

First Year MHA Degree Examinations, September 2013

PAPER VI – OPERATIONS RESEARCH

Time: 3 Hours

Max Marks: 100

- Answer all the questions
- Draw diagrams wherever necessary

Essays:

(2x20=40)

1. A pharmaceutical company has 100 kg of A, 180 kg of B and 120 kg of C ingredients available per month. Company can use materials to make three basic pharmaceutical products namely 5-10-5, 5-5-10 and 20-5-10, where the numbers in each case represent the percentage of weight A, B and C respectively in each of the products. The cost of these materials is as follows:

Ingredients	Cost per kg (in Rs)
A	80
B	20
C	50
Inert Ingredients	20

Selling price of these products are Rs 40.5, Rs 43 and 45 per kg, respectively. There is a capacity restriction of the company for the product 5-10-5, so that company should produce 30 kg per month. Determine how much of each of the products, company should produce in order to maximize its monthly profit.

2. From the following details draw a plan of ABC classification

Item	Units	Unit Cost(in Rs)
1	7,000	5.00
2	24,000	3.00
3	1,500	10.00
4	600	22.00
5	38,000	1.50
6	40,000	0.50
7	60,000	0.20
8	3,000	3.50
9	300	8.00
10	29,000	0.40
11	11,500	7.10
12	4,100	6.20

Short Essays:

(2x10=20)

3. The data collected in running a machine, the cost of which is 60,000 are given below

Year	1	2	3	4	5
Resale value (Rs)	42,000	30,000	20,400	14,400	9,650
Cost of spares (Rs)	4,000	4,270	4,880	5,700	6,800
Cost of labour (Rs)	14,000	16,000	18,000	21,000	25,000

Determine the optimum period for replacement of the machine.

4. A project consists of activities for which the relevant data are given below

Activity	Preceding activities	Duration
A	—	4
B	—	7
C	—	6
D	A,B	5
E	A,B	7
F	C,D,E	6
G	C,D,E	5

- Draw a network diagram and find project completion time.
- Calculate TF and find critical path.

Short notes:

(8x5=40)

5. Explain the dominance property and its rules in game theory

6. Explain event-type simulation

7. In a clinic patients arrive with mean rate of 30 per hour according to a Poisson input process. The time required for the doctor to treat a patient is at the rate of 90 seconds. Find the average waiting time of a patient. Also determine the average number of customers in the clinic and average queue length.

8. Use graphical method to solve the following problem

$$\text{Minimize } Z = 3x_1 + 2x_2$$

Subject to constraints

$$5x_1 + x_2 \geq 10$$

$$x_1 + x_2 \geq 3$$

and $x_1, x_2 \geq 0$

9. Explain the types of decision making environments

10. Solve the following transportation problem

	D1	D2	D3	D4	S
P1	2	3	11	7	6
P2	1	0	6	1	1
P3	5	8	15	9	10
D	7	5	3	2	

11. State and explain the factors involved in inventory analysis.

12. Explain resource leveling and resource smoothing.
