



SCHOOL OF BUILDING AND ENVIRONMENT

DEPARTMENT OF CIVIL ENGINEERING

BOARD OF STUDIES MEETING - Academic year 2017-2018

The second Board of studies meeting for the Department of Civil Engineering, School of Building and Environment will be held on 22.11.2017 at 1.00 pm

Internal members

1. Dr. S.Packialakshmi, Head and Associate Professor, Department of Civil Engineering
2. Dr.R.Padmapriya, Associate Professor, Department of Civil Engineering
3. Mrs. C. S Danee Joycee, Associate Professor, Department of Civil Engineering
4. Mrs. A. Annadurai, Associate Professor, Department of Civil Engineering

External members

1. Dr. Arul Jayachandran, Structural Engineering Division, IIT Madras, India.
2. Dr. K. Gunasekaran, Associate Professor, Division of Transportation Engineering, Anna University
3. Dr. S.T. Ramesh, Associate Professor, NIT Trichy
4. Dr. V. Balakumar, Senior Consultant at Simplex Infrastructurs Ltd
5. Ar. Rajan Venkateshwaran, Head, centre for Excel & Future Development, L&T

Agenda:

1. Review of Curriculum for the upcoming Academic Year
2. Implementation of Elective Course Structural Optimization for PG programme


(S. PACKIALAKSHMI)

HOD/CIVIL



SCHOOL OF BUILDING AND ENVIRONMENT

DEPARTMENT OF CIVIL ENGINEERING

Minutes of Board of Studies Meeting - Academic year 2017-2018

The second periodic Board of Studies Meeting for the Academic Year 2017-2018 (both UG and PG programme) is held on 22nd November, 2017 at 1.00 pm at CADD Lab - I, Civil Engineering Dept.

Members Present

1. Dr. Arul Jayachandran, Structural Engineering Division, IIT Madras, India.
2. Dr. K. Gunasekaran, Associate Professor, Division of Transportation Engineering, Anna University
3. Dr. S.T. Ramesh, Associate Professor, NIT Trichy
4. Dr. V. Balakumar, Senior Consultant at Simplex Infrastructures Ltd
5. Ar. Rajan Venkateshwaran, Head, centre for Excel & Future Development, L&T
6. Dr. S.Packialakshmi, Head and Associate Professor, Department of Civil Engineering
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9. Mrs. A. Annadurai, Associate Professor, Department of Civil Engineering

The discussion in Board of Studies meeting on the industrial demands of the Civil Engineering field in light of the agenda, the member Dr. Arul Jayachandran, Structural Engineering Division, IIT Madras, India has appreciated the review of curriculum and recommended to include the Elective course Structural Optimization for the PG programme.


(S. Packialakshmi)

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HOD/CIVIL

EXPERT MEMBERS

SCI5610	STRUCTURAL OPTIMIZATION	L	T	P	Credits	Total Marks
		3	1	0	4	100

COURSE OBJECTIVE

To study the optimization methodologies applied to structural engineering.

UNIT 1 BASIC PRINCIPLES AND CLASSICAL OPTIMIZATION TECHNIQUES 12 Hrs.

Definition - Objective Function; Constraints - Equality and inequality - Linear and non-linear, Side, Non-negativity, Behaviour and other constraints - Design space- Feasible and infeasible - Convex and Concave - Active constraint - Local and global optima. Differential calculus - Optimality criteria - Single variable optimization - Multivariable optimization with no constraints - (Lagrange Multiplier method) - with inequality constraints (Khun - Tucker Criteria).

UNIT 2 LINEAR AND NON-LINEAR PROGRAMMING 12 Hrs.

LINEAR PROGRAMMING: Formulation of problems - Graphical solution - Analytical methods - Standard form - Slack, surplus and artificial variables - Canonical form - Basic feasible solution - simplex method - Two phase method - Penalty method - Duality theory - Primal - Dual algorithm.

NON LINEAR PROGRAMMING: One Dimensional minimization methods: Unidimensional - Unimodal function - Exhaustive and unrestricted search - Dichotomous search - Fibonacci Method – Golden section method – Interpolation methods. Unconstrained optimization Techniques.

UNIT 3 GEOMETRIC PROGRAMMING 13 Hrs.

Posynomial - degree of difficulty - reducing G.P.P to a set of simultaneous equations - Unconstrained and constrained problems with zero difficulty – Concept of solving problems with one degree of difficulty.

UNIT 4 DYNAMIC PROGRAMMING 12 Hrs.

Bellman's principle of optimality - Representation of a multistage decision problem - concept of sub-optimization problems using classical and tabular methods.

UNIT 5 STRUCTURAL APPLICATIONS – Genetic Algorithms, Fuzzy optimization Techniques 12 Hrs.

Methods for optimal design of structural elements, continuous beams and single storied frames using plastic theory - Minimum weight design for truss members - Fully stressed design - Optimization principles to design of R.C.structures such as multistorey buildings, water tanks and bridges.

Max. 60 Hours

COURSE OUTCOME

On the end of the course, student will be able to:

- CO1 - Apply the knowledge of engineering fundamentals to formulate and solve the engineering problems by classical optimization techniques.
- CO2 - Identify, formulate and solve engineering problems by linear and non-linear programming.
- CO3 - Analyse the problem and reducing G.P.P to a set of simultaneous equations.
- CO4 - Apply the Engineering knowledge to understand the concept of dynamic programming.
- CO5 - Design various structural elements with minimum weight.
- CO6 - Explain Bellman's principle of optimality

TEXT / REFERENCE BOOKS

1. Rao,S.S. "Optimization theory and applications", Wiley Eastern (P) Ltd.,1984
2. Uri Krish, "Optimum Structural Design", McGraw Hill Book Co. 1981
3. Spunt, "Optimization in Structural Design", Civil Engineering and EngineeringMechanics Services, Prentice-Hall, New Jersey 1971.
4. Iyengar.N.G.R and Gupta.S.K, "Structural Design Optimisation", AffiliatedEast West Press Ltd, New Delhi, 1997.

END SEMESTER EXAM QUESTION PAPER PATTERN

Max. Marks: 80

Exam Duration : 3 Hrs.

PART A : 6 Questions of 5 marks each – No choice - uniformly distributed

30 Marks

PART B : 2 Questions from each unit of internal choice, each carrying 10 marks

50 Marks