QP Code: RD19MSC065 Reg. No | | | | | | | | | | | AR 19

# GIET UNIVERSITY, GUNUPUR – 765022

M. Sc (Third Semester) Examinations, December' 2020

## CE 303 / MTPE 303 – Optimization Techniques-I

(Mathematics)

Time: 2 hrs Maximum: 50 Marks

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

Q.1. Answer **ALL** the questions (2 x 10 = 20)

a. Explain the uses of Gomory's Algorithm for pure integer linear programs?

b. What are the uses of Branch and Bound method when compare with other integer methods?

c. Define linear programming problem and give two examples.

d. Write the proof of "If $f$ is differentiable at x belongs to T and x is a local minimal of prob-1 then gradient of f $(x)^T$ d $\geq 0$ for all d belongs to closure of x"

e. Let $f$ be a pseudo convex function on a open convex set $T$ is subset of $R^n$, Also let gradient of $f(x) = 0$ for some $x \in T$, then $x$ is global minimum of $f$ over $T$.

f. Max $Z = 10x_1 + 8x_2$

Subject to $15x_1 + x_2 \leq 5,\ x_1 + 20x_2 \geq 6,\ 2x_1 - 21x_2 \geq 16;\ x_2,\ x_2 > 0$ .

Introduce slack, surplus and artificial variables for given constraints.

g. Define Hessian Matrix. Give two examples

h. What are the differences between Lagrange's method and Kuhn-Trucker conditions?

i. In game theory, what is role of minimax and maximin principle. Explain the uses of it?

j. Define convex programming problem and convex set. Give one example each.

**PART – B (6 x 5 = 30 Marks)**

<u>Answer ***ALL*** the questions</u> Marks

2. Write the step by step working procedure of Gomory's Algorithm for pure integer linear programs? (6)

3. Solve the following LPP using graphical method (6)

   Maximize $Z = 6X_1 + 8X_2$

   Subject to $5X_1 + 10X_2 \leq 60,\ 4X_1 + 4X_2 \leq 40$ and $X_1, X_2 \geq 0$.

4. Solve the non linear programming problem by using Lagrange's multiplier method (6)

   Maximize $Z = 5X_1 - 3X_1^2 + 6X_2 - 2X_2^2$

   Subject to $2X_1 + 3X_2 = 12$.

5. Solve the following LPP using dual Simplex method (6)

   Maximize $Z = 6X_1 + 8X_2$

   Subject to $5X_1 + 10X_2 \leq 60,\ 4X_1 + 4X_2 \leq 40$ and X1, X2 $\geq 0$

6. Write the proof of "Every local minimum of the convex programming is a global minimum". (6)

7. Explain the proof of "The set of all optimal solutions to the convex programming is convex". (6)

8. Consider the 4x4 game played by players A and B as shown in below matrix. Solve it optimally. (6)

| | | player B | | | |
|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 |
| player A | 1 | 4 | 2 | 8 | 10 |
| | 2 | 6 | 2 | -1 | 9 |
| | 3 | 5 | 7 | 8 | 2 |
| | 4 | 3 | 6 | 5 | 7 |

9. Write the step by step procedure of Dominance principal? (6)

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