1989.
8. Warszawski, A., Industrialization and Robotics in Building - A managerial approach, Harper & Row, London 1990.



MCE13S006

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
DESIGN OF CONCRETE STRUCTURES

3 1 0 4

OBJECTIVE

- To study the behaviour, analysis and design of R.C. structures.

UNIT I: OVERALL REVIEW

14 Hrs

Review of limit state design of beams - Slabs and columns according to IS 456-2000 - Calculation of deflection and crack width according to IS 456-2000.

UNIT II: DESIGN OF SPECIAL RC ELEMENTS

11 Hrs

Design of Slender columns - Design of R.C walls - Ordinary and shear walls - Design of Corbels - Deep – beams and grid floors.

UNIT III: FLAT SLABS AND FLAT PLATES

10 Hrs

Design of flat slabs and flat plates according to ACI method - Design of shear load - reinforcement and edge(spandrel) beams - Yield line theory and Hillerberg method of design of slabs.

UNIT IV: INELASTIC BEHAVIOUR OF CONCRETE BEAMS

15 Hrs

Inelastic behavior of concrete beams - moment - rotation curves - moment redistribution - Baker's method of plastic design - Design of cast-in-situ joints in frames.

UNIT V: GENERAL

10 Hrs

Detailing for ductility - fire resistance of buildings - field control of concrete.

Total No of Hours: 60

TEXT BOOKS

1. Purushothaman, P, Reinforced Concrete Structure Structural Elements: Behaviour Analysis and Design , Tata Mc Graw Hill, New Delhi 1986.
2. Varghese, P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India New Delhi, 1995.
3. Krishna Raju, N.Advanced Reinforced Concrete Design, CBS Publishers and New Delhi Distributors, 1986.



MCE13S007

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
EXPERIMENTAL STRESS ANALYSIS

3 1 0 4

OBJECTIVE

- To learn the principles of measurements of static and dynamic response of Structures and carryout the analysis of results.

UNIT I: STRAIN GUAGES

10 Hrs

Mechanical, optical and acoustic gauges, description and operation of gauges, electrical resistance strain gauges, types of gauges, static and dynamic strains, strain rosette, calibration of gauges and circuit theory – Effect of transverses strain recorders and loads cells.

UNIT II: MODEL ANALYSIS

10 Hrs

Structural similitude, use of models, model analysis, structural and dimensional analysis, Buckingham Pi theorem, applications, Muller Breslau principle for indirect model analysis, use of Begg's Eney's and R.P.I. deformeters and moment indicator, design of models for direct and indirect analysis.

UNIT III: PHOTOELASTICITY

10 Hrs

Introduction of photoelasticity; polariscope, compensators, models materials, calibration of photoelastic materials Isochromatic and Isoclinic Fringes, stress determination, time – Edge effects, three dimensional photoelasticity, freezing techniques. Moiré fringe technique, Grid methods – Holography and interferometry use of X-ray and laser beams in stress analysis – Elementary ideas.

UNIT IV: ANALOGIES

10 Hrs

Membrane analogy for torsion and flexure, sand heap analogy, hydrodynamic and electrical analogies.

UNITV: MISCELLANEOUS METHODS

20 Hrs

Brittle acquer techniques, linear transducers, accelerometers, choice of experimental methods, model loadings, basic standards and accuracy of measurements , Introduction Of Dynamic Analysis- (Non – destructive testing, ultrasonic and sonic testers, flaw detectors).

Total No of Hours: 60

REFERENCES

1. Dr. T.P. Ganesan, "Model analysis of Structures", Universities Press Hyderabad, 2000.
2. Dove, R.C. and Adams, P.H., Experimental stress Analysis and Motion measurement. Prentice Hall of India (Private Ltd., New Delhi) 1965.
3. Dally, J.W. and Riley, W.F. Experimental Stress Analysis, McGraw Hill, 2nd Edn. New York, 1978.
4. Heteryi (ed) Handbook of experimental stress analysis, John Wiley and sons, New york, 1950. Coker, E.G. and Filon, L.N.G. A treatise on Photoelasticity, Cambridge University Press, 2nd Edn., Revised by H.T.Jesop, London, 1957.
5. Forcht, M.M. Photoelasticity, Vol.I and Vol.II John Wiley and sons, Newyork, 1941.
6. Durelli, A.J. Applied Stress Analysis, Prentice Hall, New Jersey, 1967.



MCE13S008

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
THEORY OF ELASTIC STABILITY

3 1 0 4

OBJECTIVE

- To study the concept of buckling and analysis of structural elements.

UNIT I: INTRODUCTION

15 Hrs

Concept of stability approaches to stability analysis, characteristics of stability problems, Columns - Buckling of columns with various end conditions, imperfect columns, Elastically supported columns, non-prismatic columns, Built-up columns, Inelastic buckling, Experimental study of column behavior, Empirical column formulae. Buckling of bars on elastic foundations, Large deflection of buckled bars.

UNIT II: BEAMS – COLUMNS

8 Hrs

Beam-column theory, Application to buckling of frames.

UNIT III: TORSIONAL BUCKLING

14 Hrs

Combined tensional and flexural buckling. Lateral Buckling - Lateral buckling of beams, pure bending of simply supported beam and cantilever, numerical solutions.

UNIT IV: PLATES

8 Hrs

Buckling of thin plates, various edge conditions, inelastic buckling, post buckling strength.

