CEN- 809: MACHINE LEARNING TECHNIQUES

L	T	P			
3	1	0		Internal:	40 Marks

Credits : 4   **Total: 100 Marks**

Duration of Exam : 3 Hours

L   T   P   Internal: 40 Marks
3   1   0   External: 60 Marks
Credits : 4   **Total: 100 Marks**
Duration of Exam : 3 Hours

Course Outcomes:
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1   Students will be able to understand the concept of machine learning.
2   Students will be able to analyze different types of regression techniques and its applications
3   Students will be able to apply different types of dimensionality reduction techniques used in machine learning
4   Students will be able to understand about the Artificial neural network and its uses in various field
5   Students will be able to understand about the deep learning and its component and their implementation to solve various types of problems

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UNIT I

Introduction of Machine Learning, AI, ML and DL, Types of machine learning, Instance based learning, model-based learning, challenges in Machine Learning, Application of ML, ML development life cycle (MLDLC), fundamental of machine learning, univariate analysis, bivariate analysis, Multivariate Analysis

UNIT II

Linear Regression, Regression Metrics, MAE, MSE, RMSE, R squared , Adjusted R squared, Multiple Regression, Gradient descent, Batch Gradient , Stochastic Gradient , Mini Gradient, Polynomial Regression, Bias, variance, regularization techniques, Regularization Methods, Lasso Regression, Ridge Regression, Elastic Net Regression,   Logistic regression, classification evaluation metrics, Accuracy, confusion matrix, Precision, Recall, F1-Score, macro and weighted F1-Score, SoftMax regression or multinomial logistic regression, polynomial logistic regression

UNIT III

Dimensionality reduction, Subset selection, Forward selection, Backward selection, Principal component analysis**,** Linear Discriminant Analysis, Fisher's criterion, t-Distributed Stochastic Neighbor Embedding (t-SNE), Kullback–Leibler divergence

UNIT IV

Introduction to Deep Learning, Types of Neural Network, McCulloch-Pitts Neuron Model, Boolean Functions Using M-P Neuron, The Perceptron, Logistic regression using perceptron , Activation Functions,

Multilayer Perceptron(MLP), Multilayer Forward propagation , Back Propagation: Input, output and hidden layer computation, Memorization

UNIT V

Gradient descent in deep learning, Vanishing gradient problem, Early stopping, dropout layer, regularization in deep learning, CNN, convolution, padding & strides, pooling, backpropagation in CNN, Recurrent neural network(RNN), types of RNN

BOOKs:
- Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
- Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007
- Deep Learning, by Goodfellow, Bengio, and Courville.
- The Hundred-Page Machine Learning Book by Andriy Burkov by Andriy Burkov
- Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, Third Edition