Date: 02-05-2017   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART-A

Answer ALL questions   **10 X 2=20**

1. What is an optimal solution?

2. Find the standard form of an LPP.

     Minimize $Z = 3 x_1 + 2x_2$

   Subject to $2 x_1 + x_2 = 15$; $3x_1 - 4x_2 \geq -6$; $x_1 - 2x_2 \geq 5$; $x_2 \geq 0$

3. Define Dual problem.

4. Write the conditions for travelling salesmen problem.

5. What is an assignment problem?

6. Define Ideal time.

7. What is Dummy Activity?

8. List out different time estimates for PERT.

9. What is Setup Cost in inventory model?

10. Define Reorder level.

PART-B

Answer ALL questions   **5 X 8=40**

11 a) A firm manufactures three products A,B and C. The profits are Rs3,Rs.2 and Rs.4 respectively. The firm has two machines. The processing time in minutes for each machine on each product is given below

Machine	Products		
	A	B	C
D	4	3	5
E	2	2	4

Machines D and E have 2,000 and 2,500 machine-minutes respectively. The firm must manufacture at least 100A's; 200B's and 50C's but not more than150C's. Formulate a linear programming model to maximize the total profit.

(OR)

11 b) Solve the following L.P.P graphically.

     Max $Z = 6 x_1 - 2x_2$
     Subject to $2 x_1 - x_2 \leq 0$; $x_1 \leq 4$; $x_1, x_2 \geq 0$

12 a) (i) Write the Standard form of Primal problem and Dual problem.

    (ii)Construct the dual to the primal problem

$$\text{Maximum } Z = 80x_1 + 90x_2$$
$$\text{Subject to } 3x_1 + 5x_2 \leq 30; \ 3x_1 + 2x_2 \leq 21; x_1, x_2 \geq 0$$

(OR)

12 b) Obtain the initial basic feasible solution of the following transportation problem by the **north-west corner rule**

	D1	D2	D3	D4	S
O1	5	3	6	2	19
O2	4	7	9	1	37
O3	3	4	7	5	34
D	16	18	31	25	**90**

13 a) A manager has four sales man and four sales districts .He estimates that the profit per day from each salesman in each district would be as follows (in Rs.).Find the assignment of salesmen to district that will result in maximum profit

	A	B	C	D
1	33	21	35	23
2	29	23	37	31
3	31	31	33	29
4	27	25	35	37

(OR)

13 b) A company has 4 jobs on hand .Each of these must be processed in two departments the sequential order is A→B.

	Job-1	Job-2	Job-3	Job-4
Department A (days):	8	6	5	2
Department B (days):	8	3	4	5

14 a) A project schedule has the following characteristics. Construct a network .Find the critical path and duration of the project.

Activity:	1-2	1-4	1-7	2-3	3-6	4-5	4-8	5-6	6-9	7-8	8-9
Time:	2	2	1	4	1	5	8	4	3	3	5

(OR)

14 b) Explain the difference between CPM and PERT.

15a) A company uses annually 24,000 units of raw material which costs Rs1.25/unit placing each order cost Rs.22.50 and the carrying cost is 5.4%/year of the average inventory. Find the total cost including the cost of material.

(OR)

15 b) The daily demand for a commodities 100 units Every time an order is places a fixed cost of Rs.100 is incurred. The daily holding cost/unit inventory is Rs.0.02.If the lead-time is 12 days, determine the E.O.Q and reorder point.

PART-C

16 a) Use Simplex method to solve the following L.P.P

$$\text{Max } Z = 4 x_1 + 10 x_2$$

$$\text{Subject to} \quad 2x_1 + x_2 \leq 50$$

$$52x_1 + 5x_2 \leq 100$$

$$2x_1 + 3x_2 \leq 90$$

$$x_1, x_2 \geq 0$$

b) Find the optimal solution for the given transportation problem

	D1	D2	D3	D4	Availability
O1	1	2	1	4	30
O2	3	3	2	1	50
O3	4	2	5	9	20
Requirement	20	40	30	10	

17 a) A company has six jobs which go through three machines X,Y, Z in order XYZ. The processing time in minutes for each job on each machine is as follows

Jobs	:1	2	3	4	5	6
Machine X	: 18	12	29	36	43	37
Machine Y	7	12	11	2	6	28
Machine Z	: 19	12	23	47	28	36

What should be the sequence of the jobs such that the total mark span is minimized?

b) A project has the following characteristics

Job	Duration(days)		
i-j	t_0	$t_m t_p$	
1-2	3	6	15
1-6	2	5	14
2-3	6	12	30
2-4	2	5	8
3-5	5	11	17
4-5	3	6	15
6-7	3	9	27
5-8	1	4	7
7-8	4	19	28

(i)   Draw the network.
(ii)   Calculate the length and variance
(iii)   Find the total completion days.

18 a) A Manufacture has to supply 12000 units of his product/year. Shortages are not allowed the inventory holding costRs.0.20/unit/month. The set up cost/run is Rs.350. Determine the following

        (i) The optimum lot size q_0
        (ii) Optimum scheduling period t_0
        (iii) Minimum total variable yearly cost

b)

    (i) Define Slack and surplus variable.
    (ii) State the methods used to find the initial solution to TPP
    (iii)What is sequencing problem?
    (iv)Write the formula for EOQ for Instantaneous receipt of goods without shortage.
    (v) Define Critical path.

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