UNIT V: APPROXIMATE METHODS

15 Hrs

Energy methods, Iterative procedure and Finite element formulation.

Total No of Hours: 60

REFERENCES

1. Allen, H.G., and Bulson, P.S., Background to Buckling, McGraw Hill Book Company, New Delhi 1980.
2. Smitses, Elastic Stability of Structures, Prentice Hall, New Delhi 1973.
3. Timoshenko, S., and Gere., Theory of Elastic Stability, McGraw Hill Book Company, New Delhi 1961.
4. Brush and Almoth., Buckling of Bars, Plates and Shells, McGraw Hill Book Company, New Delhi 1975.
5. Chajes, A. Principles of Structures Stability Theory, Prentice Hall, New Delhi 1974.
6. Ashwini Kumar, Stability Theory of Structures, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1985.



MCE13S009

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
THEORY OF PLATES AND SHELLS

3 1 0 4

OBJECTIVES

- To study the behaviour and analysis of thin plates and the behaviour of anisotropic and thick plates.
- Study the behaviour and design of shells, design of plates.

UNIT I : BENDING OF RECTANGULAR PLATES

8 Hrs

Bending of plate to cylindrical surface long uniformly loaded plates – Rectangular plates – Differential equations of laterally loaded plates – Navier’s and Levy’s solutions – Pure bending in two perpendicular directions.

UNIT II: BENDING OF CIRCULAR PLATES

7 Hrs

Circular plates – Clamped and simply supported – bending of concentrically loaded circular plates. Analysis of stress and deformation of plates bent by transverse loads – plates on elastic supports – Energy methods and approximate methods of solution.

UNIT III: CLASSIFICATION OF SHELLS

15 Hrs

Synclastic – Anticlastic – Singly and Doubly curved – Translation and revolution.

UNIT IV: MEMBRANE THEORY

15 Hrs

Analysis of singly and doubly shells – Applications of elliptic paraboloid and hyperbolic paraboloid shells – Analysis of shells of evolutions like conical and circular domes.

UNIT V: FLEXURE THEORY

15 Hrs

Shells of revolution – edge disturbance – problems of symmetrically loaded spherical shells – Cylindrical tanks with uniform wall thickness – Circular cylindrical shell roof – Dischinger and Finster Waalder theories – Application of numerical methods of shells.

Total No of Hours: 60

REFERENCE BOOKS

1. Flugge, Stresses in shells, 2nd ed., Springer – Verlag, Berlin, 1960
2. Sziland, R. Theory and Analysis of Plates (Classical and Numerical Methods) Prentice Hall, Ijc. New Jersey, 1974.
3. Billington, D.P. Thin Shell concrete structures 2nd ed. McGraw Hill Book Co., New York, 1965.
4. Ugural, Il. Theory and practice of shell structures, Wilhelm Ernst and John Berlin, 1968.
5. Timoshenko.S and Krieger.S.W., Theory of Plates and Shells, McGraw Hill Co., New York 1990.



MCE13S010

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
REPAIR AND REHABILITATION OF STRUCTURES

3 1 0 3

OBJECTIVE

- To study the damages, repair, rehabilitation of structures.

UNIT I: GENERAL

6 Hrs

Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking.

UNIT II: INFLUENCE ON SERVICEABILITY AND DURABILITY

6 Hrs

Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

UNIT III: MAINTENANCE AND REPAIR STRATEGIES

8 Hrs

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 - testing techniques.

UNIT IV: MATERIALS FOR REPAIR

8 Hrs

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

UNIT V: TECHNIQUES FOR REPAIR

9 Hrs

Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete, Guniting and Shot Crete Epoxy injection, Mortar repair for cracks, shoring and underpinning.

UNIT VI: EXAMPLES OF REPAIR TO STRUCTURES

8 Hrs

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure .Engineered demolition techniques for Dilapidated structures - case studies

Total No of Hours: 45

TEXT BOOKS

1. Denison Campbell, Allen and Harold Roper, " Concrete Structures ", Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R.T.Allen and S.C.Edwards, " Repair of Concrete Structures ", Blakie and Sons, UK, 1987.

REFERENCES

1. M.S.Shetty, " Concrete Technology - Theory and Practice ", S.Chand and Company, New Delhi, 1992.
2. Santhakumar, A.R., " Training Course notes on Damage Assessment and repair in Low Cost Housing ", RHDC-NBO " Anna University, July, 1992.
3. Raikar, R.N., " Learning from failures - Deficiencies in Design ", Construction and Service - R & D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.
4. N.Palaniappan, " Estate Management, Anna Institute of Management ", Chennai, 1992.
5. Lakshmi pathy, Metal Lecture notes Workshop on " Repairs and Rehabilitation of Structures ", 29 - 30th October 1999.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
STRUCTURAL ENGINEERING LAB

MCE13SL01

0 0 1 1

OBJECTIVE

- Students should get good knowledge about various tests conducted for concrete.

