

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 7113

Roll No.

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M.B.A.

(SEMESTER-II) THEORY EXAMINATION, 2011-12

OPERATIONS RESEARCH

Time : 3 Hours]

[Total Marks : 100

Note : Attempt questions from **all** Sections as directed.

Section – A

1. Answer the following : **10 × 2 = 20**
- “Operations Research is no more than a quantitative analysis of the problem.” Explain.
 - Discuss the scope of Operations Research.
 - Describe the necessity of Operations Research in industry.
 - Outline the steps involved in the simplex method for solving a linear programming maximization problem.
 - What is Game Theory ? State the assumptions underlying it.
 - How do you use Gantt Chart for solving sequencing problem ? Why is it not employed for solving larger problems ?
 - “Dual of a dual is its primal.” Explain.
 - Degeneracy in a transportation problem.
 - Write a lucid note on replacement problem.
 - Characteristics of M/M/1 queue model.

Section – B

2. Attempt any **three** of the following : **3 × 10 = 30**
- “Operations Research is inter-disciplinary in nature and require a team approach for the solution of a problem.” How far is this statement correct ?
 - “Linear Programming is one of the most frequently and successfully used operations research technique to managerial and business decisions.” Elucidate this statement with some examples.
 - What is an Assignment Problem ? Is it true to say that it is a special case of the transportation problem ? Explain with example.
 - What are the basic characteristics of a ‘Queue System’ ? Explain in brief, the important assumptions of a Queue Model.
 - “There are two basic planning and controlling techniques used in the Network Scheduling – PERT and CPM.” Explain briefly.

Section – C

5 × 10 = 50

Attempt following :

3. Solve the following LPP :

Minimize $Z = 12x + 3y$

Subject to $4x + 6y \geq 24,000$

$x + y \geq 5,000$

$8x + 2y \geq 16,000$

and $x \geq 0, y \geq 0$

OR

A wholesale company has three warehouses from which supplies are drawn for four retail customers. The company deals in a single product, the supply of which at each warehouse are :

Warehouse No.	Supply units	Customer No.	Demand units
I	20	A	15
II	28	B	19
III	17	C	13
		D	18

Conveniently, total supply at the warehouses is equal to total demand from the customers. The following table gives the transportation cost per unit shipment from each warehouse to each customer :

Warehouse	Customer			
	A	B	C	D
I	3	6	8	5
II	6	1	2	5
III	7	8	3	9

Determine, what supplies to despatch from each of the warehouses to each customer so as to minimize overall transportation cost.

4. A marketing manager wants to assign four regions to four different salesmen. Salesmen differ in their efficiency and territories also differ in potentiality. An estimated sales (in ₹ lakhs) by different salesmen in the four territories are given below :

Salesmen	Territories			
	P	Q	R	S
A	45	60	70	80
B	20	32	42	74
C	25	37	47	55
D	40	35	30	30

Determine the optimal assignment schedule for the maximization of sales.

OR

A washing machine repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come in and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 hours a day. What is repairman expected idle time each day ? How many jobs are ahead of the average set just brought in ?

5. Two competitors are competing for a similar product. The pay-off matrix, in terms of their advertising plan is given below :

Competitor A	Competitor B		
	Large Advt.	Medium Advt.	Small Advt.
Large Advt.	70	80	50
Medium Advt.	90	60	95
Small Advt.	150	90	65

Find the optimal strategies and the value of the game.

OR

The following table shows the various jobs of a network along with their time estimates :

Activity	Estimated Duration work		
	Optimistic	Most likely	Pessimistic
1 - 2	1	1	7
1 - 3	1	4	7
2 - 4	2	2	8
2 - 5	1	1	1
3 - 5	2	5	14
4 - 6	2	5	8
5 - 6	3	6	15
6 - 7	2	4	8

Draw a network diagram and determine the critical path. What is the minimum time for completion of projects.

6. A firm is considering replacement of a machine whose cost price is ₹ 12,200 and the scrap value ₹ 200. The running cost (maintenance and operating) in rupees are found from experience to be as follows :

Year	1	2	3	4	5	6	7	8
Running cost	200	500	800	1200	1800	2500	3200	4000

When should the machine be replaced ?

OR

There are six jobs which must go through two machines A and B in the order AB. Processing time in hours is given below :

Job	1	2	3	4	5	6
Machine A	8	10	11	12	16	20
Machine B	7	5	0	14	3	9

Determine the optimal sequence and the elapsed time.

7. What is the difference between decision making under risk and decision making under uncertainty ? Explain the difference between expected opportunity loss and expected value of perfect information.

OR

Sonia Limited is considering the introduction of a new product to its existing product range. It has defined two levels of sales as 'high' and 'low' on which to base its decision and has estimated the probability with which each market level will occur together and their costs and consequential profits or losses. The information is summarized as follows :

Event	Probability	Market Product (000's)	Do not market product (000's)
High sales	0.3	150	0
Low sales	0.7	- 40	0

The company's marketing manager suggests a market survey be undertaken to provide further information on which to base the decision. On past experience with a certain market research organisation, the marketing manager assesses its ability to give good information in the light of subsequent sales achievements as follows :

Market research survey outcome	When actual sales are 'high'	When actual sales are 'low'
'High' sales forecast	0.5	0.1
Indecisive report	0.3	0.4
'Low' sales forecast	0.2	0.5

The market research will cost ₹ 20,000. Draw a decision tree and determine the best strategy for the company.