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Name: ………………………

Reg. No.………..……………

SECOND SEMESTER BCA DEGREE EXAMINATION, APRIL 2020
(CUCBCSS – UG)
(Supplementary/Improvement)
CC17U BCA2 C04 – OPERATIONS RESEARCH
(Mathematics – Complementary course)
(2017, 2018 Admissions)

Time: Three Hours

Maximum: 80 Marks

PART – A
Answer *all* questions. Each question carries 1 mark.

1. VAM stands for _____.

2. What do you mean by transportation problem?

3. Least efficient method for finding the initial basic solution of transportation problem is _____.

4. In transportation problem the objective function is always _____ type.

5. Expand PERT.

6. _____ is the shortest possible time in which an activity can be completed under ideal conditions if everything goes well.

7. _____ is the duration by which an activity can be delayed without delaying the project.

8. In assignment problem, when the number of lines is less than n, we say the solution is _____.

9. Define minimum ratio.

10. Define balanced transportation problem.

(10 x 1 = 10 Marks)

PART – B
Answer *all* questions. Each question carries 2 marks.

11. Explain three advantages of OR models.

12. What is degeneracy in assignment problem?

13. Write the dual of $Max\ Z = 10x + 6y$ subject to

$$2x + 2y \le 4,$$
$$10x + 4y \le 20,$$
$$6x + 16y \ge 24,$$
$$x, y \ge 0.$$

Turn Over

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30. Find the initial basic solution of the following transportation using least cost method and optimal solution by MODI method.

	A	B	C	Supply
X	7	3	4	2
Y	2	4	3	3
Z	3	4	6	5
Demand	4	1	5	

31. Find the optimal sequence of jobs that minimizes the total elapsed time based on the following information.

Job	1	2	3	4	5	6	7
Machine A	10	8	12	6	9	11	9
Machine B	6	4	6	5	3	4	2
Machine C	8	7	5	9	10	6	5

32. Solve the following Travelling salesman problem to find the minimum cost.

	A	B	C	D
A	-	46	16	40
B	41	-	50	40
C	82	32	-	60
D	40	40	36	-

(3 x 10 = 30 Marks)

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14. What is Float?

15. Explain penalty in VAM.

16. Define canonical form of LPP.

17. Write the standard form of LPP.

18. Define critical path in a network.

<div align="right">(8 x 2 = 16 Marks)</div>

PART – C

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

19. Solve the problem graphically $Minimize\ Z = x + y$ subject to

$$-3x + 4y \geq 12,$$

$$2x - y \geq -2,$$

$$2x + 3y \geq 12,$$

$$x \leq 4, y \geq 2, x, y \geq 0.$$

20. Find the solution of LPP using simplex method. $Max\ Z = 6x + 4y$ subject to

$$-x + y \leq 2,$$

$$x - y \leq 2,$$

$$3x + 2y \leq 9,$$

$$x, y \geq 0.$$

21. Solve the assignment problem for minimum cost

	1	2	3	4	5
A	8	4	2	6	1
B	0	9	5	5	4
C	3	8	9	2	6
D	4	3	1	0	3
E	9	5	8	9	5

22. Nippon Batteries produce two types of cells, ordinary and sealed. Each sealed type takes twice as long to produce as ordinary one. It can make a maximum of 2000 cells. Lead, the chief raw material is sufficient for 1500 cells whether sealed or ordinary. The sealed type requires special packing, of which only 600 per day are available. Profit on ordinary type is Rs. 3.00 and on sealed type is Rs. 5.00. Formulate the problem mathematically to maximize the profit.

23. Draw the network diagram and find the critical path of the following data.

Activity	A	B	C	D	E	F	G	H	I
Predecessors	-	-	-	A	A	B, D	C	B	F, G
Time	23	8	20	16	24	18	19	4	10

24. Find the initial basic solution of the transportation problem using VAM.

Source	Destination 1	2	3	4	Supply
A	21	16	15	3	11
B	17	18	14	3	13
C	32	27	18	41	19
Demand	6	10	12	15	

25. Write the algorithm for North West Corner Rule.

26. Explain the limitations of LPP.

27. Find the optimum sequence of processing of jobs to minimize the total time required to complete all the jobs for the following data.

	1	2	3	4	5	6	7
Machine A	30	120	50	20	90	110	40
Machine B	80	100	90	60	30	10	70

<div align="right">(6 x 4 = 24 Marks)</div>

PART – D

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

28. Use Big M method to solve the following LP problem $Minimize\ Z = 600x + 500y$ subject to

$$2x + y \geq 80,$$

$$x + 2y \geq 60,$$

$$x, y \geq 0.$$

29. Solve the following problem using two phase method. $Maximize\ Z = 300x + 400y$ subject to

$$5x + 4y \leq 200,$$

$$3x + 5y \leq 150,$$

$$5x + 4y \geq 100,$$

$$8x + 4y \leq 80,$$

$$x, y \geq 0.$$