1. Tests on Cement -Consistency, Setting Times, Soundness, Compressive Strength.
2. Workability Test on Fresh Concrete
3. “E” value for concrete.
4. Casting of Reinforced concrete beams for conducting flexure and shear tests.
5. Bending test on steel flat
6. Testing of various types of reinforcement using mechanical and electrical strain gauges.
7. Creep and Shrinkage.
8. Permeability of Concrete.
 - a. Rapid chloride Penetration Test,
 - b. Freeze and Thaw test,
 - c. Acid test ,
 - d. Alkali aggregate reaction test
 - e. VCC testing fire resistance
 - g. Autoclaving
9. Non Destructive Testing Of Concrete.
 - a. Ultra Sonic Pulse velocity Test,
 - b. Rebound Hammer test
 - c. Cover Meter
 - d. Rebar Locator
 - e. Concrete Analyzer

Total No of Hours: 30

REFERENCES

1. Purushothaman, P, Reinforced Concrete Structure Structural Elements : Behaviour Analysis and Design , Tata Mc Graw Hill, New Delhi 1986.
2. Varghese, P.C., Limit State Design of Reinforced Concrete, Prentice Hall of India New Delhi, 1995.
3. Krishna Raju, N.Advanced Reinforced Concrete Design, CBS Publishers and New Delhi Distributors, 1986.
4. Neville, A.M., Properties of Concrete , Pitman Publishing Limited, London.
5. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi.



MCE13S011

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
DESIGN OF STEEL STRUCTURES

3 1 0 4

OBJECTIVES

- To study the behaviour of members and connections, analysis and design of steel towers, chimneys.
- Study the design of with cold formed steel and plastic analysis of structures.

UNIT I: GENERAL

12 Hrs

Design of members subjected to lateral loads and axial loads - Analysis and design of Industrial buildings and bents - Sway and non-sway frames - Design of Purlins, Louver rails, Gable column and Gable wind grider –Analysis of Gable Frames check for deflection.

UNIT II: DESIGN OF CONNECTIONS

12 Hrs

Types of connections - Design framed beam connections - Seated beam connections - Unstiffened, Stiffened seat connections, Continuous beam-to-beam connections and continuous beam-to-column connection both welded riveted.

UNIT III: ANALYSIS AND DESIGN OF STEEL TOWERS

12 Hrs

Analysis and design of Transmission Line Towers Types of bracing patterns - Sag and Tension calculations –Design of self supporting chimney(lined and unlined) and guyed steel stacks - Stresses due to wind and earthquake forces - Design of foundations - Along with loads - calculation Gust Factor Method.

UNIT IV: PLASTIC ANALYSIS OF STRUCTURES

12 Hrs

Introduction - Shape factor - Moment redistribution - Static, Kinematic and Uniqueness theorems – Combined mechanism - Analysis of single bay and two bay portal frames - Methods of plastic moment distribution – Effect of axial force and shear force on plastic moments - Connections Moment resisting connection - Design of continuous beams.

UNIT V: DESIGN OF LIGHT GAUGE STEEL STRUCTURES

12 Hrs

Types of cross sections - local bucking and lateral bucking - concepts of Effective width - Design of compression and tension members, Beams, Deflection of beams and design of beam webs. Combined stresses and connections, wall studs.

Total No of Hours: 60

***Note: (Use of approved data books permitted)**

REFERENCES

1. Horne, M.R., and Morris, L.J., Plastic Design of Low -rise frames, Granada Publishing Ltd.,UK 1981.
2. Salmon, C.G., and Johnson, J.E. Steel Structure -Design and Behaviour, Harper and Row, UK 1980.
3. Dayarathnam, P., Design of Steel Structure, A.H.Wheeler, UK 1990.
4. Kuzamanovic,B.O. and Willems,N., Steel Design for Structural Engineers, Prentice Hall, New Delhi 1977.
5. Wie - Wen Yu., Cold-formed Steel Structures, McGraw Hill Book Company, New Delhi 1973.
6. William McGuire, Steel Structures, Prentice Hall, Inc., Englewood Cliffs, New b



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
DESIGN OF SEISMIC RESISTANT STRUCTURES

MCE13S012

3 1 0 4

OBJECTIVE

- To understand seismic design concepts.

UNIT I: INTRODUCTION

7 Hrs

Elements of Engineering Seismology - Theory of Vibration - Response Spectrum.

UNIT II: HISTORICAL

7 Hrs

Indian Seismicity - Earthquake History - Behaviour of Structures in the past Earthquakes.

UNIT III: DESIGN CONCEPTS

7 Hrs

Seismic Design Concepts - Cyclic load behaviour of RC, Steel and Prestressed Concrete elements – Design spectrum - Principles of capacity design.

UNIT IV: CODAL PROVISIONS

12 Hrs

Provisions of Seismic Code (IS 1893) - Building systems frames, shear walls, Braced Frames, Combinations - Torsion.

UNIT V: DESIGN AND DETAILING

13 Hrs

Performance of Regular Buildings 3 D Computer Analysis of Building Systems (Theory Only) - Design and Detailing of frames - Shear walls and Frame walls.

UNIT VI: SPECIAL PROBLEMS AND CASE STUDIES

14 Hrs

Structural Configuration - Seismic performance - Irregular Buildings - Soil performance, Modern Concepts – Base Isolation - Adaptive system - Case studies.

Total No of periods: 60

***Note: (Use of approved data books permitted)**

REFERENCES

1. Course Notes "Design of Reinforced Concrete Building", IIT, Kanpur, June 1999.
2. Bungale S.Taranath "Structural Analysis and Design of Tall Buildings" McGraw Hill Book Company, New York, 1999.



MCE13SL02

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
COMPUTER AIDED STRUCTURAL DESIGN-LAB

0 0 2 1

OBJECTIVE

- Student should aware of computer application of structural design.

