

SIR PADAMPAT SINGHANIA UNIVERSITY, UDAIPUR

COURSE CONTENTS

Fourth Year (II semester) Batch:2008-2012

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3 0 0 3

Course Code: CE-420 (Elective-III)

Course Name: ADVANCED STRUCTURAL ANALYSIS

Objective: This course discusses advanced techniques used in analyzing indeterminate structures.

UNIT - I

Moment Distribution method: Application to the analysis of portal frames with inclined legs, gable frames

UNIT – II

Strain energy method: Application to the analysis of continuous beams and simple portal frames.

UNIT - III

Influence lines: Influence line diagrams for Reaction, Shearing force and Bending moment in case of determinate beams and Influence line diagrams for member forces in determinate trusses – application of influence line diagrams.

UNIT - IV

Analysis Two hinged and Three hinged arches using influence lines.

UNIT - V

Flexibility Method: Introduction to the structural analysis by flexibility concept using Matrix approach and application to continuous beams and plane trusses.

UNIT - VI

Stiffness method: Introduction to the structural analysis by stiffness concept using Matrix approach and application to continuous beams and plane trusses.

UNIT - VII

Analysis of portal frames by flexibility and stiffness methods. Drawing of bending moment diagram.

UNIT - VIII

Plastic Analysis: Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS:

1. Matrix methods of Structural Analysis by Pandit and Gupta – Tata Mc.Graw Hill
2. Analysis of structures Vol. I & II by Vazrani and Ratwani. Khanna publications.
3. Comprehensive Structural Analysis [Vol.1 & 2](#) by Dr. Vaidyanathan and Dr. P.Perumal - by Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:

1. Structural Analysis by D.S.Prakash Rao - Sagar books
2. Structural Analysis Vol. I & II by Bhavi Katti Vikas Publications.
3. Matrix structural analysis by T.N.Gayl; Tata Mc.Graw Hill company

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Course Code: CE-421(Elective-III)

Course Name: PAVEMENT ANALYSIS AND DESIGN

Objective: This course discusses various topics related to pavements such as types of pavements, materials used in pavement construction, different methods of designing flexible and rigid pavements and maintenance of pavements.

UNIT – I

Types of pavement – Factors affecting design of pavements – wheel loads – ESWL Concept- tyre pressure – contact pressure, Material characteristics – Environmental and other factors.

UNIT – II

Stresses in flexible pavement – layered systems concept – one layer system – Boussinesq Two layer system – Burmister Theory for Pavement Design.

UNIT – III

Stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction – stresses due to warping, stresses due to loads, stresses due to friction.

UNIT – IV

Pavement design: CBR Method of Flexible Pavement Design- IRC method of flexible pavement design.- AASHO Method of Flexible Pavement design

UNIT – V

IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of Joints – Use of Tie Bars and Dowell Bars.

UNIT – VI

Highway Materials – Soil, Aggregate and Bitumen- Tests on aggregates – Aggregate Properties and their Importance- Tests on Bitumen – Bituminous Concrete- Requirements of Design Mix- Marshall's Method of Bituminous Mix design.

UNIT – VII

Highway construction – Construction of Earth Roads- Gravel Roads – WBM Roads- Bituminous Pavements- Cement Concrete Roads- Steps in Construction- Reinforced Concrete Pavements – Soil Stabilization – Methods and Objectives- Soil-cement Stabilization and Soil-lime Stabilization.

UNIT – VIII

Need for Highway Maintenance- Pavement Failures- Failures in Flexible Pavements-Types and Causes-Rigid Pavement Failures- Types and causes- Pavement Evaluation- Benkleman Beam method- Strengthening of Existing Pavements- Overlays.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.J.Justo, Nemchand & Bros., 7th Edition (2000).
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal – Khanna publishers – (2003).

REFERENCES:

1. Principles of pavement design – Yoder & wit zorac – Jhonwilley & Sons.

CODES:

1. IRC Code for flexible pavement – IRC – 37 -2001.
2. IRC Code for Rigid pavement – IRC – 58 – 2002.

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Course Code: CE-422 (Elective-III)

Course Name: INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT

Objective: This course discusses the basic theories of industrial waste water management, the problems arising from the discharge of industrial waste in oceans and lakes, recirculation and treatment of industrial waste and waste water.

UNIT – I

Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing and Brewery Industries – Boiler and Cooling water treatment methods.

UNIT – II

Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems.

UNIT – III

Industrial waste water discharges into streams. Lakes and oceans and problems.

UNIT – IV

Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries.

UNIT – V

Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods.

UNIT – VI

Manufacturing Process and design origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

UNIT – VII

Manufacturing Process and design origin of liquid waste from Sugar Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects and treatment methods.

UNIT – VIII

Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods.

TEXT BOOK:

1. Waste Water Treatment by M.N. Rao and Dutta, Oxford & IBH, New Delhi.

REFERENCES:

1. Liquid waste of Industry by Newmerow.
2. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr).

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Course Code: CE-423 (Elective-III)

Course Name: Watershed Management

Objective: This course discusses the characteristics of watershed, and watershed management considering various aspects such as forestation, agriculture, land management and administrative requirements.

History of Watershed Management and its relevance to India: Characteristics of watersheds, base hydraulic considerations for different land use. Role of different types of vegetation in watershed management, Role of ecosystem, Foresting, Agriculture, Grassland and Wild land management techniques, Mountain terrains, administrative requirements, Evaluation of control measures, Command Area Development. On-farm management.

References:

1. J.V.S. Murthy, “Watershed Management”, New Age International, II Ed., 1998.

2. Wurbs, R.A., and James, W.P., “Water Resources Engineering”, Prentice-Hall, NJ, 2002.

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Course Code: CE 424 (Elective-III)

Course Name: Rock Mechanics and Tunnelling

Objective: This course discusses the various properties of rocks, methods of testing, investigating rocks and modern techniques for designing and constructing tunnels.

Engineering properties of rocks, Surface and sub-surface investigation in rock including geophysical studies, Weathering of rocks, Discontinuities, Field and laboratory testing of rocks and rock masses, Stress-strain characteristics, Deformability of rocks, Friction and Shear strength, Slope stability, effect of water, analysis and design of tunnels, Blasting, Bolting, Tunnelling techniques, Application numerical techniques.

Texts/References

R.E. Goodman, Introduction to Rock Mechanics, John Wiley and Sons, New York, 1989.

JACGER, Charles, Rock Mechanics and Engineering, Cambridge University Press, London, 1972.

Megaw, T.M. and J.V. Bartlett, Tunnels : Planning, Design, Construction, International Edition, Ellis Horwood Limited, John Wiley and sons, New York, 1983.

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Course Code: ME-422 (Elective-III)

Course Name: Basics of Wind Engineering

Objective: This course discusses various aspects of wind engineering and its application in designing different structures.

Introduction: state of the art in wind engineering.

Bluff body aerodynamics: boundary layer separation; wake and vortex formations; pressure, lift, drag and moment effect.

Structural dynamics: single degree of freedom linear system; multi-degree of freedom linear system; example of along-wind response.

Aero elastic phenomena; vortex shedding and lock-in phenomena; models of vortex-induced response; across wind galloping; wake galloping; flutter; torsion divergence.

Wind tunnel simulation of aerodynamic and aero-elastic behaviour of bluff bodies.

Application to design of tall buildings, slender towers and stacks.

Effects of wind on low-rise buildings under general and extreme conditions.

Codes of practices on analysis and design of wind sensitive structures.

References:

1. Wind Effects on Structures – E. Simiu & R. Scanlan.