20U203 (Pages: 3) Name: …….

Reg. No: …….

SECOND SEMESTER B.C.A. DEGREE EXAMINATION, APRIL 2021

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U BCA2 C04 - OPERATION RESEARCH

(Computer Application - Complementary Course)

(2019 Admission onwards)

Time: Two Hours Maximum: 60 Marks

Credit: 3

Part A (Short answer questions)

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

1. Explain the growing importance of O. R. in decision making
2. " Operations research is an aid for the executive in making his decisions based on scientific method analysis" Explain the statement briefly.
3. Define the optimum basic feasible solutions.
4. Define a standard primal form and its dual problem for minimization problem.
5. When a transportation problem is said to be balanced?
6. Convert the following transportation problem into balanced problem.

	I	II	III	Supply
A	10	9	14	70
B	8	1	5	35
C	5	12	3	60
Demand	80	70	50	

7. Write the mathematical formulation of a general assignment problem.
8. How do you convert a maximization assignment problem into a minimization problem?
9. Draw a network diagram from the following data.

Activity	A	B	C	D	E	F	G
Predecessors	---	---	A	A	B	C	D, E

10. What are the advantages of Critical Path Method (CPM)?
11. 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.

12. What do you mean by Idle time on a machine*?*

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

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

13. Give the algorithm for Big M Method.

14. Check the degeneracy of the LPP

$$\text{Maximize } z = 3x + 9y$$

$$\text{Subject to } x + 4y \leq 8$$

$$x + 2y \leq 4$$

$$x, y \geq 0$$

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

	I	II	III	IV	Supply
I	11	13	17	14	250
II	16	18	14	10	300
III	21	24	13	10	400
Demand	200	225	275	250	

16. Solve the following assignment problem, to assign the jobs A, B, C, D to four workers.

	I	II	III	IV
A	1	4	6	3
B	9	7	10	9
C	4	5	11	7
D	8	7	8	5

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

From	To			
	A	B	C	D
A	∞	46	16	40
B	41	∞	50	40
C	82	32	∞	60
D	40	40	36	∞

18. Write the steps for Backward Pass Calculation in a critical path problem.

19. Write the algorithm for the optimum sequence for n jobs on K machines.

(**Ceiling: 30 Marks**)

Part C (Essay questions)

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

20. (a) Formulate mathematically the linear programming problem: A company makes two kinds of leather belts. Belt A is a high-quality belt, and belt B is of lower quality. The respective profits are Rs. 4. 00 and Rs. 3. 00 per belt. Each belt of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1000 per day. The supply of leather is sufficient for only 800 belts per day (Both A and B combined). Belt A requires a fancy buckle and only 400 per day are available. There are only 700 buckles a day available for belt B. Determine the optimal product mix.

(b) Solve this problem using graphical method.

21. Find the optimal solution of the following transportation problem.

	D_1	D_2	D_3	D4	Availability
O_1	2	2	2	1	**3**
O_2	10	8	5	4	**7**
O_3	7	6	6	8	**5**
Requirements	**4**	**3**	**4**	**4**	

(1 × 10 = 10 Marks)

****