



II Semester M.B.A. (Day) Degree Examination, June 2008
(2007-08 Scheme)

2.6 : QUANTITATIVE METHODS AND OPERATIONS RESEARCH

Time: 3 Hours

Max. Marks : 75

SECTION - A

Answer any six questions. Each question carries two marks. (6×2=12)

1. a) Define an OR model.
- b) What is feasibility region ?
- c) What is the difference between pure strategy and mixed strategy ?
- d) What is degeneracy ? How does the problem of degeneracy arise in a transportation problem ?
- e) What is an unbalanced assignment problem ?
- f) Explain free and independent floats.
- g) Discuss the assumptions underlying the EOQ formula.
- h) Define saddle point in game theory.

SECTION - B

Answer any three questions. Each question carries 8 marks. (3×8=24)

2. A company has four sales representatives who are to be assigned to four sales territories. The monthly sales increase estimated for each sales representative for different sales territories (in lakhs of rupees) are shown below :

Sales Representatives	Sales Territories			
	1	2	3	4
A	200	150	170	220
B	160	120	150	140
C	190	195	190	200
D	180	175	160	190

Suggest optimal assignment and the total maximum sales increase per month.

3. A factory requires 1500 units of an item per month, each costing Rs. 27. The cost per order is Rs. 150 and the inventory carrying charges work out to 20% of the average inventory. Find out the EOQ and the number of orders per year.

Would you accept a 2% price discount on a minimum supply quantity of 1200 units? Compare the total cost in both the cases.

4. For a machine the following data are available :

Year	0	1	2	3	4	5	6
Cost of spares (Rs.)	–	200	400	700	1000	1400	1600
Salary of maintenance staff (Rs.)	–	1200	1200	1400	1600	2000	2600
Losses due to breakdown (Rs.)	–	600	800	700	1000	1200	1600
Resale value (Rs.)	12,000	6,000	3,000	1,500	800	400	400

Determine the optimum period for replacement of the above machine.

5. Find the sequence and total elapsed time required in performing the following jobs on three machines in the order ABC. Processing times (in hrs) are given in the following table

Job		1	2	3	4	5
Machine	A	8	10	6	7	11
	B	5	6	2	3	4
	C	4	9	8	6	5

6. Bakery keeps stock of a popular brand of cake. Previous experience indicates the daily demand as given here.

Daily Demand 0 10 20 30 40 50

Probability 0.01 0.20 0.15 0.50 0.12 0.02

Consider the following sequence of random members

48, 78, 19, 51, 56, 77, 15, 14, 68, 09

Using this sequence stimulate the demand for the next 10 days. Find out the stock situation if the owner of the bakery decides to make 30 cakes every day. Also estimate the daily average demand for the cakes on the basis of simulated data.



SECTION - C

(2×12=24)

Answer any two questions. Each question carries 12 marks.

7. Define Operation Research. What are the important techniques used in Operation Research ? Explain their limitations.

8. Solve the LPP by Simplex Method

$$\text{Maximize } z = 3x_1 + 5x_2 + 4x_3$$

$$\text{S.t. } 2x_1 + 3x_2 \leq 8$$

$$2x_2 + 5x_3 \leq 10$$

$$3x_1 + 2x_2 + 4x_3 \leq 15$$

$$\text{and } x_1, x_2, x_3 \geq 0.$$

9. A manufacturer wants to ship 22 loads of his product as shown below. The matrix gives the kilometers from sources of supply to the destinations

		Destination					Supply
		D ₁	D ₂	D ₃	D ₄	D ₅	
Source	S ₁	5	8	6	6	3	8
	S ₂	4	7	7	6	5	5
	S ₃	8	4	6	6	4	9
Demand		4	4	5	4	8	

Shipping cost is Rs. 10 per load per km. What shipping schedule should be used to minimize total transportation cost ?



SECTION - D
(Compulsory)

10. Case Study

(1×15=15)

A project consists of the following activity and different time estimates (in days)

Activity	Optimistic time (t_o)	Pessimistic time (t_p)	Most likely time (t_m)
1-2	3	15	6
1-3	2	14	5
1-4	6	30	12
2-5	2	8	5
2-6	5	17	11
3-6	3	15	6
4-7	3	27	9
5-7	1	7	4
6-7	2	8	5

- Draw a network.
 - Determine the CP and their variances.
 - Find the earliest and latest expected times to reach each node.
 - What is the probability that the project will be completed by 27th day ?
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