QPC: RM19MSC147 AR- 19 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

M. Sc (Fourth Semester) Examinations, May – 2021

MTPE 404 – OPTIMIZATION TECHNIQUES-II

(MATHEMATICS)

Time: 2 hrs Maximum: 50 Marks

(The figures in the right hand margin indicate marks.)

PART – A **(2 x 10 = 20)**

Q.1. Answer **ALL** the questions

a. State the conditions under which a quadratic programming problem will have unique optimal solution.
b. State strong duality theorem.
c. Define generalized inverse of a matrix A.
d. Write any three applications of quadratic program.
e. State the concept used in the reduced gradient method.
f. State the requirements for using the Kelly's cutting plane method.
g. What is signomial and when a signomial is said to be posynomial?
h. State Bellman's optimality. Principle.
i. State weak duality theorem.
j. What is a compementarity problem?

PART – B **(6 x 5 = 30 Marks)**

Answer ***ANY FIVE*** questions Marks

2. Apply Wolfe's method to solve the quadratic programming problem:
   Minimize $f(x_1, x_2) = -10x_1 - 25x_2 + 10x_1^2 + x_2^2 + 4x_1x_2$ (6)
   Subject to $x_1 + 2x_2 \leq 10,\ x_1 + x_2 \leq 9\ and\ x_1, x_2 \geq 0$
3. Explain in detail the Beale's Algorithm for solving quadratic programming problem. (6)
4. Explain Lemke's Complementary Pivoting Algorithm. (6)
5. Let A be a matrix of order m x n and $rank\ (A) = r$, then prove that a $g - inverse\ A^-$ exist and also $rank\ (A^-) \geq rank\ (A)$. (6)
6. Use the Frank and Wolfe algorithm to Minimize $f(x) = x_1^2 + 4\,x_2^2$ subject to $x_1 + 2x_2 - x_3 = 1,\ -x_1 + x_2 + x_4 = 0, x_i \geq 0\ \ (i = 1, 2, 3, 4)$ (6)
7. Prove that a solution point x^* is a K-T point of the nonlinear programming problem $Minimize\ f(x)\ ,\ subject\ to\ Ax = b, x \geq 0,$ where $x \in R^n, b \in R^m\ and\ A = (a_{ij})$ is an m x n matrix. (6)
8. A can is to be made in the form of right circular cylinder to contain at least V cubic inches of oil. What dimensions of the can will require the least amount of material? (6)
9. Find an expression for maximum height attained by projectile using dynamic program. (6)

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