CLASS – XII : SEMESTER – III

SUBJECT: ARTIFICIAL INTELLIGENCE AND DATA SCIENCE (AIDS)-THEORY

FULL MARKS: 35 **CONTACT HOURS: 60 Hours**

UNIT NO.	SUB UNIT	TOPICS	CONTACT HOURS	MARKS
Unit -1 First order predicate logic (4)	**1**	Predicate, Quantifier, Universal Quantifier and Existential quantifier with simple examples, Simple concept of Unification (without details of MGU), Well-formed formula, translating English sentences to predicate logic(with simple examples), conversion to clause form (With Simple examples), Basic concept of Inference (With Simple examples), resolution in first order logic (With Simple examples)	8	4
Unit -2 Uncertainty Management (2)	2	Handling Uncertain Knowledge , Uncertainty and Rational decision, Probabilistic Reasoning, Bayes Rule, Conditional probability , Probabilistic inference using Bayes rule	4	2
Unit -3 Data Visualization (10)	3	Need for data visualization. Key Data Visualization Techniques (with suitable examples): Line plots, Bar plots, Histograms, Box plots, Scatter plots, Bubble plot, Treemaps, Heatmaps, Word clouds, Geospatial maps. Visualizing two-dimensional data with pair-wise scatter plots. Key Techniques in 3D Data Visualization: 3D Scatter Plots, 3D Surface Plots, contour plots. A brief introduction to data visualization platforms -Tableu and Google Chart	**16**	**10**

Unit-4 Introduction to Machine Learning (5)	5A	Definition of machine learning, Difference between traditional programming and Machine Learning, Applications of machine learning Types of Machine Learning (Supervised, Unsupervised, Semi-supervised and reinforcement learning), Linear Regression with one variable(feature), Hypothesis representation, Concept of hypothesis space, Concept of training examples, Concept of cost/loss function , Squared Error cost function, Normal method for finding the values of the parameters for the Linear Regression model with one variable , Gradient descent algorithm for minimizing Squared Error cost function to find the values of the parameters for the Linear Regression model with one variable, Effect of learning rate, Importance of feature scaling (min-max normalization. Define feature or attribute with Some examples, Types of features(continuous, categorical), Representation of training examples with multiple features, Regression with multiple variables (features) and its hypothesis representation, Formula for finding the values of the parameters for the Linear Regression model with multiple features (Mention formula only, no mathematical derivation for multivariate regression), Polynomial Regression(basic concept only).	10	5

Unit -5 Supervised Learning (14)	5A	Difference between regression and classification, Examples of some real world classification problems, Linear classification and threshold classifier, Concept of mis classification error, accuracy. Concept of input space and linear separator, Drawback of threshold classifier, Logistic regression model (without derivation), Use of logistic function in defining hypothesis function for logistic regression model, Probabilistic interpretation of the logistic regression model's output, Use of logistic regression model in binary classification task, Multi-class classification using One *vs.* all strategy.	14	10
	5B	Measuring performance of machine learning algorithms: confusion matrix, true positive, true negative, false positive, false negative, error, accuracy, precision, recall, F-measure, sensitivity and specificity, K-fold cross validation	8	4

NB : Additional 10 hours for Remedial and/or Tutorial classes