1. Program Using Arrays and Functions for Matrix Manipulation.
2. Programs to Draw Bending Moment and Shear Force Diagrams. Using Graphic in C
3. Program for Design of Slabs. Using Excel
4. Program for Design of Beams. Using Excel
5. Program for Design of Column and Footing Using Excel
6. Analysis of Truss Using STAAD Pro.
7. Analysis of Multistoried Space Frame, Using STAAD Pro.
8. Analysis of Bridge Deck Slab.

Total No of Hours: 30

TEXT BOOKS/REFERENCES

1. Computer Aided Design by C.S.Krishnamoorthy and S.Rajeev.
2. Computational Structures by S.Rajasekharan.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING

MCE13SE01

PRESTRESSED CONCRETE STRUCTURES

3 1 0 4

OBJECTIVE

- Principle of prestressing, analysis and design of prestressed concrete structures.

UNIT I : DESIGN PRINCIPLES FOR FLEXURE SHEAR BOND AND END BLOCKS INTRODUCTION AND CODAL PROVISIONS

12Hrs

Principles of Prestressing - types and systems of prestressing, need for High Strength materials, Analysis methods losses, deflection (short-long term), camber, cable layouts. Behaviour under flexure - codal provisions (IS, British ACI and DIN), ultimate strength. Design of flexural members,

UNIT II: DESIGN OF COMPRESSION MEMBERS

12 Hrs

Design for Shear, bond and torsion. Design of End blocks and their importance Design of tension members - application in the design of prestressed pipes and prestressed concrete cylindrical water tanks. Design of compression members with and without flexure - its application in the design piles, flagmasts and similar structures.

UNIT III: COMPOSITE BEAMS

12 Hrs

Composite beams - analysis and design, ultimate strength - their applications. Partial prestressing - its advantages and applications.

UNIT IV: CONTINUOUS BEAMS

12 Hrs

Application of prestressing in continuous beams, concept of linear transformation, concordant cable profile and cap cables.

UNIT V: DESIGN OF SPECIAL STRUCTURES

12 Hrs

Special structures like prestressed folded plates, prestressed cylindrical shells, prestressed concrete poles.

Total No of Hours: 60

TEXT BOOKS

1. Prestressed Concrete by Krishna Raju, Tata McGraw Hill Publishing Co. 2nd Edition, Berlin 1988.
2. Fundamentals of Prestressed Concrete by N.C.Sinha & S.K.Roy S.Chand & Co., New Delhi 1985.

REFERENCES

1. T.Y.Lin, Design of Prestressed Concrete Structures, John Wiley and Sons, Inc Berlin1960.
2. Leonhardt.F., Prestressed Concrete, Design and Construction, Wilhelm Ernst and Shon, Berlin, 1964.



Dr.M.G.R
Educational and Research Institute
Univeristy

(Decl. U/S 3 of UGC Act 1956)

DEPARTMENT OF CIVIL ENGINEERING

MCE13SE02

FINITE ELEMENT METHODS IN ENGINEERING

3 1 0 4

OBJECTIVES

- To study the energy principles, finite element concept.
- Stress analysis, meshing.
- Nonlinear problems and applications.

UNIT I: INTRODUCTION

10 Hrs

Boundary Value Problem - Approximate Solution - Variation and Weighted Residual Methods - Ritz and Gale kin Formulations - Concepts of Piecewise Approximation and Finite Elements - Displacement and Shape Functions - Weak Formulation - Minimum Potential Energy - Generation of Stiffness Matrix and Load Vector.

UNIT II: STRESS ANALYSIS

10 Hrs

Two Dimensional problems - Plane Stress, Plain Strain and Ax symmetric Problems - Triangular and Quadrilateral Elements - Natural Coordinates - Isoperimetric Formulation - Numerical Integration - Plate Bending and Shell Elements - Brick Elements - Elements for Fracture Analysis.

UNIT III: MESHING AND SOLUTION PROBLEMS

10 Hrs

Higher Order Elements - p and h Methods of refinement - IIL conditioned Elements - Discrimination Errors –Auto and Adaptive Mesh Generation Techniques - Error Evaluation.

UNIT IV: NONLINEAR AND VIBRATION PROBLEMS

10 Hrs

Material and Geometric No linearity - Methods of Treatment - Consistent System Matrices – Dynamic Condensation - Eigen Value Extraction.

UNIT V: THERMAL ANALYSIS

5 Hrs

Application to Thermal analysis Problem

PRACTICALS IN FEM ANALYSIS

15 Hrs

Total No of Hours: 60

REFERENCES

1. Bathe , K.J., Finite Elements Procedures in Engineering analysis, Prentice Hall Inc., New Delhi 1995.
2. Zienkiewicz, O.C, and Taylor, R.L., The Finite Elements Methods , Mc Graw Hill New Delhi, 1987.
3. Chandrupatla, R.T. and Belegundu, A.D ., Introduction to Finite Elements in Engineering, 2nd Edition , Prentice Hall of India, New Delhi 1997.
4. Moaveni,S., Finite Element Analysis : Theory and Application with ANSYS, Prentice Hall Inc., New Delhi 1999.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
TALL STRUCTURES

MCE13SE03

3 1 0 4

OBJECTIVE

- To study the behaviour, analysis and design of tall structures.

UNIT I: DESIGN CRITERIA

7 Hrs

Design philosophy, Loading, Sequential loading, materials - high performance Concrete - Fiber reinforced Concrete - Light weight Concrete - Design mixes.

