

SECOND SEMESTER UG DEGREE EXAMINATION, APRIL 2024**(Supplementary- 2018 Admission)****BCA****CBCA2C04T: OPERATIONS RESEARCH****Time: 3 Hours****Maximum Marks: 80****PART A: Answer *all* the questions. Each carries *one* mark.**

1. Define dummy activity.
2. Define total elapsed time.
3. What is mathematical model?
4. Define feasible solution of a transportation problem.
5. What is a constraint?
6. What is critical path?
7. Write one application of Linear programming.
8. What is a network diagram?
9. How do you find the cell for allotment in VAM?
10. Write any two similarities between CPM and PERT.

(10 x 1 = 10 Marks)**PART B: Answer *all* the questions. Each carries *two* marks**

11. What is unbalanced transportation problem?
12. Write the difference between transportation problem and assignment problem.
13. What are slack and surplus variables?
14. Define: (a) free float, (b) independent float.
15. What is a network diagram?
16. Explain Two Phase method.
17. Define Sequencing problem.
18. State the fundamental properties of duality.

(8 x 2 = 16 Marks)**(PTO)**

PART C: Answer any six questions. Each carries four marks.

19. Write a short note on degeneracy in transportation problem.

20. What are the phases of Operations Research?

21. Explain Least cost entry method.

22. Solve the following LPP graphically:

Minimize

$$Z = 5x_1 + 8x_2$$

Subject to

$$6x_1 + 2x_2 \geq 12; 2x_1 + 2x_2 \geq 8; 4x_1 + 12x_2 \geq 24; x_1, x_2 \geq 0$$

23. What is travelling salesman problem?

24. Write any two assumptions used for solving sequence problem.

25. Find initial basic feasible solution for the following transportation problem by using Vogel's method:

Origin	Destination			Availability
	A	B	C	
W	2	7	4	5
X	3	3	1	8
Y	5	4	7	7
Z	1	6	2	14
Requirement	7	9	18	34

26. Draw the network diagram for the following table:

Activity	A	B	C	D	E	F	G	H	I	J	K
Predecessor	-	A	B	C	B	E	D,F	E	H	G,I	J

27. Explain the Hungarian method for solving assignment problem.

(6 x 4 = 24 Marks)

PART D: Answer any three questions. Each carries ten marks.

28. Use dual simplex method to solve the following LPP:

Minimize

$$Z = 3X_1 + X_2$$

subject to the constraints

$$X_1 + X_2 \geq 1,$$

$$2X_1 + 3X_2 \geq 2,$$

$$X_1, X_2 \geq 0.$$

29. Explain the different operations research models used today in the business world.

30. Solve using Simplex Method:

Maximize $Z=5x_1 + 3x_2$

Subject to $x_1 + x_2 \leq 2$

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

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

$$x_1, x_2 \geq 0$$

31. Solve the following travelling salesman problem :

	A	B	C	D	E
A		4	7	3	4
B	7		6	7	5
C	4	6		3	4
D	3	3	7		7
E	4	4	5	7	

32. Find the optimum solution of the following transportation problem using MODI method:

	P	Q	R	Supply
A	4	8	8	56
B	16	24	16	82
C	8	16	24	77
Demand	72	102	41	

(3 x 10 = 30 Marks)