(6 pages)

MAY 2015 **P/ID 77731/MBN4D**

Time : Three hours Maximum : 100 marks

PART A — (5 × 6 = 30 marks)

Answer any FIVE out of Eight questions.

1. Explain the concept of operations Research.

2. List down and explain the major sectors applying the operations research.

3. Solve the following LPP using graphical method:

Minimize $z = 2x_1 + 3x_2$

Subject to :

$x_1 + x_2 \geq 6$
$7x_1 + x_2 \geq 14$
$x_1, x_2 \geq 0.$

4. Find the optimal solution for the following assignment problem.

		Job			
		I	II	III	IV
Workers	A	3	4	2	1
	B	5	6	3	2
	C	4	7	4	0
	D	3	1	6	4

5. Explain the concept of PERT with an example.

6. What are the limitations of CPM? Explain.

7. In a telephone booth the arrivals are the average of 10 minutes apart. A call on the average takes 3 minutes. If there is one phase, calculate the expected probability that an arrival will have to wait more than 10 minutes before the phase is free.

8. A demand for a certain item is 18,000 units per year. The holding cost per unit is Rs.1.20 per year and the cost of 1 procurement is Rs.400. No shortages are allowed :

Determine:

(a) Optimum order quantity

(b) Number of orders per annum

(c) Time between the orders

(d) Total cost per year when the cost of one unit is Re.1.

PART B — (5 × 10 = 50 marks)

Answer any FIVE out of Eight questions.

9. Discuss the methodology and scope of operation research.

10. Use simplex method to solve the following LLP:

Max $Z = 4x_1 + 10x_2$

Subject to constraints

$2x_1 + x_2 \leq 50$
$2x_1 + 5x_2 \leq 100$
$2x_1 + 3x_2 \leq 90$
$x_1 \geq 0$ and
$x_2 \geq 0$.

11. Solve the following assignment problem:

	W	X	Y	Z
A	18	24	28	32
B	8	13	17	19
C	10	15	19	22

12. List down and explain the merits and demerits of PERT and CPM.

13. A super market has two girls running up sales at the counters. If the services time for each customer is exponential with mean 4 minutes, and if people arrive is a Poisson fashion at the rate of 10 an hour.

    (a) What is the probability of having to wait for service?

    (b) What is the expected percentage of idle time for each girl?

14. Consider a self service store with one cashier. Assume Poisson arrivals and exponential service times. Suppose that nine customers arrive on the average every 5 minutes and the cashier can serve 10 in 5 minutes. Find:

(a) The average number of customers queuing for service.

(b) The probability of having more than 10 customers in the system.

(c) The probability that a customer has to queue for more than 2 minutes.

15. Define "Replacement policy of Individual and group replacement". And also write an essay on replacement model.

16. A fleet owner finds from his past records that the cost/year of running an equipment whose purchase price is Rs.6,000 are as given below.

Year:	1	2	3	4	5	6	7
Running cost (Rs.):	1,000	1,200	1,400	1,800	2,300	2,800	3,400
Resale Values (Rs.):	3,000	1,500	750	375	200	200	200

Determine at what age is replacement due?

PART C — (1 × 20 = 20 marks)

Case:

17. A Confectioner sells confectionary items, past data of demand per week (in hundred kilogram) with frequency is given below:

Demand/Week:	1	5	10	15	20	25
Frequency:	2	11	8	21	5	3

Using the following sequence of random numbers, generate the demand for the next 10 weeks. Also find the average demand per week.

35, 52, 90, 13, 23 ,73, 34, 57, 35, 83, 94, 56, 67, 66 , 60.

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