Roll No: | | | | | | | | | | | | |

MBA
(SEM II) THEORY EXAMINATION 2021-22
QUANTITATIVE TECHNIQUES FOR MANAGERS

Time: 3 Hours   *Total Marks: 100*
Notes:
- *Attempt all Sections and Assume any missing data.*
- *Appropriate marks are allotted to each question, answer accordingly.*

SECTION-A	Attempt **All** of the following Questions in brief	Marks(10X2=20)	CO
Q1(a)	What do you mean by Operations Research?		
Q1(b)	What do you mean by states of nature?		
Q1(c)	What is duality?		
Q1(d)	What is Basic Feasible Solution of m × n transportation problem?		
Q1(e)	What do you mean by Unbalanced Assignment Problem?		
Q1(f)	What do you understand by Two Person Zero Sum Game?		
Q1(g)	In a sequencing problem, what is the meaning of total elapsed time?		
Q1(h)	What do you mean by Queue Discipline?		
Q1(i)	What do you mean by Gradual Failure and Sudden failure?		
Q1(j)	What is critical path in a network?		

SECTION-B	Attempt **ANY ONE** of the following :	Marks(2X15=30)	CO
Q2(a)	i) Solve the following LPP. $\text{Max } Z = 2x_1 + 5x_2 + 7x_3$ Subject to $3x_1 + 2x_2 + 4x_3 \leq 100$ $x_1 + 4x_2 + 2x_3 \leq 100$ $x_1 + x_2 + 3x_3 \leq 100$ Where $x_1, x_2, x_3 \geq 0$		

ii) A company is faced with the problem of assigning five jobs to five machines; each job must be done on only one machine, the cost of processing each job on each machine is given below (in Rs.) Find out the optimal assignments.

		Machines				
		M₁	M₂	M₃	M₄	M₅
Jobs	J₁	7	5	9	8	11
	J₂	9	12	7	11	10
	J₃	8	5	4	6	9
	J₄	7	3	6	9	5
	J₅	4	6	7	5	11

Q2(b)	Phrase of the particular case (Example for Questions related with given phase in Sub Parts) i) A Company has four plants P₁, P₂, P₃, P₄, from which it supplies to three markets M₁, M₂, M₃. Determine the optional transportation plan from the following data, given the plant to market shifting costs, quantities available at each plant and quantities required at each market.		

Market	Plant	Required at

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	P_1	P_2	P_3	P_4	Market
M_1	19	14	23	11	11
M_2	15	16	12	21	13
M_3	30	25	16	39	19
Available at plant	6	10	12	15	43

ii) A truck owner finds from his past records that the maintenance cost of a truck (whose purchase price is Rs. 3,00,000) during the first 8 years of its life and the resale price at the end of each year, is as follows :

Year	1	2	3	4	5	6	7	8
Maintenance Cost (Rs.)	36,000	48,000	60,000	72,000	84,000	96,000	1,08,000	1,20,000
Re-Sale Price (Rs.)	2,00,000	1,50,000	1,00,000	80,000	70,000	60,000	50,000	40,000

Find the optimum replacement period of the truck.

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	**CO**
Q3(a)	Discuss briefly the importance of Operations Research in decision making.		
Q3(b)	A shop keeper prepares a food at a total cost of Rs. 4 per plate and sells it at a price of Rs. 6. The food is prepared in the morning and is sold during the same day. Unsold food during the same day is spoiled and is to be thrown away. According to the past sales, number of plates is not less than 20 or greater than 23. You are to formulate the (i) pay off table (ii) loss table.		

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	**CO**
Q4(a)	Vitamin A and B found in foods F_1 and F_2. One unit of food F_1 contains 3 units of vitamin A and 4 units of Vitamin B. One unit of food F_1 and F_2 cost Rs. 4 and Rs. 5 respectively. The minimum daily need per person of vitamin A and B is 80 and 100 units respectively. Assuming that anything in excess of daily minimum requirement is not harmful, find out the optimum mixture of F_1 and F_2 at the minimum cost which meets the minimum requirement of vitamin A and B.		
Q4(b)	Explain the method used for solving a transportation problem & testing its optimality.		

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	**CO**
Q5(a)	Discuss briefly the Hungarian method of solving an assignment problem.		
Q5(b)	Solve the following game whose pay off matrix is as below:		

Player B

		I	II	III	IV
Player A	I	20	15	12	35
	II	25	14	8	10

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		III	40	2	10	5	
		IV	-5	4	11	0	

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	**CO**
Q6(a)	A certain manufacturers has to process 6 items through stages of production viz., assembling and polishing. The time taken for each of these items at different stages of production are given below. Find the optimal sequence so as to minimize the total processing time. Also calculate the total elapsed time.		

Item	1	2	3	4	5	6
Assembling	8	10	6	7	9	14
Polishing	5	9	10	8	12	8

Q6(b)	What do you mean by a queue? Give an example and explain the basic elements of queue.		

SECTION-C	Attempt **ANY ONE** following Question	Marks **(1X10=10)**	**CO**
Q7(a)	Why does the problem of replacement arises? What is individual & group replacement?		
Q7(b)	The time estimates (in weeks) for the activities a PERT network are given below:		

Activity	Optimistic time (t_0)	Most likely time (t_m)	Pessimistic time t_p
1—2	1	1	7
1—3	1	4	7
1—4	2	2	8
2—5	1	1	1
3—5	2	5	14
4—6	2	5	8
5—6	3	6	15

(i) Draw the project network.
(ii) Determine the expected project duration.