Printed Pages: 02 **Sub Code: KMB206**

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MBA

(SEM II) THEORY EXAMINATION 2022-23

QUANTITATIVE TECHNIQUES IN MANAGEMENT

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

(a) What is meant by Operations Research?
(b) What is Linear Programming Problem?
(c) What is meant by Duality?
(d) Define Transportation Problem.
(e) What is meant by Assignment Problem?
(f) What do you mean by Game Theory?
(g) DefineSequencing Problem.
(h) What is Queuing Theory?
(i) What do you mean by Replacement Problem?
(j) State about Project Management.

SECTION B

2. Attempt any *three* of the following:

(a) Discuss the Scope of Operations Research.
(b) Explain the North-West Corner Rule with steps.
(c) Write down the algorithm for solution of an Assignment Problem.
(d) Write short note on Johnsons Algorithm for "n jobs through 2 machines".
(e) How the theory of replacement is used in the replacement of items whose maintenance cost varies with time? Explain.

SECTION C

3. Attempt any *one* part of the following: **10x1=10**

(a) Using Simplex Algorithm solve the problem.

Max Z = $2x_1 + 5x_2 + 7x_3$

Subject to

$3x_1 + 2x_2 + 4x_3 \le 100$

$x_1 + 4x_2 + 2x_3 \le 100$

$x_1 + x_2 + 3x_3 \le 100$

Where $x_1, x_2, x_3 \ge 0$

(b) Find out the optimum solution for the following transportation problem:-

	I	**II**	**III**	**IV**	**V**	**Supply (a_i)**
I	5	9	6	6	3	8
II	4	7	7	6	5	5
III	8	4	6	6	4	9
Demand (b_j)	4	4	5	4	8	

4. Attempt any *one* part of the following: 10x1=10

(a) Discuss the Limitations of Operations Research.

(b) Explain the Historical Background of Operations Research.

5. Attempt any *one* part of the following: 10x1=10

(a) XYZ company is facing with the problem of assigning 4 machines to 6 different jobs (one machine to one job only). The profits are estimated as follows:-

		Machines			
		1	**2**	**3**	**4**
Jobs	**A**	3	6	2	6
	B	7	1	4	4
	C	3	8	5	8
	D	6	4	3	7
	E	5	2	4	3
	F	5	7	6	4

Solve the problem to maximize the profit.

(b) Solve the game whose pay-off matrix is

		Player B			
		I	**II**	**III**	**IV**
Player A	**I**	3	2	0	-1
	II	2	0	4	3

6. Attempt any *one* part of the following: 10x1=10

(a) There are five jobs each of which must go through the two machine A and B in the order AB. Processing time are given below:-

Job	**1**	**2**	**3**	**4**	**5**
Machine A	10	2	18	6	20
Machine B	4	12	14	16	8

Determine a sequence for five jobs that will minimize the total elapsed time. Calculate the total elapsed time.

(b) In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that inner-arrival time follows an exponential distribution and the serve time distribution is also exponential with an average 36 minutes. Calculate the following:
(i). The mean queue size (line length), and
(ii). The probability that the queue size exceeds 10.

7. Attempt any *one* part of the following: 10x1=10

(a) A firm is considering when to replace its machine whose price is Rs. 12,200. The scrap value of the machine is Rs. 200 only. From past experience the machine costs of the machine are as under:

Year	1	2	3	4	5	6	7	8
Maintenance Cost in Rs.	200	500	800	1200	1800	2500	3200	4000

Examine, when the new machine should be purchased?

(b) The following table shows the jobs of a network along with their time estimates:

Jobs	**1-2**	**1-6**	**2-3**	**2-4**	**3-5**	**4-5**	**6-7**	**5-8**	**7-8**
t_0 (days)	1	2	2	2	7	5	5	3	8
t_m (days)	7	5	14	5	10	5	8	3	17
t_p (days)	13	14	26	8	19	17	29	9	32

Draw the project network and find the probability of the project completing in 40 days.
[Given : $\phi\,(0 \cdot 8) = 0 \cdot 2881$]

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