Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Second Semester MBA Degree Regular and Supplementary Examination June 2024

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 Elucidate the concept of duality in OR (2)

2 Briefly explain Unbalanced Assignment Problem and how to overcome it. (2)

3 Interpret "Decision Tree". (2)

4 Discuss the concept of economic life in the context of replacement analysis. (2)

5 What is a two-person zero sum game? (2)

PART B

Answer any 3 questions. Each question carries 10 marks

6 A small-time toy manufacturer manufactures two types of toys, Luna and Max. Both are processed in two machines A & B. Luna takes 2 hours in A and 1 hour in B, whereas Max takes 1 hour in A and 3 hours in B. 80 hours are available in A weekly and 90 hours are available in B weekly. The profit earned per Luna and Max are ₹ 10 and ₹ 15 respectively. Formulate the problem as an LPP and solve it. (10)

7 A toy manufacturing company has three factories located in different cities, and they need to transport their products to four distribution centers in various locations. The transportation costs per unit (in rupees) from each factory to each distribution center are as follows: (10)

Factory/Distribution Center	DC1	DC2	DC3	DC4
F1	10	15	20	12
F2	8	14	18	11
F3	11	13	16	14

The demand (in units) at each distribution center and the supply (in units) at each factory are as follows:

- Demand at DC1: 30 units
- Demand at DC2: 25 units
- Demand at DC3: 35 units
- Demand at DC4: 20 units
- Supply at F1: 40 units
- Supply at F2: 30 units
- Supply at F3: 50 units

Find the optimal transportation plan that minimizes the total transportation cost.

8 a. Discuss the different decision making environments. (5)

b. Discuss briefly the basic assumptions of a queuing model. (5)

9 A retail store wants to determine the optimal order quantity for a popular product. The store sells an average of 100 units of this product per week. The cost to place an order is ₹50, and the annual holding cost per unit is ₹5. The store operates for 52 weeks in a year. Determine the optimal order quantity and the associated total ordering cost, total holding cost and the total annual cost. (10)

10 The following table lists the jobs of a project along with their time estimates in days. (10)

Job	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
To	3	2	6	2	5	3	3	1	4
Tm	6	5	12	5	11	6	9	4	19
Tp	15	14	30	8	17	15	27	7	28

a) Draw the project network

b) Calculate the length and variance of the critical path

c) What is the approximate probability that the project will be completed in (i) 40 days (ii) 35 days

d) Find the duration which has 95% chance to meet.

PART C

Compulsory question carrying 20 marks

11 a. Five different machines can do any one of the five required jobs with different profits resulting from each assignment as shown below. Find out maximum profit possible through optimum assignment. (10)

Job/Machine	A	B	C	D	E
1	30	37	40	28	40
2	40	24	27	21	36
3	40	32	33	30	35
4	25	38	40	36	36
5	29	62	41	34	39

11 b. Solve the following game graphically. (10)

PLAYER A	**PLAYER B**					
	B1	B2	B3	B4	B5	B6
A1	2	-1	3	5	-2	6
A2	-2	4	-1	-3	1	0

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