Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech Degree (S,FE) Examination January 2023 (2015 scheme)

Course Code: EC363

Course Name: OPTIMIZATION TECHNIQUES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) Find the maxima, minima and saddle points ,if any, of $f(x) = {x_1}^3 + {x_2}^3 - 3x_1 - 12x_2 + 25$ (5)

b) Maximize $f(x_1, x_2, x_3) = -{x_1}^2 - {x_2}^2 - {x_3}^2 + 4x_1 + 6x_2$ (10)

Subject to $x_1 + x_2 \leq 2$

$2x_1 + 3x_2 \leq 12$

$x_1, x_2, x_3 \geq 0$ using Kuhn-Tucker conditions

2 a) Using penalty method (Big M-method) solve the following LPP (10)

Minimize Z=$5x + 3y$

subject to

$2x + 4y \leq 12$

$2x + 2y = 10$

$5x + 2y \geq 10$

and $x, y \geq 0$

b) Write down the Simplex algorithm to solve a Linear Programming Problem (5)

3 a) Solve the following LPP graphically (7)

Minimize Z=$200x + 500y$

subject to the constraints

$x + 2y \geq 10$

$3x + 4y \leq 24$

and $x \geq 0, y \geq 0$

b) Using method of Lagrange multipliers, Minimize $f(x_1, x_2, x_3) = {x_1}^2 + {x_2}^2 + {x_3}^2$ subject to constraints $4x_1 + {x_2}^2 + 2x_3 = 14$ (8)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Determine the optimum basic feasible solution to the following transportation problem using MODI method. (8)

	A	B	C	Supply
I	50	30	220	1
II	90	45	170	3
III	250	200	50	4
Demand	4	2	2	

b) Obtain the initial feasible solution to the following transportation problem using North West Corner method. (7)

	D_1	D_2	D_3	D_4	Availabilities
O_1	3	1	7	4	300
O_2	2	6	5	9	400
O_3	8	3	3	2	500
Demand	250	350	400	200	

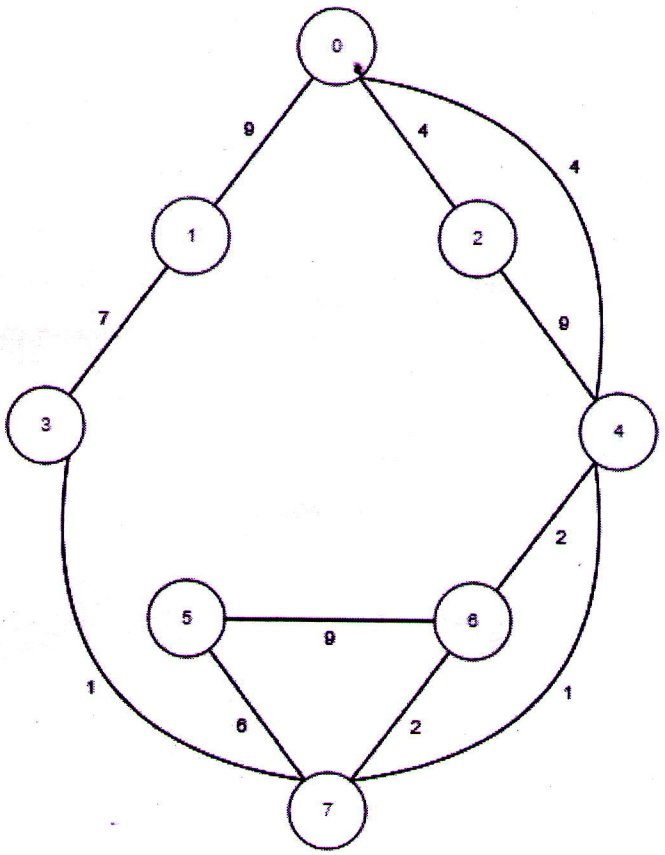
5 a) Solve the following game graphically (8)

Player B

$$\text{Player } A \begin{bmatrix} 1 & -3 \\ 3 & 5 \\ -1 & 6 \\ 4 & 1 \\ 2 & 2 \\ -5 & 0 \end{bmatrix}$$

b) In a game of matching coins with two players ,suppose A wins one unit of value when there are two heads ,wins nothing when there are two tails and loses ½ unit of value when there are one head and one tail. Determine the payoff matrix, the best strategies for each player and the value of the game to A (7)

6 a) Using Dijkstra's method find the shortest path from node 0 to node 7 from the following network path model (7)



b) Find an IBFS to the following transportation problem by LC method (8)

	D_1	D_2	D_3	D_4	D_5	Supply
O_1	73	40	9	79	20	8
O_2	62	93	96	8	13	7
O_3	96	65	80	50	65	9
O_4	57	58	29	12	87	3
O_5	56	23	87	18	12	5
Demand	6	8	10	4	4	

PART C

Answer any two full questions, each carries 20 marks.

7 a) Use Fibonacci search method to find the minimum of the function $f(x) = 0.65 - \frac{0.75}{(1+x^2)} - 0.65x\tan^{-1}(x)$ (10)

b) Minimize $f(x) = 2x^2 + y^2$ in two iterations from the point (1,2) using steepest descent method (3 iterations only) (10)

8 a) Using Newton-Raphson method minimize the function $f(x) = -6x^6 - 4x^5 - 100x^2 + 3000$ starting with $x_1 = 1, \epsilon = 0.01$ (10)

b) Explain genetic algorithm. (10)

9 a) Define the following terms (10)

i.) Fitness function ii) Mutation iii) Reproduction

b) Using Hooke-Jeeves method Minimize $f(x_1, x_2) = {x_1}^2 + 3{x_2}^2 + 6x_1x_2 - x_1 - x_2$ by taking $\Delta x = \Delta y = 0.5$ and starting from the point (2,-1)(perform two iteration) (10)

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