1212-16-505-001

Code No: 3372/CORE

FACULTY OF SCIENCE

M.Sc. IV Semester Examination, 2018

Subject: Mathematics

Paper – IV (C) Advanced Operation Research

Time: 3 Hours **Max. Marks: 80**

Note: Answer all questions from Part A and Part B. Each question carries 4 marks in Part – A and 12 marks in Part – B.

PART – A (8x4=32 Marks)
(Short Answer Type)

1. Explain Maximin and MiniMax principles.
2. Define a saddle point. Explain with an example.
3. Explain the terms Salvage value and shortage costs.
4. Explain ABC analysis.
5. Define a General Non-linear programming problem.
6. Obtain the necessary conditions for the non-linear programming problem: Maximize $Z = x_1^2+3x_2^2+5x_3^2$ STC. $x_1+x_2+3x_3 = 2$, $5x_1+2x_2+x_3 = 5$; $x_1, x_2, x_3 \geq 0$
7. Define a General Quadratic Programming Problem.
8. State the applications of Non-linear programming problem.

PART – B (4x12=48 Marks)
(Essay Answer Type)

9. (a) The pay off matrix of a game is given below. Find the best strategy for each player and the value of a play of the game to A and B.

		Player B				
		B_1	B_2	B_3	B_4	B_5
Player A	A_1	9	3	1	8	0
	A_2	6	5	4	6	7
	A_3	2	4	3	3	8
	A_4	5	6	2	2	1

(b) Show that the value of the game is $V = \frac{a_{11}a_{22}-a_{21}a_{12}}{a_{11}+a_{22})-(a_{12}+a_{21})}$ for any 2x2 game without saddle point having pay off matrix from AtoB is $((a_{ij}))_{2x2}$.

OR

c) Solve the following 5x2 game graphically:

		B_1	B_2
Player A	A_1	-2	5
	A_2	-5	3
	A_3	0	-2
	A_4	-3	0
	A_5	1	-4

Contd...2...

10.(a)(i) A commodity is to be supplied at a constant rate of 200 unit per day. Supplies of any amounts can be had at any required time, but each ordering costs Rs.50, costs of holding the commodity in inventory is Rs.2/- per unit per day while the delay in the supply of the item induces a penalty of Rs.10 per unit per delay of 1 day. Find the optimal policy(q,t) where t is the re-order cycle period and q is the inventory level after re-order. What would be the best, if penalty cost becomes ?

(ii) Explain the E.O.Q system of ordering.

OR

.10.(a) Explain the steps involved in the procedure of ABC analysis.

(b) A Company purchases three items, A,B and C Their annual demand and unit prices are given in the following table.

Item	Annual Demand	Unit Price
A	1,00.000	3
B	80,000	2
C	600	96

If the company wants to place forty orders per year for all three items. What is the optimal number orders for each item?

11.(a) Solve the following non-linear programming problem graphically.

Minimize $Z = (x_1-2)^2 + (x_2-1)^2$

Subject to the constraints:

$$-x_1^2+x_2 \quad 0$$
$$-x_1-x_2+2 \quad 0$$
$$x_1, x_2 \quad 0$$

b) Use Kuhn-Tucker conditions to solve the non linear programming problem.

Maximize $z = -x_1^2 - x_2^2 - x_3^2 + 4x_1 + 6x_2$

Subject to the constraints

$$x_1+x_2 \leq 2$$
$$2x_1+3x_2 \leq 12$$
$$x_1, x_2 \geq 0$$

12 a) Use wolfs method to solve the QPP

Minimize $Z = x_1^2+x_2^2+x_3^2$

Subject to the constraints

$$2x_1+x_2-x_3 \leq 0$$
$$x_1 \geq 1$$
$$x_2 \geq 1$$

OR

b) Use Beal's method to solve the QPP

Maximize $Z = 2x_1+3x_2-x_1^2$

Subject to the constraints

$$x_1 + 4x_2 \leq 4$$
$$x_2 + x_2 \leq 2$$
$$x_1 , x_2 \geq 0$$

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