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| **SESSION** | **FEB MARCH 2025** |
| **PROGRAM** | **MASTER OF BUSINESS ADMINISTRATION (MBA)** |
| **SEMESTER** | **IV** |
| **COURSE CODE & NAME** | **DADS401 ADVANCED MACHINE LEARNING** |
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**Assignment Set – 1**

**Q1. Write a note on:**

**(a) Criticise the types of Stationarity.**

**(b) Illustrate Exponential Smoothing. 5+5**

**Ans 1.**

**a. Types of Stationarity**

Stationarity in time series analysis refers to the property of a process where its statistical features such as mean, variance, and autocorrelation structure remain constant over time. There are primarily three types of stationarity: strict stationarity, weak (or second-order) stationarity, and trend stationarity.

**Strict stationarity** requires the complete joint distribution of any subset of variables to

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**Q2. Write a note on:**

**a. Interpret the ARCH Model. Explain its Usage.**

**b. Appraise a few risks associated with Artificial Intelligence. 5+5**

**Ans 2.**

**a. ARCH Model and its usage**

The Autoregressive Conditional Heteroskedasticity (ARCH) model, developed by Robert Engle in 1982, is a statistical model used to describe time series data exhibiting volatility clustering. This phenomenon refers to the observation that large changes in a series tend to be followed by large changes, and small changes tend to be followed by small changes, regardless of direction. ARCH models are particularly significant in financial and economic datasets.

In an ARCH model, the variance of the current error term depends on the squared error terms

**Q3. (a) Demonstrate any three applications of AI in Medical sciences.**

**(b)Discuss some challenges or limitations we face with Deep Learning. 5+5**

**Ans 3.**

**(a) Applications of AI in Medical Sciences**

Artificial Intelligence (AI) has made significant strides in transforming the field of medical sciences. One of the most impactful applications is in medical imaging and diagnostics. AI-powered systems, especially deep learning models like Convolutional Neural Networks (CNNs), are capable of identifying patterns in X-rays, MRIs, and CT scans with accuracy comparable to or exceeding that of human radiologists. These tools are used in detecting diseases such as cancer, tuberculosis, and brain tumors at early stages, improving patient outcomes.

Another application is in predictive analytics for disease outbreaks and patient monitoring. AI

**Assignment Set – 2**

**Q4. (a) Summarise Back Propagation.**

**(b) Appraise the classification of the Layers of CNN.**

**Ans 4.**

**a. Backpropagation**

Backpropagation is a supervised learning algorithm widely used for training artificial neural networks. The process involves the computation of gradients of a loss function with respect to the network’s weights, allowing the model to adjust these weights and minimize prediction errors. Backpropagation begins with a forward pass where inputs are processed layer by layer to compute an output. Once the output is obtained, the loss or error is calculated by comparing it with the actual value using a suitable loss function. This error is then propagated

**Q5. (a) What is an Auto-Encoder? Explain its classification.**

**(b) Describe the concept of LSTM. 5+5**

**Ans 5.**

**a. Understanding Autoencoders in Machine Learning and its classification**

Autoencoders are a class of unsupervised artificial neural networks that aim to learn efficient representations of input data. The goal of an autoencoder is to compress the input into a latent-space representation and then reconstruct the output from this representation to be as close as possible to the original input. This structure comprises three components: the encoder, the bottleneck, and the decoder. The encoder compresses the input data into a

**Q6. (a) Contrast between SARSA and Q-Learning.**

**(b) Reframe some algorithms commonly used with Image recognition systems. 5+5**

**Ans 6.**

**a. Comparison Between SARSA and Q-Learning**

SARSA and Q-learning are two popular reinforcement learning algorithms used for policy learning in an environment. They are both model-free, meaning they do not require prior knowledge of the environment’s dynamics. However, their learning strategies are fundamentally different. SARSA stands for State-Action-Reward-State-Action, while Q-learning is based on the State-Action-Reward-State formulation. The key difference lies in