Name: ……………………….

Reg. No: …………………….

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2023

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U BCA2 C04 - OPERATIONS RESEARCH

(Computer Application – Complementary Course)

(2019 Admission onwards)

Time: 2.00 Hours Maximum: 60 Marks

Credit: 3

Part A (Short answer questions)

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

1. Explain the term model in operations research.
2. What are the categories in the models by the extent of generality?
3. Explain slack variable with an example.
4. Define the basic variables and the basic vector.
5. Give the form of a general transportation table.
6. How do you convert an unbalanced transportation problem to a balanced one?
7. What you mean by an assignment problem?
8. What you mean by prohibited assignment problem?
9. Define the term 'event' in network.
10. Define independent float in an activity.
11. A project schedule has the following characteristics

Activity	1-2	1-3	2-4	3-4	3-5	4-9	5-6	5-7	6-8	7-8	8-10	9-10
Days	4	1	1	1	6	5	4	8	1	2	5	7

From the above information construct a network diagram.

12. What is sequencing?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. Explain the degeneracy in the LPP.
14. Formulate the dual of the following LPP

Minimize $z = 4x + 6y + 18z$

Subject to $x + 3y \geq 3$

$y + 2z \geq 5$

$x, y, z \geq 0$

15. Find an initial basic feasible solution to the following transportation problem using Vogel's Approximation method.

	D_1	D_2	D_3	D4	Availability
O_1	1	2	3	4	6
O_2	4	3	2	0	8
O_3	0	2	2	1	10
Requirements	4	6	8	6	

16. A company wishes to assign 3 jobs to 3 machines in such a way that each job is assigned to some machine and no machine works on more than one job. The cost of assigning job to machine is given by the matrix below.

Cost matrix: $\begin{bmatrix} 8 & 7 & 6 \\ 5 & 7 & 8 \\ 6 & 8 & 7 \end{bmatrix}$ Find the minimum cost of making the assignment.

17. Solve the following travelling salesman problem to minimize the cost per cycle:

From	To				
	A	B	C	D	E
A	∞	4	7	3	4
B	4	∞	6	3	4
C	7	6	∞	7	5
D	3	3	7	∞	7
E	4	4	5	7	∞

18. What are the limitations of PERT?

19. Use the graphical method to minimize the time added to process the following jobs on the machines shown, that is for each machine find the job which should be done first. Also calculate the total time elasped to complete both the jobs:

Job 1	Sequence	A	B	C	D	E
Job 1	Time	3	4	2	6	2
Job 2	Sequence	C	B	A	D	E
Job 2	Time	5	4	3	2	6

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. Use two phase method to maximize $z = 5x + 3y$

Subject to $2x + y \leq 1$

$x + 4y \geq 6$

$x, y \geq 0$

21. Solve the following transportation problem to minimize the total cost.

	1	2	3	4	Supply
A	21	16	25	13	11
B	17	18	14	23	13
C	32	27	18	41	19
Demand	6	10	12	15	

(1 × 10 = 10 Marks)

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