25. a) What are the significance of artificial variables in LPP?

    b) Write a short not on two phase method.

26. Find the $maximum\ of\ z = 6x + 8y$ by solving its dual.

    Subject to $5x + 2y \leq 20$

    $x + 2y \geq 10,$

    $x \geq 0, y \geq 0$

27. Solve the following TP. The supply and demands are 76 ,82, 77 and 72, 102, 41 respectively

4	8	8
16	24	16
8	16	24

28. Derive the formula for EOQ for the manufacturing inventory model without shortage.

29. Find the optimum order quantity for a product for which the price breaks are as follows:

Quantity	Unit cost (Rs)
$0 \leq Q_1 \leq 800$	Re 1.00
$800 \leq Q_2$	Re 0.98

    The yearly demand for the product is 1600 units/year, cost of placing an order is Rs.5, and the cost of storage is 10% per year.

30. Find the critical path and the duration of the project.

Activity	A	B	C	D	E	F	G	H	I
Predecessor	-	-	-	A	B	C	D, E	B	H, F
Estimated time in weeks	3	5	4	2	3	9	8	7	9

31. What is a replacement problem? When does it arise? Describe various types of replacement situations and decisions with suitable examples.

(5 x 8 = 40 Marks)

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18U315 (Pages: 4) Name: ……..……..

Reg. No. …..……..

THIRD SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2019

(CUCBCSS - UG)

CC15U BCA3 C06 - OPERATIONS RESEARCH

(Complementary Course)

(2015 & 2016 Admissions Supplementary)

Time: Three Hours Maximum: 80 Marks

Part A

Answer ***all*** questions. Each question carries 1 mark.

1. A feasible solution to an LPP must

   a) satisfy all the constraints only

   b) be a corner point of the feasible region

   c) satisfy the constraints as well as the non- negative restrictions

   d) none of the above

2. Number of basic solutions to an $m \times n$ system of LPP is

   a) n^m b) nm c) nP_m d) nC_m

3. Non-basic variables have $z_j - c_j = 0$ in the optimal table of simplex method indicates

   a) infeasible solution b) multiple optimal solution

   c) unbounded solution d) degenerate solution

4. Dual simplex method is applicable to those LPP's start with

   a) an infeasible solution b) an infeasible but optimum solution

   c) a feasible solution d) a feasible and optimum solution.

5. The minimum number of lines covering all zeros in a reduced cost matrix of order n in AP can be

   a) at most n b) at least n c) $n - 1$ d) $n + 1$

6. The problem of replacement is not concerned about the

   a) items that deteriorate graphically

   b) item that fail suddenly

   c) determination of optimum replacement interval

   d) maintenance of an item to work out profitability

7. The unit cost rises the EOQ will

   a) increase b) decrease

   c) either increase or decrease d) none of the above

8. The slack for an activity in the network is equal to

   a) $LS - ES$ b) $LF - LS$ c) $EF - ES$ d) $EF - LS$

9. The transportation problem is balanced if

   a) total demand and total supply are equal and the number of sources equals the number of destinations

   b) number of sources equals the number of destinations

   c) total demand equals total supply irrespective of the number of sources and destinations

   d) none of the routes is prohibited

10. Which of the following is not associated with an LPP

    a) proportionality b) uncertainty c) additivity d) divisibility

(10 x 1 = 10 Marks)

Part B

Answer ***all*** questions. Each question carries 2 marks.

11. Write the following LPP in both standard and canonical form.

$$\text{Min } z = 2x_1 - x_2$$
$$\text{Subject to } x_1 + 2x_2 \leq -4$$
$$3x_1 - x_2 \geq 3$$
$$x_1, x_2 \geq 0$$

12. Write the dual of the following LPP.

$$\text{Min } z = 7x_1 + 3x_2$$
$$\text{Subject to } 5x_1 + x_2 \geq 3$$
$$x_1 + 2x_2 = 2$$
$$x_1, x_2 \geq 0$$

13. Write down the rules of network construction.

14. Explain the significance of Duality theory in LPP.

15. What are the characteristics of fundamental problem of EOQ?

(5 x 2 = 10 Marks)

Part C

Answer any ***five*** questions. Each question carries 4 marks.

16. Solve by simplex method.

$$\text{Max } z = 3x_1 + 4x_2$$
$$\text{Subject to } 2x_1 + 3x_2 \leq 16$$
$$4x_1 + 2x_2 \leq 16$$
$$x_1, x_2 \geq 0$$

17. Solve using dual simplex method.

$$\text{Min } z = 10x_1 + 6x_2 + 2x_3$$
$$\text{Subject to } -x_1 + x_2 + x_3 \geq 1$$
$$3x_1 + x_2 - x_3 \geq 2$$
$$x_1, x_2, x_3 \geq 0$$

18. Formulate the TP as an LPP and explain feasible, basic feasible and optimal solutions of a Transportation problem.

19. Explain degeneracy in TP.

20. A manufacturer has to supply his customer with 600 units of his product per year. Shortages are not allowed and the shortage cost amounts to Rs.0.60 per unit per year. The set-up cost per run is Rs.80.00. Find the optimum run-size and the minimum average yearly cost.

21. A computer centre has got 3 expert programmers. The centre needs 3 application programmes to be developed. The head of the computer centre after studying carefully the programmes to be developed, estimates the computer time in minutes required by the experts to the programmes as follows.

Programmers	Programmes		
	A	B	C
1	120	100	80
2	80	90	110
3	110	140	120

Optimize the problem.

22. Explain the following terms used in PERT:

    (i) Pessimistic time (ii) Optimistic time and (iii) most likely time

23. What are the essential characteristics of O.R? Mention different phases in O.R study. Explain the role of computers in this field.

(5 x 4 = 20 Marks)

Part D

Answer any ***five*** questions. Each question carries 8 marks.

24. Solve by Big-M Method.

$$\text{Max } z = 2x_1 + 3x_2$$
$$\text{Subject to } x_1 + 2x_2 \geq 6$$
$$x_1 + x_2 \geq 5$$
$$x_1, x_2 \geq 0$$