Reg. No. | | | | | | | | | | | | |

Question Paper Code : 27306

5 Year M.Sc. DEGREE EXAMINATION, MAY/JUNE 2016

Fifth Semester

Software Engineering

ESE 051 – OPERATIONS RESEARCH

(Regulations 2010)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. State the limitations of the graphical method of solving a LPP.

2. Solve the LPP by graphical method :

   Maximize $Z = 3x_1 + 4x_2$

   Subject to $x_1 + x_2 \leq 450$; $2x_1 + x_2 \leq 600$; $x_1, x_2 \geq 0$.

3. What do you mean by transportation model ?

4. Distinguish between transportation model and assignment model.

5. What do you mean by shortest route problem ?

6. Write a short note on Total float and free float.

7. What are the different forms of inventory ?

8. Explain the terms : (i) Shortage cost (ii) lead time (iii) Reorder point

9. What is the queueing theory ?

10. Write briefly about the queueing model M/M/1.

PART – B (5 × 16 = 80 marks)

Answer All questions

11. (a) Use Big - M method to solve Minimize $Z = 4x_1 + 3x_2$

$$\begin{aligned} 2x_1 + x_2 &\geq 10 \\ \text{Subject to} \quad -3x_1 + 2x_2 &\leq 6 \\ x_1 + x_2 &\geq 6 \\ \text{and} \quad x_1, x_2 &\geq 0 \end{aligned}$$

OR

(b) Use Two Phase method to solve Maximize $Z = 2x_1 + x_2 + \frac{1}{4}x_3$

$$\begin{aligned} 4x_1 + 6x_2 + 3x_3 &\leq 8 \\ \text{Subject to} \quad 3x_1 - 6x_2 - 4x_3 &\leq 1 \\ 2x_1 + 3x_2 - 5x_3 &\geq 4 \\ x_1, x_2, x_3 &\geq 0 \end{aligned}$$

12. (a) Solve the transportation problem with unit transportation costs in rupees, demands and supplies as given below :

Destination		D_1	D_2	D_3	Supply
Origin	A	5	6	9	100
	B	3	5	10	75
	C	6	7	6	50
	D	6	4	10	75
Demands		70	80	120	

OR

(b) A company is faced with the problem of assigning four different salesman to four territories for promoting its sales. Territories are not equally rich in their sales potential and the salesman also differ in their ability to promote sales. The following table gives the expected annual sales (in thousands of Rs) for each salesman if assigned to various territories. Find the assignment of salesman so as to maximize the annual sale. Solve the transportation problem with unit transportation costs in rupees, demands and supplies as given below:

Territories		1	2	3	4
Salesman	1	60	50	40	30
	2	40	30	20	15
	3	40	20	35	10
	4	30	30	25	20

13. (a) Calculate the total float, free float and the independent float for the project whose activities are given below:

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration	8	7	12	4	10	3	5	10	7	6

OR

(b) Explain (i) Dijkstra's algorithm & (ii) Floyd's algorithm with illustration.

14. (a) A manufacture has to supply his customer with 600 units of his products per year. Shortage are not allowed and storage cost amount to 60 paise per unit per year. The set up cost is ₹ 80, find (i) the economic order quantity (ii) the minimum average yearly cost (iii) the optimum number of order per year (iv) the optimum period of supply per optimum order.

OR

(b) The demand for an item in a company is 18000 units per year, and the company can produce the item at a rate of 3000 per month. The cost of one set up is Rs. 500.00 and the holding cost of one unit per month is 15 paise. The shortage cost of one unit is Rs. 20 per month. Determine the optimum manufacturing quantity and the number of shortages. Also determine the manufacturing time and time between set ups.

15. (a) Customer arrives at one window drive in bank according to Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The space in front of the window including that for the serviced car can accommodate a maximum of 3 cars. Other can be wait outside the space.

(i) What is the probability that an arriving customer can drive directly to the space in front of the window ?

(ii) What is the probability that an arriving customer will have to wait outside the Indicated space ?

(iii) How long the arriving customer is expected to wait before starting service ?

OR

(b) A petrol station has two pumps. The service time follows with exponential distribution with mean 4 minutes and cars arrive for service in a Poisson process at a rate of ten cars per hour. Find the probability that a customer has to wait for service. What proportion of time the pump of time the pump remains idle ?