Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Second Semester MBA Degree Regular and Supplementary Examination June 2023

Course Code: 20MBA110

Course Name: OPERATIONS RESEARCH

Max. Marks: 60 Duration: 3 Hours

PART A

Answer all questions. Each question carries 2 marks Marks

1 Briefly explain sensitivity analysis in OR (2)

2 Elucidate IBFS in Transportation Problems. (2)

3 Explain the Kendall Lee notation (2)

4 Interpret the term 'service level' in inventory management (2)

5 What is Saddle Point in game theory? (2)

PART B

Answer any 3 questions. Each question carries 10 marks

6 Maximize the objective function $Z = 4x + 3y$ (10)

subject to the constraints:

$2x + y \leq 10$

$x + 2y \leq 8$

$x, y \geq 0$

7 A company has 4 job positions (A, B, C, D) and 4 employees (W, X, Y, Z) available to fill those positions. The table below shows the cost of assigning each employee to each job: (10)

	A	B	C	D
W	9	5	3	8
X	7	6	2	4
Y	3	8	6	5
Z	4	7	2	3

Assign employees to the jobs in such a way that the total cost is minimized.

8 A retailer purchases mangoes every morning at ₹ 60 a dozen and sells at ₹ 90 a dozen. Any mango unsold at the end of the day can be disposed on the next day (10)

at a salvage value of ₹ 30 per dozen (thereafter they have no value). Past sales have ranged from 15 to 18 dozens per day. The following is the record of sales for the past 120 days.

Dozens sold: 15 16 17 18

No of days : 12 24 48 36

Find out how many dozens should the retailer purchase per day in order to maximize the profit.

9 A firm has a machine whose purchase price is ₹ 100000. Its running cost and resale price at the end of different years are as follows: (10)

Year	1	2	3	4	5	6
Running cost (₹)	7500	8500	10000	12500	17500	27500
Resale Price (₹)	85000	76500	70000	60000	40000	15000

Obtain the economic life of the machine and the minimum average cost.

10 Two cereal manufacturers are competing for an increased market share. The pay -off matrix, shown in the table describes the increase in market share for Crunch Masters and decrease in market share for Cereal Savvy. (10)

Crunch Masters	**Cereal Savvy**			
	Give coupons	Decrease Price	Maintain status quo	Increase advertising
Give coupons	2	-2	4	1
Decrease Price	6	1	12	3
Maintain status quo	-3	2	0	6
Increase advertising	2	-3	7	1

Determine the optimal strategies for both the manufacturers and the value of the game.

PART C

Compulsory question carrying 20 marks

11 a. A steel company has three open hearth furnaces and five rolling mills. The transportation costs (₹ per quintal) for shipping steel from furnaces to rolling mills are given in the following table: (10)

	M1	M2	M3	M4	M5	Supply
F1	20	10	15	10	30	80
F2	25	20	25	10	5	120
F3	30	25	20	35	35	140
Demand	40	40	60	80	80	

What is the optimal shipping schedule?

11 b A construction project has the following activities with their respective durations and dependencies: (10)

Activity	**Precedence**	**Duration (Weeks)**
A	None	3
B	None	4
C	A	2
D	A	5
E	B,C	2
F	D,E	3

Find the critical path, project duration, total float, free float and independent float.

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