UNIT II: LOADING AND MOVEMENT

8 Hrs

Gravity Loading : Dead and live load, methods of live load reduction, Impact, gravity loading, construction loads.

Wind loading : Static and dynamic approach, Analytical and wind tunnel experimental method.

Earthquake loading : Equivalent lateral force, modal analysis, combinations of loading working stress design, Limit state design, plastic design.

UNIT III: BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS

10 Hrs

Factors affecting growth, Height and Structural form. High rise behaviour, Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls, wall-frames, tubulars, cores, futrigger - braced and hybrid mega system.

UNIT IV: ANALYSIS AND DESIGN

25 Hrs

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of building as total structural system considering overall integrity and major subsystem interaction, Anlysis for member forces, drift and twist, computerised general three dimensional analysis.

Structural Elements : Sectional shapes, properties and resisting capacity, design, deflection, cracking, prestressing, shear flow. Design for diffenential movement, creep and shrinkage effects, temperature effects and fire resistance.

UNIT V: STABILITY OF TALL BUILDINGS

10 Hrs

Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and P-Delta analysis, Translational, Torsional instability, out of plum effects, stiffness of member in stability, effect of foundation rotation.

Total No of periods: 60

TEXT BOOK

1. Taranath B.S., Structural Analysis and Design of Tall Building, McGraw Hill, 1988.

REFERENCES

1. Dr. Y.P.Gupta, Editor. Proceedings National Seminar on High Rise Structures Design and Construction practices for middle level cities Nov. 14 -16, 1995, New Age International Limited, Publishers, Madras -20.
2. Wilf gang Schuller, High Rise Building Structures, John Wiley and Sons, New Jercey 1977.
3. Bryan stafford Smith, Alexcoull, Tall Building Structures , Analysis and Design,John Wiley and Sons, Inc New Jercey 1977



MCE13SE04

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
ADVANCED CONSTRUCTION MANAGEMENT

3 1 0 4

OBJECTIVE

- To study about CPM &PERT ,Types of contract, construction finance, construction process control.

UNIT I : MANAGEMENT SCIENCE

10 Hrs

Introduction in construction – The organization of projects and contracts, control of time and money, engineering economics, planning and programming techniques. Scheduling Procedure & Techniques -CPM project planning & Searching – GANTT charts, milestone schedules – PERT & CPM and their use. Resource allocation, Resource leveling, Resource smoothing, updating.

UNIT II: CONSTRUCTION CONTRACTS

15 Hrs

Indian Contract, Types of Contract, International Contract Document, Law of Traits Estimating and Pricing, FIDIC contract.

UNIT III: PROJECT FINANCING

10 Hrs

Construction finance, planning of funds, budgeting, measurement and valuation, monitoring and reporting, linking time and money cost models, cost control and reporting project appraisal.

UNIT IV: PRODUCTION MANAGEMENT ORGANIZING

15 Hrs

Materials planning, budgeting and inventory control management of surplus materials, equipment control, Quality Control. Development of human resources – Motivation, Performance & satisfaction.

UNIT V: CONSTRUCTION PROCESS

10 Hrs

Construction process control, work-study, crew size, layout computers in project planning and construction management.

Total No of periods: 60

REFERENCES

1. Hira A. Ahuja, Project Management – techniques in planning and controlling construction projects, wiley, Interscience London 1998.
2. Anthony Walker, project Management in Construction. London 1998
3. Frank Harris and Ronald Mc Catfer, Management and Investment Decisions Constructions Plant. London 1998
4. Thompson P.A., Organisation and Economics of Construction McGraw Hill, 1981. London
5. James. A.F. Stoner and Charles Wankel – Management – Prentice Hall of India, New Delhi, 1986.



Dr.M.G.R
Educational and Research Institute
Univeristy

(Decl. U/S 3 of UGC Act 1956)

DEPARTMENT OF CIVIL ENGINEERING

MCE13SE05

PROBABILISTIC METHODS IN CIVIL ENGINEERING

3 1 0 4

OBJECTIVES

- To study about concepts of structural safety.
- Probabilistic analysis.
- Semi – probabilistic design at various limit states.

UNIT I : BASIC CONCEPTS OF STRUCTURAL SAFETY

15 Hrs

Basic concepts of structural safety Random variables and distribution probabilistic models – Nature of random variables and probabilities, union of events, conditional event, Baye’s rule, uniform law, hyper geometric law, Binomial law, Expected values, Calculation means and variances,

UNIT II: APPROXIMATION

15 Hrs

Approximation by central limit theorem, Chebysheve inequality, Gauss inequality Monte Caralo approximation – Statistical inference, Least squares, significance test, Chi – Square test. Basic formulation of linear regression. Multiple linear and non-linear regression

UNIT III: APPLICATIONS

15 Hrs

Applications –Collection and analysis of data on material strengths and loads safety factors – Reliability of structural systems.

UNIT IV: PROBALISTIC ANALYSIS

7 Hrs

Probalistic analysis and design of reinforced concrete and prestressed concrete beams.

UNIT V: SEMI- PROBABILISTIC ANALYSIS

8 Hrs

Semi – probabilistic design at various limit states – Design of columns – Reliability design of tension members, beams and columns, structural safety against dynamic forces.

