

Time : 3 Hours

Max. Marks : 100

Answer All Questions

PART – A (10 X 2 = 20 Marks)

1. State the limitations of graphical method.
2. What is sensitivity analysis?
3. How the problem of degeneracy arise in a transportation problem?
4. Define total float of an activity.
5. What is a purchasing model?
6. What are the assumptions made in a quantity discount model?
7. Explain Kendal's notation with an example.
8. When is simulation preferable?
9. What is meant by payoff matrix?
10. List few multivariable search techniques.

PART – B (16 X 5 = 80 Marks)

11. Use Big M method to solve

$$\text{Minimize } Z = 4x_1 + x_2$$

Subject to

$$\begin{aligned} 3x_1 + x_2 &= 3 \\ 4x_1 + 3x_2 &\geq 6 \\ x_1 + 2x_2 &\leq 3 \\ \text{and } x_1, x_2 &\geq 0. \end{aligned}$$

(16)

12. a. Solve the following travelling salesman problem.

		To			
		A	B	C	D
From	A	-	46	16	40
	B	41	-	50	40
	C	82	32	-	60
	D	40	40	36	-

(16)

(or)

b.i. The following table indicates the details of a project. The durations are in date. Draw the network, find the critical path and determine the expected standard deviation of the completion time:

Activities	1-2	1-3	1-4	2-4	2-5	3-5	4-5
Optimistic time	2	3	4	8	6	2	2
Most likely time	4	4	5	9	8	3	5
Pessimistic time	5	6	6	11	12	4	7

(10)

ii. Find the sequence that minimises the total elapsed time required to complete the following jobs on machines M_1 , M_2 and M_3 in the order M_1 , M_2 , M_3 .

Task	A	B	C	D	E	F
M_1	8	3	7	2	5	1
M_2	3	4	5	2	1	6
M_3	8	7	6	9	10	9

(6)

13.a. Find the optimum order quantity for a product where the annual demand for the product is 500 units, the cost of storage per unit per year is 10% of the unit cost and ordering cost per order is Rs 180.00. The unit costs are given below:

Quantity	Purchasing cost (per unit)
$0 \leq Q_1 < 500$	Rs.25.00
$500 \leq Q_2 < 1500$	Rs.24.80
$1500 \leq Q_3 < 3000$	Rs.24.60
$3000 < Q_4$	Rs.24.40

(16)

(or)

b. Consider a shop which produces three items. The items are produced in lots. The demand rate for each item is constant and can be assumed to be deterministic. No back orders are to be allowed.

The pertinent data for the items is given in the following table:

Item	1	2	3
Holding cost (Rs)	20	20	20
Set-up cost (Rs)	50	40	60
Cost per unit (Rs)	6	7	5
Yearly demand rate	10,000	12,000	7,500

Determine approximately the economic order quantity when the total value of average inventory levels of these items is Rs.1,000.

14a. Shaheen tailoring house has one tailor specialized in men's shirts. The number of customers requiring stitching of shirts appears to follow Poisson distribution with mean arrival rate of 12 per hour. Customers are attended to by the tailor on a first come first served basis, and they are willing to wait for service if there be queue. The time the tailor takes to attend a customer is exponentially distributed with a mean of 4 minutes. Find the following:

- a) traffic intensity(utilization), b) The probability that the queuing system is idle, c) the average time the tailor is free on 8 hour working day, d)The number of customers in the shop, e) the expected number of customers waiting for tailor's services, f) The probability that there shall be 5 customers in the shop, g) The expected length of the non empty queue, h) the time a customer expects to spend in the shop and i) the probability that a customer shall spend more than 10minutes for the tailor's service.

(16)

(or)

b.i. Trucks of a company arrive at a transshipment centre to be unloaded in a pattern which is characterized by the Poisson distribution. The average rate of arrivals is 45 per hour. A set of attendants unload the trucks, and the level of service is 100 per hour on an average. The drivers make Rs.16 per hour and the set of attendants are paid Rs.10 per hour. How much expense on the average is incurred by the company for idle time on part of each driver each time hi is at the transshipment centre? Find the optimum number of sets of attendants to be employed for transshipment.

(12)

ii. Write detailed notes on Monte Carlo simulation.

(4)

15a. Solve the following 3X3 game.

		Player B		
		3	-1	-3
Player A	-3	3	-1	
	-4	-3	3	

(16)

(or)

b. Describe briefly various types of multi-variable search techniques.

(16)