GIET UNIVERSITY, GUNUPUR – 765022

RN19MSC012

Roll No: | | | | | | |

Total Number of Pages : 2 AR-18 M. Sc

M.Sc 3rd SEMESTER REGULAR EXAMINATIONS, NOV/DEC 2019-20

Subject code: CE-303

Subject: OPTIMIZATION TECHNIQUES-1

Time: 3 Hours Max Marks: 80

The figures in the right hand margin indicate marks.

SECTION A

[4 X4 =16]

Q.1 Answer any four of the following:

a Distinguish between pure and mixed integer programs

b Define Lagrange's function.

c What is the importance of Kuhn Tucker conditions

d State the necessary conditions of Lagrange's multiplier method.

e What do you understand by saddle point?

f Define a Fair Game.

OR

2. Answer all questions from the following [2 x 8 =16]

a State GOMORY'S mixed integer continuous variables algorithm.

b Explain with neat diagram Branch and bound method in integer programming

c What is a Game Theory? List out the assumptions made in the theory of game.

d Explain maximin /minimax principle

e Explain Kuhn Tucker optimality conditions

f Find the value of the game with pay-off matrix of two players is given as:

$$\begin{bmatrix} 1 & 3 & 1 \\ 0 & -4 & -3 \\ 1 & 5 & -1 \end{bmatrix}$$

g Explain dominance principle.

h Derive the dual of the primal linear program; max z= $3x_1 + 2x_2$

Subject to $x_1 + 3x_2 \leq 6$

$x_1 - x_2 \leq 3$

$x_1 + 2x_2 \leq 5$

$x_1, x_2 \geq 0$

SECTION-B

Answer all Questions: [16 x4 =64]

3a Solve the pure IPP by using Gomory's algorithm 16 marks

Minimize Z= $-9x_1 - 10x_2$

Subject to $x_1 + x_2 + x_3 = 3$

$2x_1 + 5x_2 + x_4 = 15$

Where $x_1, x_2\ x_3, x_4 \geq 0$ and integer

OR

b Solve the IPP by using Branch and bound technique 16 marks

Minimize Z= $4x_1 + 3x_2$

Subject to $x_1 \leq 4, x_2 \leq 6$

$5x_1 + 3x_2 \geq 30$

Where $x_1, x_2 \geq 0$ and integer

4a Solve the NLPP by using Kuhn Tucker conditions — 16marks

$\text{Max}Z=12x_1 + 21x_2+2x_1 x_2-2x_1{}^2 - 2x_2{}^2$

Subject to $x_2 \leq 8$

$x_1 + x_2 \leq 10$

Where $x_1, x_2 \geq 0$

OR

b Solve the NLPP by using Lagrange's multiplier method

Optimize $Z=4x_1{}^2 + 2x_2{}^2 + x_3{}^2 - 4x_1 x_2$

Subject to $x_1 + x_2 + 3x_3 = 15$

$2x_1 - x_2 + 2x_3 = 20$

Where $x_1, x_2\ x_3 \geq 0$

5a (i) Solve graphically the game with the pay-off matrix $\begin{bmatrix} 1 & 0 & 4 & -1 \\ -1 & 1 & -2 & 5 \end{bmatrix}$. — 8 marks

(ii) Let the function f be twice continuously differentiable on a set $T \subset R^n$ and x^* be a local minimum of the problem minf(x) subject to $x \in T$ then for any $d \in D(x^*)$ (i) $\nabla f(x^*)^T d \geq 0$ (ii) $d^T H(x^*) d \geq 0$ if $\nabla f(x^*)^T d = 0$ Where H (x^*) is the Hessian matrix of f. Evaluated x^* — 8 marks

Or

b (i) Solve the given game by using dominance principle with the pay-off matrix — 8 marks

$\begin{bmatrix} 1 & 7 & 2 \\ 6 & 2 & 7 \\ 5 & 1 & 6 \end{bmatrix}$.

(ii) State and prove sufficient conditions for non negative saddle point. — 8 marks

6a Solve mixed integer programming problem — 16marks

Maximize $Z= x_1 + x_2$

subject to $3x_1 + 2x_2 \leq 7$

$x_2 \leq 2$

Where $x_1, x_2 \geq 0$ and x_1 is an integers.

Or

b Define convex programming problem. Solve the problem — 16marks

Minimize $Z= -log x_1 - log x_2$

subject to $x_1 + x_2 \leq 2,$

Where $x_1, x_2 \geq 0$