Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 18 – 12- 2025 **Time:** 01:00pm – 04:00pm

School: SOCSE	**Program:** B.Tech CSE(AIML)	
Course Code : CAI3402	**Course Name:** Optimization Techniques for Machine Learning	
Semester: VII	**Max Marks**:100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**24**	**26**	**26**	**24**	

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	State the basic idea of Coordinate Descent.	**2 Marks**	**L1**	**CO1**
2.	Define Multivariate optimization.	**2 Marks**	**L1**	**CO1**
3.	Expand RMSProp.	**2 Marks**	**L1**	**CO2**
4.	Define surrogate loss.	**2 Marks**	**L1**	**CO2**
5.	Define learning rate with respect to optimization	**2 Marks**	**L1**	**CO2**
6.	What is Lagrangian function?	**2 Marks**	**L1**	**CO3**
7.	What is support vector?	**2 Marks**	**L1**	**CO3**
8.	Define inequality constraints?	**2 Marks**	**L1**	**CO3**
9.	Define parent node in DAG.	**2 Marks**	**L1**	**CO4**
10.	What is brute-force traversal?	**2 Marks**	**L1**	**CO4**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Explain Coordinate Descent steps with proper algorithm & flow chart.	**10 Marks**	**L2**	**CO1**
		Or			
12.	**a.**	Explain SVM classifier optimization pipeline.	**10 Marks**	**L2**	**CO1**
13.	**a.**	Compare Binary vs Multiclass Optimization models with examples.	**10 Marks**	**L2**	**CO1**
		Or			
14.	**a.**	Compare Bivariate & Multivariate Optimization with mathematical representation.	**10 Marks**	**L2**	**CO1**
15.	**a.**	Determine computationally efficient Newton variants (Quasi-Newton idea).	**10 Marks**	**L3**	**CO2**
		Or			
16.	**a.**	Illustrate how RMSProp differs from Momentum Based Learning.	**10 Marks**	**L3**	**CO2**
17.	**a.**	Describe surrogate design principles with examples.	**10 Marks**	**L2**	**CO2**
		Or			
18.	**a.**	Explain subgradient descent algorithm for non-smooth loss.	**10 Marks**	**L2**	**CO2**
19.	**a.**	Explain Lagrangian relaxation in structured ML optimization.	**10 Marks**	**L2**	**CO3**
		Or			
20.	**a.**	Explain role of constraints in learning optimization problems.	**10 Marks**	**L2**	**CO3**
21.	**a.**	Demonstrate how SVM dual is derived from primal objective.	**10 Marks**	**L3**	**CO3**
		Or			
22.	**a.**	Determine how primal gradient descent with line search.	**10 Marks**	**L3**	**CO3**
23.	**a.**	Explain DAG structure and node dependencies with diagram.	**10 Marks**	**L2**	**CO4**
		Or			
24.	**a.**	Explain how graph-level optimization improves run-time & memory.	**10 Marks**	**L2**	**CO4**
25.	**a.**	Explain brute-force node mapping	**10 Marks**	**L2**	**CO4**
		Or			
26.	**a.**	Explain DAG as intermediate representation in compilers.	**10 Marks**	**L2**	**CO4**