Printed Pages:02 **Sub Code:KEE-055**

Paper Id: 231464 **Roll No.** | | | | | | | | | | |

BTECH
(SEM V) THEORY EXAMINATION 2022-23
OPTIMIZATION TECHNIQUE

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. What is a merit function?
b. What is a quadratic form?
c. Define the infeasibility form.
d. Explain Methods of finding initial Basic Feasible Solutions.
e. What is an interval of uncertainty?
f. Why is the scaling of variables important?
g. Give the definition of genetic algorithm.
h. Explain the types of simulation.
i. Why economic load dispatch is required for power system?
j. Write the importance of maintenance scheduling of machines.

SECTION B

2. Attempt any *three* of the following: **10x 3 = 30**

a. Find the maximum of the function $f(X) = 2x_1 + x_2 + 10$ subject to $g(X) = x_1 + 2x_2^2 = 3$ using the Lagrange multiplier method. Also find the effect of changing the right-hand side of the constraint on the optimum value of f.
b. What is simplex? Describe the simplex method of solving linear programming problem
c. Explain the Dichotomous search. Find the minimum of $f = x(x - 1.5)$ in the interval (0.0, 1.00) to within 10% of the exact value.
d. Explain in detail about the basic step of CPM/PERT and advantages and disadvantages of PERT and CPM.
e. Briefly explain about the maintenance scheduling of motor in manufacturing industry.

SECTION C

3. Attempt any *one* part of the following: **10x 1 = 10**

a. State the various methods available for solving a multivariable optimization problem with equality constraints.
b. State the Kuhn–Tucker conditions. What is a convex programming problem? What is its significance?

4. Attempt any *one* part of the following: **10x 1 = 10**

a. Use the simplex method to solve the following LP problem.
Maximize $Z = 3x_1 + 5x_2 + 4x_3$
subject to the constraints
(i) $2x_1 + 3x_2 \leq 8$, (ii) $2x_2 + 5x_3 \leq 10$, (iii) $3x_1 + 2x_2 + 4x_3 \leq 15$
and $x_1, x_2, x_3 \geq 0$

b. Find the initial basic feasible solution for the following transportation problem, using North-West Corner Rule method.

sources	D1	D2	D3	supply
S1	43	8	5	7
S2	4	4	2	8
S3	6	5	8	10
S4	2	6	3	15
Demand	8	10	27	

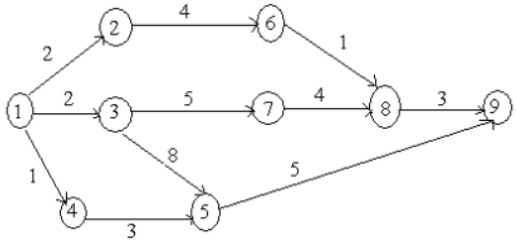
5. Attempt any *one* part of the following: 10x 1 = 10

a. What is interval halving method? Explain its procedure to solve optimization problem with suitable example.

b. State the necessary and sufficient conditions for the unconstrained minimum of a function. Define Unimodal function.

6. Attempt any *one* part of the following: 10x 1 = 10

a. Find the critical path and calculate the slack time for the following network



b. Write the short notes on:-
(a) Fitness function
(b) genetic algorithm (GA) operator
(c) compare GA with traditional method

7. Attempt any *one* part of the following: 10x 1 = 10

a. Consider two units of a plant that have fuel costs of

$F_1 = 0.2P_1^2 + 40P_1 + 120 Rs./h$

$F_2 = 0.25P_2^2 + 30P_2 + 150 Rs./h$

Determine the economic operating schedule and the corresponding cost of generation for the demand of 180 MW.

b. Explain in brief about the speed control method by fuzzy logic controller.