21U203 (Pages: 2) Name: ....

Reg.No: ....

SECOND SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2022

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U BCA2 C04 - OPERATION RESEARCH

(Mathematics - 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. What is Operations Research ?
2. "Operations research is an aid for the executive in making his decisions based on scientific method analysis" Explain the statement briefly.
3. Define solution for a general LPP.
4. Define the degenerate solution.
5. What you mean by an unbalanced transportation problem?
6. What is the condition for the existence of alternative solutions to a transportation problem?
7. Write the mathematical formulatio of a general assignment problem.
8. How do you convert a maximization assignment problem into a minimization problem?
9. What you mean by predecessor activity?
10. Define independent float in an activity.
11. What are the limitations of Critical Path Method (CPM)?
12. A project schedule has to 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.

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Use two phase method to maximize
$z=2x+y$
Subject to
$-x+y \le 1$
$x-2y \le 2$
$x+y \le -1$
$x,y \ge 0$
14. Give an algorithm to formulate a dual problem.
15. Find an initial basic feasible solution to the following transportation problem using Vogel's Approximation Method.

	D_1	D_2	D_3	D_4	Availability
O_1	22	26	34	28	500
O_2	32	36	28	20	600
O_3	42	48	26	20	800
Requirements	400	450	550	500	

16. A departmental head has three subordinates, and four tasks to be performed. The subordinates differ in efficiency, and the tasks differ in their intrinsic difficulty. His estimate, of the time each man would take to perform each task, is given in the table below:

	M_1	M_2	M_3
Task 1	9	26	15
Task 2	13	27	6
Task 3	35	20	15

Task 4	18	30	20

How should the tasks be allocated, one to a man, so as to minimize the total man-hours?

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

From	To				
	A	B	C	D	E
A	∞	375	600	150	190
B	375	∞	300	350	175
C	600	300	∞	350	500
D	160	350	350	∞	300
E	190	175	500	300	∞

18. Write the optimum sequence Algorithm for n jobs on 2 machines.

19. We have 4 jobs each of which has to go through the machines M_j j = 1, 2, 3, 4, 5, 6 in the order A, B, C, D, E, F. Processing time in hours is given below:

	Machine A	Machine B	Machine C	Machine D	Machine E	Machine F
Job A	18	8	7	2	10	25
Job B	17	6	9	6	8	19
Job C	11	5	8	5	7	15
Job D	20	4	3	4	8	12

Determine a sequence of these four jobs that minimizes the total elapsed time.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. Solve maximize $z = 5x + 10y$
Subject to $5x + 8y \le 48$
$5x + 3y \le 48$
$x + 8y \le 48$
$x , y \ge 0$.

21. The following table shows all the necessary information on the available supply to each warehouse, the requirement of each market and the unit transportation cost from each warehouse to each market:

	M_1	M_2	M_3	M_4	Supply
W_1	5	2	4	3	22
W_2	4	8	1	6	15
W_3	4	6	7	5	8
Requirement	7	12	17	9	

Find the optimal schedule and minimum total shipping cost.

(1 × 10 = 10 Marks)

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