

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION (R&S), DECEMBER 2019

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) Examine $f(x) = xe^{-x^2}$ for extreme points. (7)
- b) Maximize $f(x) = 2x_1 + x_2 + 10$ subject to $x_1 + 2x_2^2 - 3 = 0$ (8)
- 2 a) Solve the following LPP using Big M method. Maximize $Z = 2x_1 + 3x_2 + 4x_3$ subject (10)
to
 $3x_1 + x_2 + 4x_3 \leq 600, 2x_1 + 4x_2 + 2x_3 \geq 480, 2x_1 + 3x_2 + 3x_3 = 540, x_1, x_2, x_3 \geq 0$
- b) Determine whether the following function is convex or concave. (5)
 $f(x) = 3x_1^2 + 2x_2^2 + x_3^2 - 2x_1x_2 - 2x_1x_3 + 2x_2x_3 - 6x_1 - 4x_2 - 2x_3.$
- 3 a) Write the algorithm for a simplex method to solve a LPP. (7)
- b) Maximize $f(x) = 3.6x_1 - 0.4x_1^2 + 1.6x_2 - 0.2x_2^2$ subject to the constraints (8)
 $2x_1 + x_2 \leq 10, x_1, x_2 \geq 0.$

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Show that transportation problem can be regarded as a particular case of linear (5)
programming problem.
- b) National oil company has three refineries and 4 Depots. Transportation cost per ton and (10)
requirements are given below. Determine the optimal allocation of output.

	D ₁	D ₂	D ₃	D ₄	Capacity
P ₁	5	7	13	10	700
P ₂	8	6	14	13	400
P ₃	12	10	9	11	800
Requirement	300	600	700	400	

- 5 a) State dominance property in game theory and solve the following game. (7)

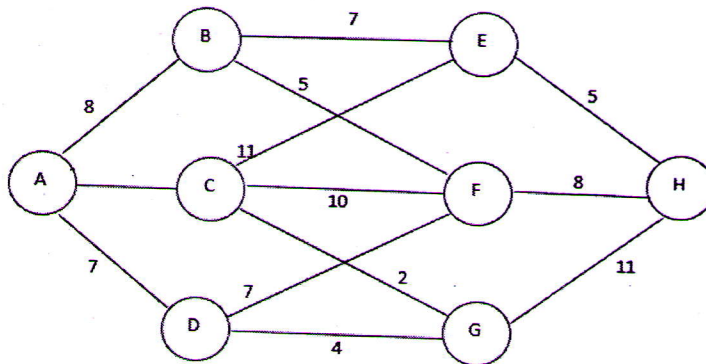
$$\begin{bmatrix} 20 & -20 & 50 \\ -25 & 25 & -25 \\ 20 & -50 & 50 \end{bmatrix}$$

- b) Consider the details of a distance network as shown below. Use PRIM algorithm to find the minimum spanning tree. (8)

Arc	Distance
1-2	8
1-3	5
1-4	7
1-5	16
2-3	15
2-6	3
2-7	4
3-4	5

Arc	Distance
3-6	6
4-5	8
4-6	12
5-8	7
6-8	9
6-9	15
7-9	12
8-9	6

- 6 a) Use Dijkstra's algorithm on the network below to find the shortest path from A to H. (8)



- b) Solve the following game using graphical method. (7)

$$\begin{bmatrix} 1 & 3 \\ 3 & 1 \\ 5 & -1 \\ 6 & -6 \end{bmatrix}$$

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Use Fibonacci search method to find the minimum of the function $f(x) = x^2 + \frac{54}{x}$ in the interval (0,5) with 6 step. (10)
- b) Minimize $f(x) = 2x_1^2 + x_2^2$ in two iterations starting from the point (1,2) using steepest (10)

descent method.

- 8 a) Draw the flow chart of Genetic algorithm and explain different stages associated with it. (10)
b) Define the following terms (i) Cross over (ii) Mutation (ii) Reproduction. (10)
- 9 a) Perform in two iterations to minimise $f(X) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ using (10)
Hooke-Jeeve's method starting from the point (0,0). Take $\Delta x_1 = \Delta x_2 = 0.8$.
b) Explain the advantages of testing function and mutation in Genetic algorithm. (10)
