BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - VII Computer Science & Engineering : WINTER: 2025
SUBJECT: OPTIMIZATION TECHNIQUES

Day : Thursday
Date : 11/12/2025

W-25604-2025

Time : 02:30 PM-05:30 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY**.
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Assume suitable data **WHEREVER** necessary.
4) Draw neat diagrams **WHEREVER** necessary.

Q.1 In a hospital, it is decided that each patient should be given at least 3, 4, 5 units of nutrients say A, B, C respectively. There are 4 foods say f1, f2 .f3 and f4 available .Let the following table shows the nutrients A, B, C present per unit in the foods f1, f2, f2 and f4. **(10)**

Nutrients	Foods				Stage capacity (min/day)
	F1	F2	F3	F4	
A	0.5	1	3	1.5	3
B	1	2	0	2.5	4
B	2	1.5	0.5	0	5

suppose the cost per unit of foods f1,f2,f3 and f4 is ₹1, ₹2, ₹3, ₹0.5 respectively. The problem is to find the best diet that can be supplied at minimum cost, satisfying the daily requirements of the patient. Formulate this into mathematical model

OR

Q.1 Explain various optimization techniques and their applications. Describe the advantages and limitations of at least two techniques. **(10)**

Q.2 Solve the following transportation problem using any suitable method **(10)**

	D1	**D2**	**D3**	**Supply**
S1	8	6	10	100
S2	9	7	4	120
S3	3	4	2	80
Demand	80	120	100	

Find an initial feasible solution.

OR

Q.2 Describe in detail the steps involved in the Graphical method of solving a linear programming problem. **(10)**

Q.3 Solve graphically the following non-linear programming problem, **(10)**
Maximize $z = x1 + 2x2$
Subject to, and $x1^2 + x2^2 \leq 1$
$2x1 + x2^2 \leq 2$
$x1, x2 \geq 0$

OR

Q.3 Describe the Steepest Descent Method used in solving unconstrained non-linear programming problems. **(10)**

P.T.O.

Q.4 Solve the following 0/1 Knapsack Problem using Dynamic Programming. **(10)**

Weights $w = [2, 3, 4, 5]$

Values $v = [3, 4, 5, 6]$

Max weight capacity $W = 5$

Formulate this as Dynamic Programming problem and solve it to determine the maximum value.

OR

Q.4 What is discrete dynamic programming? How does it differ from continuous dynamic programming in terms of state representation and applications? **(10)**

Q.5 Explain the branch and bound method for solving integer programming problems. What are the key components of this method, and how does it ensure that an optimal solution is found? **(10)**

OR

Q.5 Solve the following Integer Linear Programming Problem using the Cutting Plane method (perform at least 1 cut): **(10)**

Minimize $Z = x + 2y$

Subject to:

$2x + y \geq 4$

$x + 2y \geq 5$

$x, y \geq 0$ and integers

Q.6 Explain Neural network and sigmoid function? Explain computational procedure to solve crisp optimization problem. **(10)**

OR

Q.6 Define the union, intersection, and complement of two fuzzy sets A and B. Explain these operations with examples. **(10)**

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