Total No. of Hours: 60

REFERENCES

1. Ang & Tang., Probability concepts in Engineering Planning & Design Tata McGraw Hill Publishing Co. 2nd Edition, Berlin 1988.
2. Benjamin & Cornell, Probability, Statistics and Decisions for Civil Engineers,
3. Tata McGraw Hill Publishing Co. 2nd Edition,Berlin 1988. Stark & Nichols, Mathematical Foundations for Designing Civil Engineering systems.Laportati, E., The Assessment of Structural Safety. Tata McGraw Hill Publishing Co. 2nd Edition,Berlin 1988.
4. Thoft Christensus & Bkaer, Structural Reliability Theory and its Applications, Springer Verlay. Tata McGraw Hill Publishing Co. 2nd Edition,Berlin 1988.
5. Papoulis A., Probability, Random Variables and Stochastic Process.Haugen,
6. Probabilistic Approaches to Design, John wiley. Tata McGraw Hill Publishing Co. 2nd Edition, Berlin 1988.



MMA13SE01

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
OPTIMIZATION TECHNIQUES

3 1 0 4

OBJECTIVE

- To study about optimization techniques and algorithms and theorems.

UNIT I : INTRODUCTION

12Hrs

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

UNIT II: OPTIMIZATION TECHNIQUES AND ALGORITHMS

16 Hrs

Linear programming, Integer Programming, Quadratic Programming, Dynamic Programming and Geometric Programming methods for Optimal design of structural elements.

UNIT III: COMPUTER SEARCH METHODS

16 Hrs

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

UNIT IV: OPTIMIZATION THEOREMS

12 Hrs

Optimization by structural theorems, Maxwell, Mitchell and Heyman's Theorems for trusses and frames, fully stresses design with deflection constraints.

UNIT V: OPTIMALITY CRITERION METHODS

04 Hrs

Total No. of Hours: 60

REFERENCES

1. Spunt, Optimum Structural Design, Civil Engineering and Engineering Mechanics Services, Prentice-Hall, New Jersey 1971.
2. S.S.Rao, Optimization Theory and Applications, Wiley Eastern Limited, New Delhi, 1977.
3. Uri Krisch, Optimum Structural Design, McGraw Hill Book Co. 1981.
4. Richard Bronson, Operation Research, Schaum's Outline Series, McGraw Hill Singapore, 1983.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
CAD IN CIVIL ENGINEERING

MCE13SE06

3 1 0 4

OBJECTIVES

- To learn the principles of Computer graphics.
- Structural analysis.
- Finite element analysis and Application packages.
- Optimization and Artificial intelligence.

UNIT I

Introduction to computing – principles of operation of computers – Hardware – Software and operating systems, application programs – data handling file structures Elements of CAD system – Hardware – CAD work stations – Details of Low End and High End work stations – Graphics processors – Hardware structure of a PC based and a high end workstation – Major specifications of work station – Typical CAD work station configuration.

12 Hrs

UNIT II

CAD hardware input media – Key board cursor – Thumb wheels – Joy stick – Light pen – digitizer etc., - Display types – Storage – raster scan, refresh graphics and plasma panel – Output clenches – plotter – printer and other hand copy devices.

12 Hrs

UNIT III

Software: Details of 2D drafting software packages – Lazering and drawing primitives – display techniques. Editing – utilities – scaling dim ensuring – 3D work frame and solid modeling – shading – perspective views. Design phases – concept ional design – Design documentation – automated drafting of multistory buildings – information creation – 3D shaded views.

12 Hrs

UNIT IV

Software package for Analysis for vertical views – Wind loads – program to choose preliminary dimensions – analysis of multistory frames – with or without shear walls. Finite element method of analyzing the frames.

12 Hrs

UNIT V

Design of components – slab – beam – column and footing both in RC and Steel – rolling expert system in the design of multistory steel and RC buildings.

12 Hrs

Packages for estimation – using Lotus 123 – software for Management – program for CPM & PERT.

Total No. of Hours: 60

REFERENCES

1. Rajasekaran, S., “CAD in Civil Engineering,” Lecture, Notes.
2. C.S. Krishnamoorthy and S. Rajeev, Computer Aided Design, Narosa Publishing House, New Delhi, 1991.
3. H.B. Harrison, Structural Analysis and Design Vol. I & II, Tata McGraw Hill Publishing Co. 2nd Edition, Berlin 1988.
4. Billy E. Gillet, Introduction to Operations Research, A Computer Oriented Algorithmic approach, Tat McGraw Hill Co., 1982.
5. Richard Forsyth (Ed) Expert System Principles and Case Studies – Chapman & Hall. Tata McGraw Hill Publishing Co. 2nd Edition, Berlin 1988.



MCE13SE07

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
SOIL STRUCTURE INTERACTION

3 1 0 4

OBJECTIVE

- To study about soil – Foundation Interaction problems Analysis of pile Foundation.

UNIT I: SOIL-FOUNDATION INTERACTION

9 Hrs

Introduction to soil-Foundation interaction problems, soil behaviour, Foundation behavior, 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

14 Hrs

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

14 Hrs

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

13 Hrs

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

10 Hrs

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

Total No of periods: 60

REFERENCES

1. Selva durai, A.P.S., Elastic Analysis of Soil Foundation Interaction,Elsevier,1979
2. Poulos, H.G., and Davis,E.H., Pile Foundation Analysis and Design, John Wiley,Tata McGraw Hill Publishing Co. 2nd Edition,Berlin 1988.
3. Scott,R.F.,Foundation Analysis,Prentice Hall,1981 New Jercey
4. Structure Soil Interaction - State of Art Report,Institution of Structural Engineers, New Delhi 1978.
5. ACI 336, Suggested Analysis and Design Procedures for combined footings and Mats, American Concrete Institute, Delhi,1988



MCE13SE08

Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
DISASTER RESISTANT STRUCTURES

3 1 0 4

OBJECTIVE

- To study about the structural design to resist different natural calamities Rehabilitation and retrofitting of disastered structures.

