DECA605

Reg. No.

VI Semester B.C.A. Theory Degree Examination, June/July - 2025

COMPUTER SCIENCE

Operation Research

(NEP Scheme)

Time : 2½ Hours **Maximum Marks : 60**

Instructions to Candidates:

Answer All the Parts.

PART - A

Answer any Four questions. Each question carries Two marks. **(4×2=8)**

1. What are the applications of OR?
2. What is Degeneracy in TP?
3. What is Saddle Point?
4. Define Sequencing.
5. What is an optimal solution and feasible solution?
6. Define Optimistic time and Pessimistic time.

PART - B

Answer any Four questions. Each question carries Five marks. **(4×5=20)**

7. A company manufactures two types of products P_1 and P_2, and sells them at a profit of Rs. 3/- on P_1 and Rs. 4/- on P_2. Each product is processed on two machines M_1 and M_2. P_1 requires 2 min of processing time on M_1 and 3 min on M_2. While product P_2 requires 1 min on M_1 and 2 min on M_2. The machine M_1 is available for not more than 7 hr 5 min, while M_2 is available for 9 hr during any working day. Formulate this as an LPP.

8. Solve the following assignment problem.

		Jobs			
		I	II	III	IV
Machines	A	5	9	3	6
	B	8	7	8	2
	C	6	10	12	7
	D	3	10	8	6

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9. A book binder has one printing press on binding machine and manuscript of 7 different books. The time required for performing printing and binding operations for different books are shown below.

Book	1	2	3	4	5	6	7
Printing days	30	100	90	30	130	25	75
Binding days	35	70	85	40	100	45	60

Decide the optimum sequence of processing of books in order to minimize the total time.

10. Obtain Initial basic feasible solution using North-West corner method.

		Ware House				
		W_1	W_2	W_3	W_4	Supply
	F_1	19	30	50	10	7
Factories	F_2	70	30	40	60	9
	F_3	40	8	70	20	18
	Demand	5	8	7	14	

11. Use Dominance Principle to solve the following game.

		Player y				
		y_1	y_2	y_3	y_4	y_5
	x_1	6	15	30	21	6
Player x	x_2	3	3	6	6	4
	x_3	12	12	24	36	3

12. Explain Fulkerson's Rule.

PART - C

Answer any Four questions. Each question carries Eight marks. **(4×8=32)**

13. Solve the LPP by graphical method.

Maximize, $z = 2x_1 + 3x_2$
Subject to $2x_1 + x_2 \leq 12$
$x_1 + 3x_2 \leq 15$
where $x_1, x_2 \geq 0$

14. a) Explain Hungarian algorithm. **(6)**

b) Write the standard form of LPP. **(2)**

15. Solve the following transportation problem using modified distribution method (MODI). Use Least Cost method to obtain Initial basic feasible solution.

	D_1	D_2	D_3	D_4	Supply
S_1	4	6	8	8	40
S_2	6	8	6	7	60
S_3	5	7	6	8	50
Demand	20	30	50	50	

16. Solve the following game using graphical method. Write the strategies adopted by each player and value of the game.

	B_1	B_2	B_3
A_1	1	3	12
A_2	8	6	2

17. a) Explain the basic components of network. **(4)**

b) The sequence of activities along with their predecessor requirements is given below. Construct the network diagram. **(4)**

Activity	**Predecessor Activity**
A	--
B	A
C	A
D	B
E	C, D
F	--
G	E, F

18. The following table shows a list of jobs and their duration in days.

Job	**Duration**
1 - 2	20
1 - 3	24
1 - 4	8
2 - 5	20
3 - 4	16
3 - 7	24
4 - 5	0
4 - 6	18
5- 6	0
4 - 7	4
6 - 7	12

a) Draw the network diagram and determine the critical path.

b) Find the total Slack for each activity.