

BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - VIII Computer Science & Engineering AI & ML : SUMMER : 2025
SUBJECT: OPTIMIZATION METHODS IN MACHINE LEARNING

Day : Friday
Date : 23/05/2025

S-23996-2025

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, if necessary.
- 4) Draw neat and labeled diagrams, **wherever** necessary.

Q.1 Write importance of optimization, Write difference between a constraint surface and composite constraint surface. (10)

OR

Q.1 Solve graphically the linear programming problem. (10)
Maximize $Z = 5x_1 + 3x_2$
Subject to constraint $3x_1 + 5x_2 \leq 15$
 $5x_1 + 2x_2 \leq 10$
 $x_1, x_2 \geq 0$

Q.2 Write a short note on operation Research? Differentiate between linear and nonlinear programming problem? (10)

OR

Q.2 Explain these terms: (10)
a) Regression b) support vector method c) strong duality of optimization.

Q.3 Explain Heavy ball method for convergence analysis. (10)

OR

Q.3 Explain in brief Nesterov and FISTA method for convergence analysis. (10)

Q.4 Explain convergence proof of BFGS and DFP in machine learning. (10)

OR

Q.4 Find the value of X_2 , (10)
Minimize $f(x_1, x_2) = x_1 - x_2 + 2(x_1)^2 + 2x_1x_2 + (x_2)^2$ by
Taking point as $X_1 = \begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$

Q.5 Explain LASSO in optimization technique. (10)

OR

Q.5 What is atomic norm regularization? Also write its benefit in optimization. (10)

Q.6 What is ADMM in optimization technique and also write its application. (10)

OR

Q.6 Explain decentralization method of multipliers? (10)

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