



Date: 02-11-2018  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

**SECTION-A**

**ANSWER ALL THE QUESTIONS:**

**(10X2=20)**

1. Define OR.
2. Write down the limitations of graphical method.
3. What is degenerate solution?
4. Write down the condition for solving Assignment problem.
5. Write down the route condition for the traveling salesman problem.
6. What is idle time?
7. Define critical path.
8. What is optimistic time estimate?
9. Define Inventory.
10. What is setup cost?

**SECTION-B**

**ANSWER ALL THE QUESTIONS:**

**(5X8=40)**

11. a) A company manufactures two products A and B in two departments namely assembly department and painting department. It takes two hours in the assembling department and one hour in painting department to manufacture one unit of product A. It takes two hours in the assembling department and 2 hours in painting department for manufacturing one unit of product B. The assembling department works for three 8 hours shift per day and painting department works two 8 hours shift per day. The profit of the product A is Rs.100 and the profit of the product B is Rs.150 per unit. How many units of product A and B to be manufactured so as to maximize the profit for the company?

**(OR)**

- b) Solve the following LPP by Graphical method:

Max  $Z = 3x_1 + 4x_2$  subject to the constraints:

$$2x_1 + x_2 \leq 40 \quad , \quad 2x_1 + 5x_2 \leq 180 \quad \text{and} \quad x_1, x_2 \geq 0$$

12. a) Obtain an initial basic feasible solution to the following transportation Problem using Least cost method.

	D	E	F	G	Available
A	1	2	3	4	6
B	4	3	2	0	8
C	0	2	2	1	10
Requirements	4	6	8	6	

(OR)

b) Solve the following Traveling salesman problem.

	A	B	C	D	E
A	-	4	7	3	4
B	4	-	6	3	4
C	7	6	-	7	5
D	3	3	7	-	7
E	4	4	5	7	-

13. a) a) Solve the following assignment problem:

	A	B	C	D
I	1	4	6	3
II	9	7	10	9
III	4	5	11	7
IV	8	7	8	5

(OR)

b) Find the sequence that minimizes the total elapsed time (in Hrs) required to complete the following task on 2 machine.

Tasks	A	B	C	D	E	F	G	H	I
Machine 1	2	5	4	9	6	8	7	5	4
Machine 2	6	8	7	4	3	9	3	8	11

14. a) Define the following Terms:

- i) Activity
- ii) Event
- iii) Network
- iv) Dummy Activity

(OR)

b) A is the operation on the project. B&C can be done concurrently & both must follow A. B must proceed D. E can not begin until both B&C are completed. F is dependent on the completion of both D&E. F is the last operation on the project. Draw the arrow network and number the nodes according to Fulkerson's Rule.

15. a) Explain about various cost associated with Inventory.

(OR)

b) An automobile manufacturer purchases 2,400 casting over a period of 360 days. This requirement is fixed and known. The castings are subject to quantity discounts.

Determine the optimal purchase quantity and if

$$K_{11} = \text{Rs.}1,000$$

$$0 < q < 4,000$$

$$K_{12} = \text{Rs.} 950$$

$$q \geq 4,000$$

Cost of ordering  $C_3 = \text{Rs.}70,000$

Cost of shortage  $C_1 = \text{Rs.}0.12\%$  of the unit cost.

### SECTION-C

**ANSWER ANY TWO QUESTIONS: (2X20=40)**

16. i) Solve the following LPP by Graphical method:

Max  $Z = 3x_1 + 5x_2$  Subject to the constraints:

$$x_1 + 2x_2 \leq 2000, \quad x_1 + x_2 \leq 1500, \quad x_2 \leq 600, \quad x_1, x_2 \geq 0 \quad (10)$$

ii) A steel firm has 4 plants which purchase coal for their production from 3 mines. The cost of shipping (in 100's of RS.) one ton of coal from each mine to each plant are given below:

		Plants				Capacity
		P1	P2	P3	P4	
Mines	M1	3	1	4	5	50
	M2	7	3	8	6	50
	M3	2	3	9	2	75
Requirements		40	55	60	20	

How much coal should the firm purchase from each mine in order to satisfy the demand of the plants at minimal shipping expenses. (Using Matrix minimum method) (10)

17. i) Find the sequence that minimizes the total elapsed time (in Hrs) required to complete the following Jobs on 2 machines. Also calculate total elapsed time and idle time of each machine.

(10)

Task	J1	J2	J3	J4	J5	J6	J7
Machine A	5	7	3	4	6	7	12
Machine B	2	6	7	5	9	5	8

ii) Given the following information:

Activity	1-2	1-3	2-3	2-4	2-5	3-4	4-7	5-6	5-7	6-7
a	3	1	6	0	2	3	6	1	2	4
m	4	2	8	0	5	5	9	1	5	8
b	5	3	10	0	8	7	12	1	8	12

- Draw the Project Network
- Find the length and variance of each activity.
- Find the critical path.
- Find the length and variance of the critical path. (10)

18. (i) Define the following Terms:

- Reorder Level
- Reorder Point (10)
- Safety stock
- Shortage

(ii) A stockiest has to supply 12,000 units of a product per year to his customer. The demand is fixed and known and the shortage cost is assumed to be infinite. The inventory holding cost is Re.0.20 per unit per month and the ordering cost per order is Rs.350. Determine the following

- The optimum lot size  $q_0$
- Optimum scheduling period  $t_0$
- Minimum total variable yearly cost. (10)

★★★★★★★★