VIJAYA COLLEGE

R V ROAD, BASAVANAGUDI, BANGALORE – 560004

COMPUTER SCIENCE - IV SEM BCA

Model paper 1

BCA 405T : OPERATION RESEARCH

Duration : 3 Hours **Max. Marks: 100**

Section A

I Answer any TEN questions **10 x 2 = 20**

1. Define OR and write any two limitations of OR.
2. Write down the standard form of LPP.
3. Define artificial variables with example.
4. Define basic feasible solution and optimum solution in transportation problem.
5. Give the mathematical formulation of transportation problem.
6. How to convert a maximization problem to minimization for solving assignment problem?
7. Write down the procedure to draw minimum number of lines of the reduced matrix.
8. Define total float and free float. Write mathematical formulae for each.
9. Write the steps for backward pass computation.
10. What are the applications of PERT/CPM techniques?
11. Define Maximin – Minimax principle.
12. What is pay-off matrix? Give an example.

Section B

II Answer any FOUR questions **4 x 10 = 40**

13. a) Explain the applications of Operation Research. **5**

b) A toy company manufactures two types of dolls, a basic version doll A and deluxe version doll B. Each doll of type B takes twice as long to produce as one of type A and the company would have time to make a maximum of 2000 per day. The supply of plastic is sufficient to produce 1500 dolls per day. The deluxe version requires a fancy dress of which there are only 600 per day available. If the company makes a profit of Rs.3 and Rs.5 per doll respectively on doll A and B, formulate this as LPP. **5**

14. a) Solve graphically the following LPP **6**

Max Z = 3x + 4y

Subject to $4x + 8y \leq 32$

$9x + 2y \geq 14$

$3x + 10y \geq 30$

$x, y \geq 0$

b) What are the main features of an LPP in standard form? **4**

15. a) Determine the Initial Basic Feasible solution for the following transportation problem. Use North – West corner rule **4**

		Destination				
		1	**2**	**3**	**4**	**Supply**
Source	**A**	2	11	10	7	6
	B	1	4	2	1	5
	C	3	9	8	12	3
	Demand	3	3	5	6	

b) Use Vogel's approximation method to obtain an initial basic feasible solution of the given transportation problem. **6**

		To				
		D	**E**	**F**	**G**	**Supply**
From	**A**	11	13	17	14	250
	B	16	18	14	10	300
	C	21	24	13	10	400
	Demand	200	225	275	250	

16. a) Explain the Hungarian method of solving Assignment Problem. **5**

b) The assignment cost of assigning any one operator to any one machine is given in the following table: **5**

		Operator			
		A	**B**	**C**	**D**
Machine	**1**	10	5	13	15
	2	3	9	18	3
	3	10	7	3	2
	4	5	11	9	7

Find the optimal assignment schedule.

17. a) Explain project evaluation and review techniques. **5**

b) Draw the network for the project whose activities and their precedence relationships are given below: **5**

Activites	P	Q	R	S	T	U
Predecessor	-	-	-	P,Q	P,R	Q,R

18. Using graphical method, solve the following game whose payoff matrix for Player A is **10**

$$\begin{vmatrix} 2 & -1 & 5 & -2 & 6 \\ -2 & 4 & -3 & 1 & 0 \end{vmatrix}$$

Section C

II Answer any FOUR questions **4 x 10 = 40**

19. Solve the following LPP using Simplex Method **10**

Max $Z = 2x_1 + 2x_2 + 4x_3$

Subject to $2x_1 + 3x_2 + x_3 \leq 240$

$x_1 + x_2 + 3x_3 \leq 300$

$x_1 + 3x_2 + x_3 \leq 300$ $\quad x_1 \; x_2 \; x_3 \geq 0$

20. a) Write the steps to find the initial basic feasible solution by matrix minima method **4**

b) Solve the following TP to maximize the profit using MODI method **6**

	A	**B**	**C**	**D**	**Supply**
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Demand	6	10	12	15	

21. a) A company has 5 machines for assignment of 4 jobs. The time required to setup each machine for the processing of each job is given below. Find an optimal assignment of jobs to machine which will minimize the total setup time. **10**

	I	**II**	**III**	**IV**	**V**
1	10	11	4	2	8
2	7	11	10	14	12
3	5	6	9	12	14
4	13	15	11	10	7

22. Construct the network for the project whose activities are given below and computer the total, free and independent float of each activities and hence determine the critical path and the project duration. **10**

Activity	0-1	1-2	1-3	2-4	2-5	3-4	3-6	4-7	5-7	6-7
Duration in weeks	3	8	12	6	3	3	8	5	3	8

23. Solve the following game, use dominance method to reduce the matrix. **10**
Write the strategies adopted by each player and the value of game.

		Player B				
		Y_1	Y_2	Y_3	Y_4	Y_5
Player A	X_1	4	4	2	-4	-6
	X_2	3	6	8	-4	0
	X_3	10	2	4	10	12

24. a) Differentiate PERT and CPM. **5**

b) Find the non-degenerate basic feasible solution for the following transportation problem by Least Cost Method: **5**

		To				
		A	**B**	**C**	**D**	**Supply**
From	**I**	10	20	5	7	10
	II	13	9	12	8	20
	III	4	5	7	9	30
	IV	14	7	1	0	40
	V	3	12	5	19	50
	Demand	60	60	20	10	