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Name..

Reg. No....................................

THIRD SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2018

(CUCBCSS—UG)

Complementary Course

BCA 3C 06—OPERATIONS RESEARCH

(2014 Admissions)

Time : Three Hours

Maximum : 80 Marks

Part A

Answer all questions.

Each question carries 1 mark.

1. The basic solution in which none of the basic variable is zero is called :

    (a) Non degenerated.

    (c) Degenerated.

    (b) Basic feasible solution.

    (d) Optimum solution.

2. If Z is an objective function, which one of the following is correct

    (a) $\text{Min } Z = \text{Max} \, (-Z)$.

    (c) $\text{Min } Z = -\text{Max} \, (-Z)$.

    (b) $\text{Min } Z = 2 * \text{Max } Z$.

    (d) $\text{Min } Z = -\text{Max} \, (Z)$.

3. In a transportation problem, if the total supply is equal to the total demand then transportation problem is called :

    (a) Unbalanced.

    (c) Optimized.

    (b) Balanced.

    (d) None of these.

4. The decision variables in assignment problem assumes :

    (a) 0.

    (c) 1.

    (b) Neither (a) or (b).

    (d) Both (a) and (b).

5. Activity which does not require any resources or time is called :

    (a) Dummy.

    (c) Successor.

    (b) Predecessor.

    (d) None of these.

6. The slack for an activity is equal to :

    (a) Latest Finish- Latest start.

    (b) Earliest Finish — Earliest Start.

    (c) Latest Start-Earliest Start.

    (d) None of these.

Turn over

7. In sequencing, the time involved in moving jobs from one machine to another is :

    (a) Negligible.   (c) Significant.

    (b) Positive value.   (d) None of these.

8. Which of the following case doesn't need replacement ?

    (a) Railway time table gradually becomes out of dated.

    (b) An electric bulb fails all of a sudden.

    (c) Pipeline is blocked.

    (d) None of these.

9. Which inventory cost are associated with tax of the inventory :

    (a) Set up cost.   (c) Shortage cost.

    (b) Holding cost.   (d) None of these.

10. Which of the following is a crucial challenge for inventory management ?

    (a) Capacity must be planned.   (c) Row materials may perish.

    (b) Inventory and capacity are linked. (d) All the above.

$(10 \times 1 = 10$ marks)

Part B

Answer all questions.
Each question carries 2 marks.

11. Define optimum feasible region.

12. What are unbalanced transportation problem ?

13. Write out any *two* assumptions used for solving sequence problem.

14. Define CPM.

15. Define fluctuation inventories.

$(5 \times 2 = 10$ marks)

Part C

Answer any five questions.
Each question carries 4 marks.

16. Solve graphically the following LPP :

    Max $Z = 3X_1 + 2X_2$
    subject to constraints,

$$X_1 - X_2 \leq 1$$
$$X_1 + X_2 \geq 3 \text{ and } X_1, X_2 \geq 0.$$

17. Explain the concept of duality in linear programming.

18. How will you solve a transportation problem using North West Corner rule ?

19. A batch of 4 jobs can be assigned to 4 machines. The setup time of machines are given in the following table. Find an optimum assignment of job to machine which is minimizing the total set up time :

Machines

10	11	4	2
7	11	10	14
5	6	9	12
13	5	11	10

Jobs (left label)

20. State the rules for drawing network diagram.

21. Write down the procedures for solving problem of sequencing with two machines.

22. Let the value of money be assumed to be 10% per year and suppose that machine A is replaced after every 3 years whereas machine B is replaced after every six years. The yearly costs of both the machines are given below.

Year	:	1	2	3	4	5	6
A	:	1000	200	400	1000	200	400
B	:	1700	100	200	300	400	500

Determine which machine should be purchased ?

23. Distinguish between deterministic and probabilistic models of inventory.

$(5 \times 4 = 20 \text{ marks})$

Part D

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

24. Solve the following LPP by simplex method :

Minimize $Z = X_1 + X_2 + 3X_3$
subject to constraints,
$$3X_1 + 2X_2 + X_3 \leq 3$$
$$2X_1 + X_2 + 2X_3 \leq 2$$
and $X_1, X_2, X_3 \geq 0$.

Turn over

25. Give in detail the procedure of Big M method of solving a LPP.

26. Obtain an initial basic feasible solution to the following TP using Vogel's approximation method :

Origin \ Destination	D1	D2	D3	D4	Availability
A	4	6	8	13	500
B	13	11	10	8	700
C	14	4	10	13	300
D	9	11	13	3	500
Requirements	250	450	1050	250	

27. (1) Define assignment problem. Represent it in mathematical form.

   (2) Explain a method of solving assignment problem.

28. Explain the procedure of PERT in networking.

29. The cost of machine is Rs. 6,100 and its scrap value is Rs.100, the maintenance cost found from experience are :

Year	:	1	2	3	4	5	6	7	8
Maintenance	:	100	250	400	600	900	1200	1600	2000

When should the machine be replaced ?

30. A stockist has to supply 400 units of a product every Monday to his customer, he gets product at Rs. 50 per unit from the manufacturer. The cost of ordering and transportation from the manufacturer is Rs. 75 per order. The cost of carrying inventory is 7.5% per year of the cost of product. Calculate

   (i) Economic Order Quantity.

   (ii) Total optimal cost.

31. The utility data for a network are given below. Determine the total float, free float and independent float and identify critical path :

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

(5 × 8 = 40 marks)