UNIT I : BEHAVIOUR OF LIFE-LINE STRUCTURES

12 Hrs

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

UNIT II: COMMUNITY STRUCTURES

12 Hrs

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

UNIT III: REHABILITATION AND RETROFITTING

12 Hrs

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

12 Hrs

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

UNIT V: DAMAGE ASSESSMENT OF STRUCTURES

12 Hrs

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

Total No of Hours: 60

TEXT BOOKS

1. V.Moskvin , et.all Concrete and Reinforced Concrete - Deterioration and Protection - Mir Publishers - Moscow 1980.
2. R.T. Allen and S.C. Edwards, Repair of Concrete Structures, Blakie and Sons, U.K 1987.

REFERENCES

1. Proceedings IABSE 14th Congress "Civilisation through Civil Engineering" New Delhi, 1992.
2. Raiker R.N.Learning from failures Deficiencies in Design, Construction and Service ,
3. R & D Center (SDCPL) Raiker Bhavan, Bombay , 1987.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
DESIGN OF BRIDGES

MCE13SE09

3 1 0 4

OBJECTIVE

- To study the loads, forces on bridges and design of several types of bridges.

UNIT I: INTRODUCTION

9 Hrs

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

UNIT II: SHORT SPAN BRIDGES

12 Hrs

Load distribution theories, analysis and design of slab culverts, tee beam and slab bridges.

UNIT III: LONG SPAN GIRDER BRIDGES

15 Hrs

Design principles of continuous bridges, box girder bridges, balanced cantilever bridges.

UNIT IV: DESIGN OF PRESTRESSED CONCRETE BRIDGES

8 Hrs

UNIT V: DESIGN OF PLATE GIRDER BRIDGES

16 Hrs

(for Including bearings, substructures and footings bridges)

Total No of Hours: 60

REFERENCES

1. Raina V.K. "Concrete Bridge Practice" , Tata McGraw Hill Publishing Company, New Delhi, 1991.
2. Krishnaraju, N., "Design of Bridges" Oxford and IBH Publishing Co., Bombay, Calcutta, New Delhi, 1988
3. Bakht, B. and Jaegar, L.G., "Bridge Analysis simplified", McGraw Hill, 1985.
4. Ponnuswamy, S., "Bridge Engineering", Tata McGraw Hill, 1989
5. Derrick Beckett, "An introduction to Structural Design of Concrete Bridges", Surrey University Press, Henley Thames, Oxford Shire, 1973.
6. Taylor, F.W., Thomson, S.E., and Smulski E., "Reinforced Concrete Bridges", John Wiley and Sons, New York, 1955.



Dr.M.G.R
Educational and Research Institute
Univeristy

(Decl. U/S 3 of UGC Act 1956)

DEPARTMENT OF CIVIL ENGINEERING

ENVIRONMENTAL ENGINEERING STRUCTURES

MCE13SE10

3 1 0 4

OBJECTIVES

- To develop a basic knowledge about the environmental engineering structures and apply the same in the field application.
- At the end of the subject the students will able to design environmental engineering structures such as pipes, water tanks, special structures, repair and rehabilitation of structures and maintenance.

UNIT I: DESIGN OF PIPES

8 Hrs

Structural design of a) Concrete b) Prestressed Concrete c) Steel and d) Cast-iron piping mains, sewerage tanks design - anchorage for pipes - massive outfalls - structural design and laying - hydrodynamic considerations. Advances in the manufacture of pipes.

UNIT II: ANALYSIS AND DESIGN OF WATER TANKS

15 Hrs

Design of 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. IS Codes for the design of water retaining Structures. Design of circular, rectangular, spherical and Intel type of tanks using concrete. Design of prestressed concrete cylindrical tanks - Economic analysis - introduction to computer aided design and packages.

UNIT III: DESIGN OF SPECIAL PURPOSE STRUCTURES

15 Hrs

Underground reservoirs and swimming pools, Intake towers, Structural design including foundation of water retaining structures such as settling tanks, clarifloculators, aeration tanks etc. - effect of earth pressure and uplift considerations - selection of materials of construction.

UNIT IV: REPAIR AND REHABILITATION OF STRUCTURES

15 Hrs

Underground reservoirs and swimming pools, Intake towers, Structural design including foundation of water retaining structures such as settling tanks, clarifloculators, aeration tanks etc. - effect of earth pressure and uplift considerations - selection of materials of construction. Diagnosing the cause and damage, identification of different types of structural and non-structural cracks – repair and rehabilitation methods for Masonry, Concrete and Steel Structures.

UNIT V: EXPOSURE ON STEEL, LATTICE STRUCTURES USED IN WATER AND SEWERAGE WORKS

7 Hrs

Diagnosing the cause and damage, identification of different types of structural and non-structural cracks – repair and rehabilitation methods for Masonry, Concrete and Steel Structures.

