

SIR PADAMPAT SINGHANIA UNIVERSITY, UDAIPUR

COURSE CONTENTS

Fourth Year (II semester) Batch:2008-2012

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Course Code: CE 425 (Elective-IV)

Course Name: OPTIMIZATION TECHNIQUES

Objectives: This course discusses various optimization techniques necessary for designing various engineering structures and models.

Unit 1 :Introduction:

Engineering application of optimization, statement of an optimization problem with example for minimum weight and optimum cost consideration, classification of optimization problems and techniques, Single variable optimisation , multivariable optimization with equality and inequality constraints and without constraints.

Unit 2 : Linear Programming

Introduction,standard form of the problem, Geometry,basic terminology
Techniques of linear programming: Simplex method, Revised simplex method:Duality in linear programming,decomposition principle, post-optimality analysis, applications to engineering design

Unit 3: Non Linear Programming

Introduction,elimination methods:various search methods-Fibonacci method and golden section method Interpolation method-Quadratic and cubic interpolation methods, Direct root method.

Unit 4: Unconstrained optimization Techniques:

Introduction; Standard form of the problem and basic terminology; Direct search method- Simplex method, Random search method, Univariate and pattern search method Indirect search method-Steepest Descent (Cauchy) method, Conjugate gradient method, Newton's method, Application to engineering problems

Unit 5: Constrained Optimization Introduction; Standard form of the problem and basic terminology; Direct method: Sequential Linear Programming; Generalised Reduced gradient method, Methods of feasible direction Indirect method: Penalty function method Interior and exterior penalty function method, Convex programming problem, Check for convergence Application to engineering problems

Unit 6 : Introduction to non-traditional methods:

Genetic Algorithm: Introduction, Representation of design variables, objective function and constraints, Genetic operators and numerical results.

Introduction to Neural network based optimisation

References

1. S.S.Rao, 'Engineering Optimisation- Theory and Practice', New Age International.
2. Deb K., 'Optimisation for Engineering Design-Algorithms and Example', Prentice Hall
3. Gallagher and O.C Zeinkiewicz, 'Optimum Structural Design – Theory & Applications', John Wiley and Sons, London
4. Jozsef Farkas, 'Optimum Design of Metal structures', Ellis Horwood Limited, Chichester
5. U.Kirsch, 'Optimum structural design', McGraw –Hill, New York

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Course Code: CE 426 (Elective-IV)

Course Name: **Bridge Engineering**

Objective: This course discusses how to design short and long span bridges, pre stressed concrete bridges and plate girder bridges.

INTRODUCTION

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.

SHORT SPAN BRIDGES

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

LONG SPAN GIRDER BRIDGES

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

DESIGN OF PRESTRESSED CONCRETE BRIDGES

DESIGN OF PLATE GRIDER BRIDGES

BEARINGS, SUBSTRUCTURES AND FOOTINGS FOR BRIDGES

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 Thomes, Oxford Shire, 1973.
6. Taylor, F.W., Thomson, S.E., and Smulski E., *"Reinforced Concrete Bridges"*, John Wiley and Sons, New York, 1955.
7. Edwin H. Gaylord Jr., Charles N. Gaylord, James, E., Stallmeyer *"Design of Steel Structures"* McGraw Hill International Editions, 1992.

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Course Code: CE-427 (Elective-IV)

Course Name: **Environmental Impact, Risk Assessment and Auditing**

Objective: This course discusses methods of performing environmental assessments including environmental monitoring, environmental management and administration, both in public and private sectors.

UNIT – I

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT – II

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

UNIT – III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.

UNIT-IV

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air

and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT – V

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

UNIT – VI

Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT-VII

Post Audit activities, The Environmental pollution Act, The water Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act.

UNIT-VIII

Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:

- 1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.**
- 2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers**
- 2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi**

REFERENCES:

- 1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katania & Sons Publication., New Delhi.**

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Course Code: CE 428 (Elective-IV)

Course Name: **River Engineering**

Objective: This course helps the students to understand the river structures and their design practices with impact of river modification.

Multipurpose river use, natural and physical process in alluvial rivers, Channel modification and practices, river structures, design practices, impact of river modification, problem analysis.

Text or References:

Petersen 1986, River engineering, Prentice Hall.

Yang 1996, Sediment transport, Mc Graw Hill.

French 1985, Open Channel Hydraulics. Mc Graw Hill.

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Course Code: CE 429 (Elective-IV)

Course Name: **Offshore engineering** \

Objective: This course discusses the characteristics of offshore structures like marine jetty and the designing process of offshore structures.

Linear theory of waves, brief description of higher order wave theories, random waves, probability theories. Morison's equation, wave forces on fixed and floating structures and fluid structure interaction. Soil exploration beneath seabed, criteria of foundation design in offshore environment, pile behaviour under cyclic lateral loading, development of p-y curves. Analysis of piles and foundations of gravity platforms, soil liquefaction under cyclic stresses. Various types of offshore structures and evaluation of their environmental loads. Structural idealization and analysis of forces due to wind, waves and for linear static behaviour. Wave force on inclined members, analysis of joints in offshore structures, stress concentration and fatigue life prediction. Elementary aspects of dynamic analysis and response.

Texts/References

T. Sarapkaya and M. Isaacson, Mechanics of Wave Forces on Offshore Structures, Van Nostrand, Reinhold Co., N.Y., 1981.

C.A. Brebbia and S. Walker, Dynamic analysis of Offshore Structures, Newnes Butterworth, London, 1979.