Reg No.:_____ Name:_____

0720MBA110102104

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Second Semester MBA Degree Examination September 2021 (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 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 as LPP.

2 How do you balance an assignment problem?

3 Mention different decision-making environments.

4 List out the causes of back order.

5 What is critical activity?

(2X5 Marks=10 marks)

PART B

Answer any 3 questions. Each question carries 10 marks

6 Use Simplex method to solve the following LPP

Maximize $z = 5x_1 + 3x_2$

Subject to

$$x_1 + x_2 \leq 2$$

$$5x_1 + 2x_2 \leq 10$$

$$3x_1 + 8x_2 \leq 12$$

$$x_1, x_2 \geq 0$$

7 Solve the following assignment problem in order to minimize the total cost. The cost matrix given below gives the assignment cost when different operators are assigned to various machines.

Operators

Machines	I	II	III	IV	V
A	30	25	33	35	36
B	23	29	38	23	26
C	30	27	22	22	22
D	25	31	29	27	32
E	27	29	30	24	32

8 Arrivals at a telephone booth are considered to be Poisson distributed with an average time of 10 minutes between one arrival and the next. The length of phone call is assumed to be distributed exponentially, with mean 3 minutes.

i) What is the probability that a person arriving at the booth will have to wait?
ii) The telephone department will install a second booth when convinced that an arrival would expect waiting for at least 3 minutes for phone call. By how much should the flow of arrivals increase in order to justify a second booth?
iii) What is the average length of the queue that forms from time to time?
iv) What is the probability that it will take him more than 10 minutes altogether to wait for the phone and complete his call?

9 The annual demand of an item is 3,200 units. The unit cost is Rs. 6 and inventory carrying charges are 25 per cent per annum. If the cost of one procurement is Rs. 150 determine the following:

i) EOQ
ii) Number of orders per year.
iii) Time between two consecutive orders.
iv) The optimal cost.

10 A project schedule has the following characteristics

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Time (days)	4	1	1	1	6	5	4	8	1	2	5	7

From the above information you are required to

i) Construct a network diagram.
ii) Compute the earliest event time and latest event time.
iii) Determine the critical path and total project duration.

Compute total and free float for each activity.

(3X10 marks=30 Marks)

PART C

Compulsory question carrying 20 marks

11 a) What do you mean by modelling in operations research? Explain different classifications of OR models. (10 Marks)

b) Find the initial basic feasible solution to the following transportation problem using Vogel's approximation method.

		Destination				
		D1	D2	D3	D4	Supply
Origin	O1	11	13	17	14	250
	O2	16	18	14	10	300
	O3	21	24	13	10	400
	Demand	200	225	275	250	950

(10 marks)

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