D 43237 (Pages : 3) Name..................................

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

SECOND SEMESTER B.C.A. DEGREE EXAMINATION, MAY 2018

(CUCBCSS—UG)

Complementary Course

BCA 2C 04—OPERATIONS RESEARCH

(2017 Admissions)

Time : Three Hours Maximum : 80 Marks

Section A

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

1. Write any *two* advantages of linear programming problem.
2. How to check a transportation problem is balanced or not ?
3. Explain basic feasible solution.
4. Explain Slack and Surplus variables.
5. What are the components of Linear Programming Problem ?
6. Cite any *two* uses of Operations Research.
7. What is meant by critical path ?
8. Define Linear Programming Problem.
9. Define Optimal Solution.
10. Which method is used for solving Assignment problem.

(10 × 1 = 10 marks)

Section B

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

11. State the fundamental properties of duality.
12. What is travelling salesman problem ?
13. What are the advantages of Operations Research ?
14. Distinguish between PERT and CPM.
15. Define the terms : (a) Non negativity constraints ; (b) Objective functions.
16. Explain Least cost method.

Turn over

17. What is artificial variable ?

18. Define slack time and total float in the context of network model

(8 × 2 = 16 marks)

Section C

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

19. Why is CPM /PERT a popular and widely applied management science technique ?

20. Explain Assignment problem.

21. Briefly Explain Big M Method.

22. Formulate dual of the following LPP :

$$\text{Maximize } Z = x_1 - 2x_2 + 3x_3$$

$$\text{Subject to, } 2x_1 + x_2 + 3x_3 = 2$$

$$2x_1 + 3x_2 + 4x_3 = 1$$

$$x_1, x_2, x_3 \geq 0.$$

23. Define degeneracy in transportation problem. How is it resolved ?

24. Explain the procedure of two phase method.

25. Describe the principle of duality in linear programming problem.

26. Write a short note on project crashing.

27. Explain the steps involved in dual simplex method.

(6 × 4 = 24 marks)

Section D

Answer any **three** *questions.*
Each question carries 10 *marks.*

28. Solve the following problem using Simplex Method :

$$\text{Maximize } Z = 5x_1 + 3x_2$$

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

$$5x_1 + 2x_2 \leq 10$$

$$3x_1 + 8x_2 \leq 12$$

$$x_1, x_2 \geq 0.$$

29. Use Two phase method to solve the LPP :

Maximize $Z = 5x - 4y + 3z$

Subject to $2x + y - 6z = 20$

$6x + 5y + 10z \leq 76$

$8x - 3y + 6z \leq 50$

$x, y, z \geq 0$

30. Solve by Big M method :

Maximize $Z = 6x + 4y$

Subject to : $2x_1 + 3y \leq 30$

$3x + 2y \leq 24$

$x + y \geq 3$

$x, y \geq 0$

31. Solve the transportation problem to minimize the total transportation cost :

$$\begin{array}{ccc} & & \textit{Supply} \\ & \begin{pmatrix} 7 & 9 & 3 & 2 \\ 4 & 4 & 3 & 5 \\ 6 & 4 & 5 & 8 \end{pmatrix} & \begin{matrix} 16 \\ 14 \\ 20 \end{matrix} \\ \textit{Demand} & \begin{matrix} 11 & 9 & 22 & 8 \end{matrix} & \end{array}$$

32. A small maintenance project consists of the following 10 jobs .Draw network diagram (arrow diagram). Calculate (1) T_E and T_L values of all events ; (2) EST, LST, EFT, LFT of all activities ; and (3) Floats of all the activities .Also obtain (a) Critical activities ; and (b) Project duration.

Activity :	1 – 2	2 – 3	2 – 4	3 – 5	3 – 6	4 – 6	4 – 7	5 – 8	6 – 8	7 – 8
Duration :	4	6	10	8	2	12	4	15	14	8

(3 × 10 = 30 marks)