



**End Term (Odd) Semester Examination December 2024**

Roll no. 22 92 104

Name of the Course and semester: BCA V Semester

Name of the Paper: Optimization techniques

Paper Code: TBC-503

Time: 3 hour

Maximum Marks: 100

**Note:**

- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1.

(2X10=20 Marks)

a. Define Operations Research. Discuss its scope and the areas where it is applied. CO1

b. What are the advantages and limitations of Operations Research? CO1

c. How does Operations Research contribute to effective decision-making in an organization? CO1

Q2.

(2X10=20 Marks)

a. Solve the following L.P.P. by graphical method

CO2

$$\text{Min } Z = 20x_1 + 10x_2$$

Subject to constraints

$$x_1 + 2x_2 \leq 40,$$

$$3x_1 + x_2 \geq 30,$$

$$4x_1 + 3x_2 \geq 60,$$

$$x_1, x_2 \geq 0$$

b. Obtain initial feasible solution for the following Transportation table using (i) North West Corner rule. (ii) Least Cost Method. (iii) VAM Method. CO2

	$D_1$	$D_2$	$D_3$	$D_4$	Supply
$S_1$	19	30	50	10	7
$S_2$	70	30	40	60	9
$S_3$	40	8	70	20	18
Demand	5	8	7	14	34

c. A travelling salesman has planned to visit 4 cities. He would like to start from a particular city, visit each city once and return to the starting city. The travel cost in rupees is given in table. Find the least cost route. CO2



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		To city			
		A	B	C	D
From city	A	$\infty$	25	75	45
	B	35	$\infty$	150	25
	C	35	40	$\infty$	15
	D	65	75	130	$\infty$

Q3.

(2X10=20 Marks)

- a. The following table represent the payoff matrix with respect to player A . Solve it optimally using dominance property. CO3

		Player B				
		1	3	2	4	5
Player A	1	4	6	5	10	6
	2	7	8	5	9	10
	3	8	9	11	19	9
	4	6	4	10	6	4

- b. Use the dominance rule to reduce the following game either  $2 \times M$  Or  $N \times 2$  game and then solve by graphical method. CO3

		Player B			
		I	II	III	IV
Player A	I	19	6	7	5
	II	7	3	14	6
	III	12	8	18	4
	IV	8	7	13	-1

(2X10=20 Marks)



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- c. In a game of matching coins with two players, suppose A wins one unit of value when there are two heads, wins nothing when there are two tails and losses  $1/2$  units of values when there is one head and one tail. Determine the payoff matrix, the best strategies for each player and value of the game to A. CO3

4.

(2X10=20 Marks)

- a. In a factory, there are six jobs to perform, each of which should go through two machines A and B, in the order A, B. The processing timings (in hours) for the jobs are given here. you are required to determine the sequence for performing the jobs that would minimize the total elapsed time, T. What is the value of T? CO4

Job:	$J_1$	$J_2$	$J_3$	$J_4$	$J_5$	$J_6$
Machine A:	1	3	8	5	6	3
Machine B:	5	6	3	2	2	10

- b. 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  $M_1, M_2, \dots, M_6$ . Processing time (in hours) is given below: CO4

	Machines					
	$M_1$	$M_2$	$M_3$	$M_4$	$M_5$	$M_6$
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 the sequence that will minimize the total elapsed time. Also find the idle time of all machines

- c. Find the sequence that minimizes the total elapsed time required to complete the following jobs on the machine A-B-Find also the minimum total elapsed time (hours) and the idle times on the machines. CO4

Job	I	II	III	IV	V	VI
Machine A	3	12	5	2	9	11
Machine B	8	6	4	6	3	1
Machine C	13	14	9	12	8	13



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5.

(2X10=20 Marks)

a. What is PERT and CPM? What are the uses of PERT and CPM?

CO5

b. Construct a network for the project whose activities and precedence relationships are as give below

Activity	A	B	C	D	E	F	G	H	I	J	K
Predecessor	-	-	-	A	B	B	C	D	E	H, I	F, G

CO5

c. The following details are available regarding a project

CO5

Activity	Predecessor Activity	Duration (weeks)
A	-	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D, E	4

Determine the critical path, the critical activities and the project completion time.