BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - VII Computer Science & Engineering : WINTER : 2024
SUBJECT: OPTIMIZATION TECHNIQUES

Day : Thursday
Date : 05/12/2024

W-25604-2024

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 A factory manufactures three products. These products are processed through three distinct stages. The time required to manufacture a unit of each of three products and daily capacity of the stages are given by the following table: **(10)**

Stage	Time per unit (min)			Stage capacity min/day
	Product1	Product2	Product3	
1	2	3	4	520
2	4	6	-	460
3	-	5	2	490

It is required to determine the daily number of units to be produced of each product, given that the profit per unit of product 1, 2, 3 are 3, 5, 6 respectively. Suppose that the all the amount produced are absorbed by the market. Formulate this into mathematical model.

OR

Q.1 Explain Limitations of Linear Programming Problems (LPP). **(10)**

Q.2 Solve the following by graphical method: **(10)**

Minimize : $Z = 3x_1 + 5x_2$

Subject to $-3x_1 + 4x_2 \leq 12$

$2x_1 - x_2 \geq -2$

$2x_1 + 3x_2 \geq 12$

$x_1 \leq 4,\ x_2 \geq 2$

$x_1 \geq 0,\ x_2 \geq 0$

OR

Q.2 Obtain the basic feasible solution of the following transportation problem: **(10)**

Destination→ / Source ↓	D_1	D_2	D_3	D_4	Supply
S_1	10	0	20	11	15
S_2	12	7	9	20	25
S_3	0	14	16	18	5
Demand	5	15	15	10	45

Also find total transportation cost.

Q.3 Carry out maximum five iterations of the following problem using steepest descent method: **(10)**

Assume $X^0 = 0$

Minimize $f(x_1, x_2) = x_1 - x_2 + x_1^2 - x_1 x_2$.

P.T.O.

OR

Q.3 Solve graphically the following non-linear programming problem: (10)

Maximize : $Z = x_1 + 3x_2$

Subject to constraints

i) $x_1^2 + x_2^2 \leq 20$ *ii)* $x_1 . x_2 \leq 8$

and $x_1, x_2 \geq 0$

Q.4 Determine the values of u_1, u_2, u_3 so as to: (10)

Maximize : $Z = u_1 . u_2 . u_3$

Subject to constraints

$$u_1 + u_2 + u_3 = 10$$

and $u_1, u_2, u_3 \geq 0$

OR

Q.4 Use dynamic programming to solve the following problem: (10)

Maximize $Z = 3x_1 + 5x_2$

Subject to constraint

i) $x_1 \leq 4$ *ii)* $x_2 \leq 6$

iii) $3x_1 + 2x_2 \leq 18$ *and* $x_1, x_2 \geq 0$

Q.5 Describe classification of integer programming problems and write ILP in its standard form in abstract form. (10)

OR

Q.5 Solve the following integer programming problem using cutting plane algorithm: (10)

Maximize : $Z = 3x_1 + 12x_2$

Subject to constraints

i) $2x_1 + 4x_2 \leq 7$

ii) $5x_1 + 3x_2 \leq 15$

and $x_1, x_2 \geq 0$ and are integers

Q.6 What is neural network and sigmoid function? Explain computational procedure to solve crisp optimization problem. (10)

OR

Q.6 Define the union and intersection of two fuzzy sets A and B. Explain complement of fuzzy set with the help of Venn Diagram (10)

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