Code: 17D04201

M.Tech I Semester Regular & Supplementary Examinations January/February 2019

ADVANCED OPTIMIZATION TECHNIQUES

(Common to PE&ED and PE)

(For students admitted in 2017 & 2018 only)

Time: 3 hours Max. Marks: 60

Answer all the questions

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1 Solve by mixed integer programming

Maximize $Z = -3x_1 - 2x_2 + 10$,

Subject to: $x_1 - 2x_2 + x_3 = 5/2$,

$2x_1 + x_2 + x_4 = 3/2$,

$x_j \geq 0$ (j = 1, 2, 3, 4), x_2 and x_3 integer.

This problem is in canonical form, with x_3 and x_4 optimal basic variables for the associated linear program

OR

2 Summarizes the general procedure of Branch-and-bound for integer-programming maximization with flow chart.

3 Find the optimum solution of the following constrained multivariable problem:

Minimize $Z = x_1^2 + (x_2 + 1)^2 + (x_3 - 1)^2$

Subject to $x_1 + 5x_2 - 3x_3 = 6$.

OR

4 Describe the solving process of constrained multivariable optimization problems with inequality constraints.

5 Describe the six steps involved in Genetic algorithm.

OR

6 Compute the mutation and crossover in a genetic algorithm with real numbers. Explain in detail.

7 One of management's goals in a goal programming problem is expressed algebraically as, $3x_1 + 4x_2 + 2x_3 = 60$, where 60 is the specific numeric goal and the left-hand side gives the level achieved toward meeting this goal.

(i) Letting y+ be the amount by which the level achieved exceeds this goal (if any) and y- the amount under the goal (if any), show how this goal would be expressed as an equality constraint when reformulating the problem as a linear programming model.

(ii) If each unit over the goal is considered twice as serious as each unit under the goal, what is the relationship between the coefficients of y+ and y- in the objective function being minimized in this linear programming model?

OR

8 Describe how the NSGA-Nondominated Sorting Genetic Algorithm differs from basic simple GA with example.

9 Discover the advance optimization techniques for the design of four-bar mechanism.

OR

10 Explain application of optimization in design and analysis of springs and gears.

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