U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 22AM6PCAML **Max Marks: 100**
Course: Advanced Machine Learning **Date: 12.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	Explain Black swan paradox of beta binomial model using coin tossing problem.	**06**
	b)	Derive how to classify vectors of discrete-valued features using Naive Bayes classifier.	**07**
	c)	Derive the equation for posterior and posterior predictive distribution using Dirichlet-multinomial model.	**07**

UNIT - II

2	a)	Illustrate the concept of inference in jointly Gaussian distribution.	**06**
	b)	Explain • Quadratic Discriminant Analysis (QDA) • Linear Discriminant Analysis (LDA)	**08**
	c)	Discuss the Strategies for preventing overfitting in Multivariate Gaussian or Multivariate Normal (MVN).	**06**

UNIT - III

3	a)	Derive the posterior using Jeffreys-Lindley paradox and deliberate the importance of using priors when performing model selection.	**08**
	b)	Elucidate briefly how Bayesian approach overcomes the drawbacks of Maximum A Posteriori (MAP) Estimation.	**06**
	c)	Elaborate the pathologies of frequentist statistics by exemplifying the intervals and values scenario and also infer the likelihood principle for justification.	**06**

UNIT - IV

4	a)	Demonstrate how the Expectation Propagation and Variational message passing corresponds to optimization.	**07**
	b)	Describe the two approximation schemes used in the evaluation of posterior distribution.	**06**

	c)	Provide the optimal solution of approximating a Gaussian distribution using a factorized Gaussian.	**07**

OR

5	a)	Discuss Monte Carlo approximation.	**07**
	b)	Explain various purposes for which language modeling is used.	**06**
	c)	Illustrate Gibbs sampling algorithm with suitable data.	**07**

UNIT - V

6	a)	Define Kernel functions and explain any two types of kernels.	**07**
	b)	Illustrate Google's PageRank algorithm for web page ranking using Markov model.	**06**
	c)	Apply Support vector machines (SVMs) for classification.	**07**

OR

7	a)	Define Kernel trick and also analyse kernel PCA.	**06**
	b)	Discuss different kinds of inference in hidden Markov models.	**07**
	c)	Explain the forwards-backwards algorithm.	**07**

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