Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Second Semester MBA Degree Examination June 2022 (2020 scheme)

Course Code: 20MBA110

Course Name: OPERATIONS RESEARCH

Max. Marks: 60 Duration: 3 Hours

PART A

Answer all questions. Each question carries 2 marks

1 What are the optimal and feasible solutions in LPP?

2 How will you convert an unbalanced transportation problem to a balanced one?

3 What is the procedure for determining Maximin criteria?

4 State the concept of deterministic inventory model.

5 Solve the game whose pay-off matrix is given by

Player B

		B1	B2	B3
Player A	A1	1	3	1
	A2	0	−4	−3
	A3	1	5	−1

(5 X 2marks = 10 marks)

PART B

Answer any 3 questions. Each question carries 10 marks

6 Solve the LPP using Simplex method

Maximize $z = 4x_1 + 10x_2$

Subject to

$2x_1 + x_2 \le 50$

$2x_1 + 5x_2 \le 100$

$2x_1 + 3x_2 \le 90$

$x_1, x_2 \ge 0$

7   For the given data find an optimum assignment of jobs to the machines to minimize the total processing time.

Jobs	Machines				
	A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	6

8   A bank has decided to open a single server drive-in banking facility at its main branch office. It is estimated that 20 customers arrive each hour on an average. The time required to serve a customer is 3 minutes on an average. Assume that arrivals follow a Poisson distribution, and the service rate follows an exponential probability distribution.

The bank manager is interested in knowing the following:

   (a) What will be the average waiting time of a customer to get the service?

   (b) The proportion of time that the system will be idle.

   (c) The space required to accommodate all the arrivals, on an average, the space taken by each customer is 10 feet, that is waiting for service.

9   The annual requirement for a product is 3000 units. The ordering cost is Rs. 100 per order. The cost per unit is Rs. 10. The carrying cost per unit per year is 30% of the unit cost. i) Find EOQ. By using better organizational methods, the ordering cost per order can be brought down to Rs. 80 per order, but the same quantity as determined above has to be ordered. ii) if a new EOQ is found by using the ordering cost as Rs. 80 what would be the further savings in cost?

10   The following table shows the jobs of a network along with their time estimates

Job	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
t_0	1	2	2	2	7	5	5	3	8
t_m	7	5	14	5	10	5	8	3	17
t_p	13	14	26	8	19	17	29	9	32

Draw the project network, find the project duration and find the probability of the project completing in 40 days.

(3 X 10 marks= 30 marks)

PART C
Compulsory question carrying 20 marks

11 a) A factory manufactures two products A and B. To manufacture one unit of A, 1.5 machine hours and 2.5 labour hours are required. To manufacture product B, 2.5 machine hours and 1.5 labour hours are required. In a month, 300 machine hours and 240 labour hours are available. Profit per unit for A is Rs. 50 and for B is Rs. 40. Formulate and solve graphically. (10 marks)

b) A machine owner finds from his past records that the costs per year of maintaining a machine, whose purchase price is Rs. 6000 are as given below.

Year	1	2	3	4	5	6	7	8
Maintenance cost	1000	1200	1400	1800	2300	2800	3400	4000
Resale value	3000	1500	750	375	200	200	200	200

Determine at what age a replacement is due. (10 marks)

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