D 72436 (Pages : 6) Name

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THIRD SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2014

(U.G.—CCSS)

Complementary Course

CA 3C 06—OPERATIONS RESEARCH

Time : Three Hours Maximum : 30 Weightage

Part A

Answer **all** *questions.*
(*Weightage 1 for bunch of* 4)

1. A physical model is an example of :

   (a) Ironic model. (b) Analogue model.

   (c) Verbal model. (d) Symbolic model.

2. Minimization of objective function in LPP means :

   (a) Least value chosen among the allowable decisions.

   (b) Greatest value chosen among the allowable decisions.

   (c) Both (a) and (b).

   (d) None of the above.

3. For maximization LPP, the objective function coefficient for an artificial variable is :

   (a) + M. (b) — M.

   (c) + 1. (d) Zero.

4. The dual of the primal maximization LPP having m constraints and n non negative variables should :

   (a) A minimization LPP

   (b) Have n constraints and m non-negative variables.

   (c) Both (a) and (b).

   (d) None of the above.

5. While solving a transportation problem, the occurrence of degeneracy means that ?

   (a) Total supply equals total demand.

   (b) The solution so obtained is not feasible.

   (c) The few allocations become negative.

   (d) None of the above.

Turn over

6. The method used for solving an assignment problem is called :

(a) MODI method.

(b) Reduced matrix method.

(c) Hungarian method.

(d) None of the above.

7. Sequencing problems involving processing of two jobs on n machines :

(a) Can be solved graphically.

(b) Cannot be solved graphically.

(c) Have a condition that the processing of two jobs must be in the same order.

(d) None of the above.

8. In critical path analysis, CPM is :

(a) Event oriented.

(b) Probabilistic in nature.

(c) Deterministic in nature.

(d) Dynamic in nature.

9. A transportation problem can be represented as a network flow problem where :

(a) Origins represent sinks and destinations the sources.

(b) Origins represent sources and destinations the sinks.

(c) Objective is to maximize the network flow.

(d) Per unit transportation costs become irrelevant.

10. The problem of replacement is not concerned about the :

(a) Items that deteriorate graphically.

(b) Items that fail suddenly.

(c) Determination of optimum replacement interval.

(d) Maintenance of an item to work out profitability.

11. Inventories in general are build up to :

(a) Satisfy demand during period of replenishment.

(b) Carry reserve stocks to avoid shortages.

(c) Keep pace with changing market conditions.

(d) All of the above.

12. If EOQ is calculated, but an order is then placed which is smaller that this, will the total inventory cost :

    (a) Increase. (b) Decrease.

    (c) Either increase or decrease. (d) No change.

(12 x = 3 weightage)

Part B

Answer **all** *questions.*
(*Weightage* 1)

13. State the general linear programming problem in standard from.
14. Write the role of pivot element in simplex table.
15. Construct the dual of :

    Maximize $2000x_1 + 3000x_2$

    subject to $6x_1 + 9x_2$ 5_ 100

    $2x_1 + x_2$ 20

    x_1, x_2 0.

16. What is an unbalanced transportation problem ?
17. How do you interpret assignment problem as a linear programming model ?
18. What is meant by graphing in Network Analysis ?
19. What is no passing rule in a sequencing algorithm ?
20. What is a replacement problem ?
21. A certain item costs Rs. 235 per ton. The monthly requirement is 5 tons and each time the stock is replenished there is a set-up cost of Rs. 1000. The cost of carrying inventory has been estimated at 10% of the value of the stock per year. What is the optimal order quantity ?

(9 x 1= 9 weightage)

Part C

Answer any **five** *questions.*
(*Weightage* 2)

22. An animal feed company must produce 200 lbs of a mixture containing the ingredients X_1 and X_2. X_1 costs Rs. 3 per lb. and X_2 costs Rs. 3 per lb. Not more than 80 lbs. of X_1 can be used and minimum quantity to be used for X_2 is 60 lbs. Find how much of each ingredient should be used if the company wants to minimize the cost. Formulate the LPP.

Turn over

23. Use dual simplex method to solve :

Minimize $Z = 10x_1 + 6x_2 + 2x_3$

subject to

$-x_1 + x_2 + x_3 \geq 1$

$3x_1 + x_2 - x_3 \geq 2$

xi, x2, x3 o.

24. Solve the following assignment problem :-

	1	2	3	4
A	5	8	3	2
B	10	7	5	8
C	4	10	12	10
D	8	6	9	4

25. Find the optimal order quantity for a product for which the price breaks are as follows :

Quantity	*Purchasing Cost per unit* (Rs.)
$0 < Q_1 < 100$	20.00
100 s $Q_2 < 200$	18.00
200 < Q3	16.00

The monthly demand for the product is 400 units, the cost of storage is 20 % of the unit cost and ordering cost is Rs. 25.00 per month.

26. The purchase cost of a machine is Rs. 13,000 and its installation amount is Rs. 3,600. Its scarp value is Rs. 1600. The maintenance costs (in Rs.) found from experience are as follows :

Year	1	2	3	4	5	6	7
Maintenance cost	250	750	1000	1500	2100	2900	4000

When should the machine be replaced ?

27. A contractor has to supply 20,000 units per day. He can produce 30,000 units per day. The cost of holding a unit in stock is Rs. 3 per year and the set-up cost per run is Rs.50. How frequently and of what size the production runs be made.

28. **Given the following information :**

Activity	0 - 1	1 - 2	1 - 3	2 - 4	2 - 5	3 - 4	3 - 6	4 - 7	5 - 7	6 - 7
Duration	2	8	10	6	3	3	7	5	2	8

Draw the arrow diagram. Identify critical path and find the total project duration.

(5 x 2 = 10 weightage)

Part D

Answer any two questions.
(*Weightage* 4)

29. **Use two-phase method to :**

Maximize $Z = 3x_1 - x_2$

subject to

$2x_1 + x_2 \quad 2$

$x_1 + 3x_2 \quad 2$

$x_2 \leq 4$

$x_1, x_2 \quad 0.$

30. **Solve the following transportation problem :**

To

From

	A	**B**	**C**	**D**	***Available***
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Requirement	6	10	12	15	43

31. **Table below shows jobs, their normal time and cost and crash time and cost for a project :**

Job	***Normal time***	***Cost***	***Crash time***	***Cost* (Rs.)**
1 - 2	6	1400	4	1900
1 - 3	8	2000	5	2800
2 - 3	4	1100	2	1500

Turn over

Job	*Normal time*	*Cost*	*Crash time*	*Cost* (Rs.)
2 - 4	**3**	**800**	**2**	**1400**
3 - 4	**Dummy**			
3 - 5	**6**	**900**	**3**	**1600**
4 - 6	**10**	**2500**	**6**	**3500**
5 - 6	**3**	**500**	**2**	**800**

Indirect cost for the project is Rs. 300 per day :

(i) Draw the network of the project.

(ii) What is the normal duration cost of the project.

(iii) If all activities are crashed, what will be the project duration and corresponding cost ?

(2 x 4 = 8 weightage)