Total No of Hours: 60

TEXT BOOKS

1. Reinforced Concrete by P.Dayaratnam . S.Chand and Co.New Delhi 1985
2. Prestressed Concrete by Krishna Raju, Tata McGraw Hill Publishing Co. 2nd Edition New Delhi, 1988.
3. Reinforced Concrete by N.C.Sinha & S.K.Roy - S.Chand and Co.New Delhi 1985.

REFERENCES

1. Hulse R., and Mosley, W.H., "Reinforced Concrete Design by Computer ",
2. Macmillan Education Ltd., UK 1986.
3. Ramaswamy, G.S., "Design and Construction of Concrete shell roofs ",
4. CBS Publishers, India, 1986.
5. Green, J.K. and Perkins, P.H., "Concrete liquid retaining structures ",
6. Applied Science Publishers, India 1981.



Dr.M.G.R
Educational and Research Institute
Univeristy

(Decl. U/S 3 of UGC Act 1956)

DEPARTMENT OF CIVIL ENGINEERING

MCE13SE11 EXPERIMENTAL TECHNIQUES AND INSTRUMENTATION

3 1 0 4

OBJECTIVE

- To study different Measurements & non destructive testing methods.

UNIT I : FORCES AND STRAIN MEASUREMENT

9 Hrs

Strain gauge, Principle, types, performance and uses. Photo elasticity- principle and application-Moire fringe-Hydraulic jacks and pressure gauges- Electronic load cells-proving rings – Calibration of Testing Machines.

UNIT II: VIBRATION MEASUREMENT

9 Hrs

Characteristics of Structural Vibrations-Linear Variable Differential Transformer (LVDT)-Transducers for velocity and acceleration measurement. Vibration Meter-Seismographs-Vibration Analyzer-Display and Recording of signals-Cathode Ray Oscilloscope-XY Plotter-Digital Data Acquisition System.

UNIT III: ACOUSTICS AND WIND FLOW MEASURES

9 Hrs

Principles of Pressure and flow measurements-Pressure transducers- sound level meter- venturimeter and flow meters- wind tunnel and its use in structural analysis- structural analysis- structural modeling- direct and indirect model analysis

UNIT IV: DISTRESS MEASUREMENTS AND CONTROL

9 Hrs

Diagnosis of distress in structures- crack observation and measurements- corrosion of reinforcement in concrete-Half cell, construction and use- damage assessment- controlled blasting for demolition

UNIT V: NON DESTRUCTIVE TESTING METHODS

9 Hrs

Load testing on structures, buildings, bridges and towers- Rebound hammer- acoustic emission- ultrasonic testing principles and application- Holography- use of laser for structural testing- Brittle coating.

Total No. of Hours: 45

Tutorials Hours : 15

REFERENCES

1. Sadhu singh- Experimental stress Analysis, Khanna Publishers, New Delhi, 1996
2. JW dalley and WF Riley, Experimental Stress Analysis,Mc Graw Hill Book Company, N.Y.1991
3. L.S.Srinath et.al, experimental stress Analysis, Tata Mc Graw Hill Company, New Delhi 1984
4. R.S.Sirohi, HC Radhakrishna, Mechanical Measurements, NewAge International(P) Ltd 1997
5. F.K.Garas, J.L.Clarke and GST Armer,Structural assessment, Butterworths.London,1987
6. D.E.Bray & R.K.Stanley, Non- destructive Evaluation, Mc. Graw Hill Publishing Company,N.Y.1989
7. John Tuner and Martyn Hill, Instrumentation for engineers and scientists, Oxford University Press, 1999.



Dr.M.G.R
Educational and Research Institute
Univeristy
(Decl. U/S 3 of UGC Act 1956)
DEPARTMENT OF CIVIL ENGINEERING
DISASTER MANAGEMENT

MCE13CE08

3 1 0 4

OBJECTIVE

- To study about Disaster Risk Management & development.

UNIT I: INTRODUCTION TO DISASTERS

9 Hrs

Concepts, and definitions-Disaster, Hazard, Vulnerability, Resilience, Risks Disasters: Classification, Causes, Impacts -including social, economic, political, environmental, health, psychosocial, etc.)

UNIT II: RISK MANAGEMENT

9 Hrs

Goals and objectives of ISDR Programme- Riskidentification – Risk sharing – Disaster and development: Development plans and disaster management –Alternative to dominant approach –disaster-development linkages - Principle of risk partnership.

UNIT III: RISK REDUCTION

9 Hrs

Trigger mechanism – constitution of trigger mechanism – risk reduction by education – disaster information network – risk reduction by public awareness Application of various technologies: Data bases – RDBMS – Management Information systems – Decision support system and other systems – Geographic information systems Remote sensing-an insight – contribution of remote sensing and GIS - Case study.

UNIT IV: INTER-RELATIONSHIPS BETWEEN DISASTERS AND DEVELOPMENT: 9 Hrs

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources financial arrangements – areas of improvement –disaster preparedness — emergencyresponse.

UNIT V: DISASTER RISK MANAGEMENT IN INDIA

9 Hrs

Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation)

Total No. of Hours: 45

Tutorials Hours : 15

TEXT BOOKS

1. Pardeep Sahni, Madhavi Malalgoda and Ariyabandu, “Disaster risk reduction in South Asia”, PHI
2. Amita Sinvhal, “Understanding earthquake disasters” TMH, 2010.

REFERENCE

1. Pardeep sahani, Alka Dhameja and Uma Medury, “Disaster mitigation: Experiences and reflections”, PHI