

H

Roll No. 2192069

TBC-503

B. C. A. (FIFTH SEMESTER)

END SEMESTER

EXAMINATION, Dec., 2023

OPTIMIZATION TECHNIQUES

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Write down the characteristics of operations research. (CO1)

(b) Write down advantages, limitations and application areas of operations research.

(CO1)

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- (c) What are the different features of operations research? (CO1)

2. (a) Obtain initial feasible solution for the following Transportation table using :

(CO2)

(i) North West Corner Rule

(ii) Least Cost Method

Source	Destination			Supply
	A	B	C	
1	2	7	4	50
2	3	3	7	70
3	5	4	1	80
4	1	6	2	140
Demand	70	90	180	

- (b) Solve Max. $z = 5x + 3y$ for the following constraints : (CO2)

$$x + 2y \leq 14, 3x - y \geq 0, x - y \leq 2$$

by graphical method.

- (c) Solve the following assignment problem shown in table using Hungarian method.

(3)

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The matrix entries and processing time of each man in hours : (CO2)

	I	II	III	IV	V
A	20	22	35	22	18
B	4	26	24	24	7
C	23	14	17	19	19
D	17	15	16	18	15
E	16	19	21	19	25

3. (a) Write down the difference between PERT and CPM. (CO3)

- (b) A project has the following times schedule : (CO3)

Activity	Time (in weeks)
1-2	7
1-3	10
2-3	4
2-4	5
3-4	6
3-5	11
3-6	10
4-6	7
5-7	10
6-7	8
6-8	12
7-8	0

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Construct the network and compute :

- (i) TE and TL for each event
- (ii) Float for each activity
- (iii) Critical path and its duration

(c) A project has the following characteristics : (CO3)

Activity	a	b	m
1-2	14	25	17
2-3	14	21	18
2-4	13	18	15
2-8	16	28	19
3-4	0	0	0
3-5	15	27	18
4-6	13	21	17
5-7	0	0	0
5-9	14	20	18
6-7	0	0	0
6-8	0	0	0
7-9	16	41	20
8-9	14	22	16

Construct a PERT network. Find the critical path and variance for each :

4. (a) Reduce the game by dominance : (CO4)

		Player B		
		I	II	III
Player A	I	0	-2	7
	II	2	5	6
	III	3	-3	8

- (b) What do you understand by game theory ?
Define graphical method used in game theory. (CO4)
- (c) Find optimal strategies and value of the game : (CO4)

		Player B			
		I	II	III	IV
Player A	I	1	7	3	4
	II	5	6	4	5
	III	7	2	0	3

5. (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

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determine the sequence for performing the jobs that would minimize the total elapsed time, T. What is the value of T? (CO5)

Job	M/c A	M/c B
J1	1	5
J2	3	6
J3	8	3
J4	5	2
J5	6	2
J6	3	10

(b) Determine the optimum sequence and minimum elapsed time : (CO5)

Job	M/c A	M/c B	M/c C
1	3	4	7
2	8	5	9
3	7	1	5
4	5	2	6
5	4	3	10

(7)

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- (c) Using graphical method, calculate the total time needed to complete both the job :
time given in hours : (CO5)

Job 1		Job 2	
A	1	C	3
B	2	A	4
C	3	D	2
D	5	E	1
E	1	B	5