BCA-7-02T: Optimization Techniques

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

INSTRUCTIONS FOR THE PAPER SETTER/EXAMINER

1. The syllabus prescribed should be strictly adhered to.
2. The question paper will consist of three sections: A, B, and C. Sections A and B will have four questions from the respective sections of the syllabus and will carry 10 marks each. The candidates will attempt two questions from each section.
3. Section C will have fifteen short answer questions covering the entire syllabus. Each question will carry 3 marks. Candidates will attempt any ten questions from this section.
4. The examiner shall give a clear instruction to the candidates to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.
5. The duration of each paper will be three hours.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt any two questions each from the sections A and B of the question paper and any ten short questions from Section C. They have to attempt questions only at one place and only once. Second or subsequent attempts, unless the earlier ones have been crossed out, shall not be evaluated.

Course: Optimization Techniques	
Course Code: BCA-7-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Define and explain optimization problems in various domains.
CO2	Analyze the optimality criteria for various optimization techniques.
CO3	Translate practical problems into mathematical expressions for optimization.
CO4	Understand the concepts of Genetic programming.
CO5	Analyze optimization methods based on the behavior of biological and swarm of insects.

Detailed Contents:

Module	**Module Name**	**Module Contents**
Section-A		
Module 1	**Optimization Models**	OR models, solving the OR Model, Introduction to Linear Programming, two-variable LP model, Graphical LP Solution, Graphical sensitivity

		Analysis, Simplex Method, Big M Method, Two Phase Method, Special cases in Simplex Method Application.
Module II	**Duality and Sensitivity Analysis**	Definition of the Dual problem, Primal dual relationship, Additional Simplex Algorithm for LP, Post optimal or Sensitivity Analysis. Transportation Model, Transportation Algorithm, Assignment Model.
Module III	**Networks Models**	Definition, Minimum spanning trees algorithms, Shortest Route Problem, Maximum flow Model, Minimum Cost Capacitors flow problem, PERT & CPM.
Section-B		
Module IV	**Non-Linear Programming**	Unconstrained Algorithms, Direct search Method, Gradient Method, Constrained Algorithm, Separable programming, Quadratic Programming, Geometric Programming
Module V	**Intelligent Optimization**	Introduction to Intelligent Optimization, Optimization methods based on the behavior of biological and swarm of insects, Genetic Algorithm, Simulated Annealing Algorithm, Particle Swarm Optimization (PSO)
Module VI	**Genetic Algorithm**	Genetic Algorithm: Types of reproduction operators, crossover & mutation, Genetic Programming (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

Books

1. S. S. Rao, "Engineering Optimization: Theory and Practice", Wiley, 2008.

2. K. Deb, "Optimization for Engineering design algorithms and Examples", Prentice Hall, 2nd edition 2012.

3. C.J. Ray, "Optimum Design of Mechanical Elements", Wiley, 2007.

4. R. Saravanan, "Manufacturing Optimization through Intelligent Techniques", Taylor & Francis Publications, 2006.

5. D. E. Goldberg, "Genetic algorithms in Search, Optimization, and Machine Learning", Addison-Wesley Longman Publishing, 1989