Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Trimester MBA Degree Examination July 2021

Course Code: 36
Course Name: OPERATIONS RESEARCH

Max. Marks: 60 Duration: 3 Hours

PART A

Answer all questions. Each question carries 2 marks Marks

1 "Model building is the essence of operations research approach". Elucidate. (2)

2 Differentiate between slack variable and surplus variable. (2)

3 What is degeneracy in a transportation problem? (2)

4 What is a dummy activity and its purpose? (2)

5 "In the modern competitive world, replacement of equipment has emerged as a complex problem". Give any four reasons for replacement of equipment. (2)

PART B

Answer any 3 questions. Each question carries 10 marks

6 A firm makes two products A &B and has a total production capacity of 12 tonnes per day, A & B requiring the same production capacity. The firm has a permanent contract to supply at least 3 tonnes of A and at least 4 tonnes of B per day to another firm. Each tonne of A requires 25 machine hours of production time and each tonne of B requires 50 machine hours of production time. The daily possible number of machine hours is 500 hours. All the firms' output can be sold, and the profit made is Rs. 100 per tonne of A and Rs. 150 per tonne of B. Formulate this as an LPP and find the optimum solution. (10)

7 (a) Write short notes on Duality in LPP (4)

(b) Solve the following game (6)

		Y	
		1	**2**
X	**1**	7	10
	2	9	5

8 A software company has got four expert teams of programmers. The company needs four application programmes to be developed. The head of the software company, after studying carefully the programmes to be developed, estimated the computer time in minutes required by the respective teams to develop the application programs as follows. (10)

		PROGRAMS			
		A	B	C	D
TEAMS	1	120	100	80	90
	2	80	90	110	70
	3	110	140	120	100
	4	90	90	80	90

How the assignment of programs to the teams should be done so as to minimize the total time taken for development and find the optimum assignment cost?

9 The following table shows the activities of a project and their optimistic, pessimistic and the most likely times in days. Develop a network diagram for the project activities. Calculate the probability of finishing the project in (1) 31 days, (2) 35 days (3) What duration will have 95% confidence for project completion? (10)

Activities	1-2	1-3	2-4	3-5	4-5	4-6	5-6
To	3	7	5	10	4	4	6
Tm	6	10	8	13	6	5	6
Tp	9	19	11	22	14	6	18

10 A self-service store has one cashier at the counter. Nine customers arrive on an average every 5 minutes and the cashier can service 10 customers in that time. Find the average number of customers in the system. What is the probability that a customer arriving at the counter has to wait? The store will install a second counter if a customer has to wait on an average 12 minutes. By how much the arrival of customers be increased in order to justify a second counter? (10)

PART C

Compulsory question carrying 20 marks

11 a) A company has four plants with capacities 40, 30, 20 and 10 units respectively to meet the demands of 5 warehouses, 30, 30, 15, 20 and 5 units respectively. Given the following per unit cost of transportation, find the optimum plan. (10)

	W1	W2	W3	W4	W5
P1	7	6	5	4	9
P2	8	5	6	7	8
P3	6	8	9	6	5
P4	5	7	7	8	6

b) A retailer of refrigerator has estimated the following distribution of its demand for a season. (10)

Demand	10	11	12	13	14	15	16
Probability	0.14	0.27	0.27	0.18	0.09	0.04	0.01

Each refrigerator costs him Rs.7000 and he sells it for Rs.10000 each. Any refrigerator unsold at the end of the season must be disposed of for Rs.6000 each. How many refrigerators should be stocked so as to maximize his expected profit?

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