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MBA 2nd Semester Examination

Quantitative Methods and Operations Research (N.S.)

MBA-201

Time : 3 Hours **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) Attempt all parts of question in Section-A. Each question carries 2 marks.

(ii) Attempt any four questions from Section-B. Each question carries 5 marks.

(iii) Attempt any two questions from Section-C. Each question carries 10 marks.

SECTION - A (Do all parts)

1. (i) Explain the dominance principles used in the reduction of order of pay-off matrix of a game.

(ii) What is an artificial variable and why should it be introduced into a solution?

(iii) What is the difference between PERT and CPM?

(iv) In what kind of situations is queuing analysis most appropriate?

(v) List down the important characteristics of Economic order quantity model.

(vi) What do you mean by Zero-sum game?

(vii) Take a linear programming problem example and write its dual problem.

(viii) What do you mean by an unbalanced Transportation problem? How do you convert the unbalanced transportation problem into a balanced one?

(ix) Solve the following two person zero sum game

$$\begin{pmatrix} 1 & 7 & 3 & 4 \\ 5 & 6 & 4 & 5 \\ 7 & 2 & 0 & 3 \end{pmatrix}$$

(x) Define the term operations research and give its characteristic features.

SECTION - B (Do any four questions)

2. Discuss about various criteria of decision making under uncertainity.

3. The maintenance cost and resale value per year of a machine whose purchase price is Rs. 7,000 is given below.

Year	1	2	3	4	5	6	7	8
Maintenance cost in Rs.	900	1,200	1,600	2,100	2,800	3,700	4,700	5,900
Resale value in Rs.	4,000	2,000	1,200	600	500	400	400	400

When should the machine be replaced?

4. What are decision trees? How and in what type of situations are they employed for decision making?

5. The owner of a small machine shop has four machinists available to assign jobs for the day. Five jobs are offered with the expected profit (in Rs) for each machinist on each job as follows.

Jobs

Machines	A	B	C	D	E
M1	12	28	0	51	32
M2	12	34	11	23	9
M3	37	42	61	21	31
M4	0	14	37	27	30

Assign machinist to jobs which results in overall maximum profit.

6. Solve the game graphically

		Player B			
		I	II	III	IV
Player A	I	8	5	–7	9
	II	–6	6	4	–2

7. Solve the following by graphical method

Maximize $z = 3x_1 + 2x_2$

Subject to $x_1 - x_2 < = 2$

$x_1 + x_2 <= 4$ where $x_1 >= 0$, $x_2 >= 0$

SECTION - C (Do any two questions)

8. A project consists of seven activities and the time estimates of the activities are furnished as under:

Activity	Optimistic Days	Most likely Days	Pessimistic Days
1-2	4	10	16
1-3	3	6	9
1-4	4	7	16
2-5	5	5	5
3-5	8	11	32
4-6	4	10	16
5-6	2	5	8

(a) Draw the network diagram

(b) Identify the critical path and its duration

(c) What is the probability that the project will be completed in 5 days earlier than the critical path duration.

9. Use Big M method to Maximize $Z = 3x_1 - x_2$

subject to constraints $2x_1 + x_2 >= 2$

$x_1 + 3x_2 <= 3$

$x_2 <= 4$ where $x_1, x_2 >= 0$

10. A company is spending Rs. 1,000 on transportation of its units from three plants to four distribution centers. The supply and demand of units with unity cost of transportations are given as:

	Distribution center				
	DI	DII	DII	DIV	Availability
P1	19	30	50	12	7
P2	70	30	40	60	10
P3	40	10	60	20	18
Requirements	5	8	7	1	5

Solve it by VAM and NWCM.

11. Explain the different types of models used in Operations research.