Vivekanand Education Society's
Institute of Technology
Approved by AICTE & Affiliated to University of Mumbai

Artificial Intelligence and Data Science

Academic Year 2023-24/ TE / SEM V / Mid Term Test

23/08/2023

Syllabus for Mid Term Test

SUBJECT	syllabus
SEM IV	Mid Term Test
Cloud Computing	Introduction to Cloud Computing 1.1 Introduction– Component of CC, Comparing CC with Virtualization, Grids, Utility Computing, client-server model, P to P Computing, Impact of CC on Business, Key Drivers for Cloud Computing, Cloud computing Service delivery model. Cloud Types – Private, Public and Hybrid, when to avoid public cloud, Cloud AP. 2 Virtualization 2.1 Introduction & benefit of Virtualization, Implementation Levels of Virtualization, VMM Design Requirements and Providers, Virtualization at OS level, Middleware support for Virtualization, Virtualization structure/tools and mechanisms: Hypervisor and Xen Architecture, Binary Translation with full Virtualization, Para Virtualization with Compiler Support. Virtualization of CPU, Memory and I/O Devices, Hardware support for Virtualization in Intel x86 processor, CPU Virtualization, Memory Virtualization 3 Cloud computing Services and business value 3.1 XaaS, IaaS, PaaS- Leveraging PaaS for Productivity Languages for PaaSDBaaS(Database as a services) – SaaS (Software as a service) – Comparison of various cloud computing providers/ Softwares. 3.2 Key Business Drivers for CC- Cloud computing and out sourcing – Types of Scalability – Security issues in Cloud Computing- time to Market BenefitsDistribution over Internet – Three levels of Business value from Cloud computing

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Web Development	Unit 1) Web programming fundamentals Working of web browser, HTTP protocol, HTTPS, DNS, TLS, XML introduction, Json introduction, DOM, URL, URI, REST API Unit 2) Javascript Introduction to JavaScript: JavaScript language constructs, Objects in JavaScript- Built in, Browser objects and DOM objects, event handling, form validation and cookies.Introduction to ES5,ES6, Difference between ES5 and E S6. Variables, Condition, Loops, Functions, Events, Arrow functions, Setting CSS Styles using JavaScript, DOM manipulation, Classes and Inheritance. Iterators andGenerators, Promise, Client-server communication, Fetch Unit 3) React Fundamentals Installation, Installing libraries, Folder and file structure, Components, Component lifecycle, State and Props, React Router and Single page applications, UI design, Forms, Events, Animations, Best practices.
Artificial Intelligence	Ch 1 Artificial Intelligence (AI), AI Perspectives: Acting and Thinking humanly, Acting and Thinking rationally History of AI, Applications of AI, The present state of AI, Ethics in AI Ch 2. Introduction of agents, Structure of Intelligent Agent, Characteristics of Intelligent Agents Types of Agents: Simple Reflex, Model Based, Goal Based, Utility Based Agent Environment Types: Deterministic, Stochastic, Static, Dynamic, Observable, Semi-observable, Single Agent, Multi Agent Ch 3. Definition, State space representation, Problem as a state space search, Problem formulation, Well-defined problems 3.2 Solving Problems by Searching, Performance evaluation of search strategies, Time Complexity, Space Complexity, Completeness, Optimality . Uninformed Search: Depth First Search, Breadth First Search, Depth Limited Search, Iterative Deepening Search, Uniform Cost Search, Bidirectional Search Informed Search: Heuristic Function, Admissible Heuristic, Informed Search Technique, Greedy Best First Search, A* Search, Local Search: Hill Climbing Search, Simulated Annealing Search, Game Playing, Adversarial Search Techniques, Mini-max Search, Alpha-Beta Pruning
Data Warehousing and Mining	**1 Data Warehouse and OLAP** Data Warehousing, Dimensional Modeling and OLAP The Need for Data Warehousing; Data Warehouse Defined; Benefits of Data Warehousing ; Features of a Data Warehouse; Data Warehouse Architecture; Data Warehouse and Data Marts; Data Warehousing Design Strategies. Dimensional Model Vs ER Model; The Star Schema, The Snowflake Schema; Fact Tables and Dimension Tables; Fact less Fact Table; Updates To Dimension Tables, Primary Keys, Surrogate Keys & Foreign Keys; Aggregate Tables; Fact Constellation Schema or Families of Star Need for Online Analytical Processing; OLTP vs OLAP; OLAP Operations in a cube: Roll-up, Drilldown, Slice, Dice, Pivot ; OLAP Models: MOLAP, ROLAP, HOLAP. Major steps in ETLProcess

	2 Introduction to Data Mining ,Data Exploration and Data Preprocessing Data Mining Task primitives,Architecture,KDD process,Issues in data Mining,Types of Attributes; Statistical Description of Data; Data Visualization; Measuring similarity and dissimilarity. Why Preprocessing? Data Cleaning; Data Integration; Data Reduction: Attribute subset selection, Histograms, Clustering and Sampling; Data Transformation & Data Discretization: Normalization, Binning, Histogram Analysis and Concept hierarchy generation. **3 Classification** Basic Concepts; Classification methods: 1. Decision Tree Induction: Attribute Selection Measures, Tree pruning. 2. Bayesian Classification: Naïve Bayes' Classifier
DLOC: Statistics for Artificial Intelligence & Data Science	**Exploratory Data Analysis** 1.1 Elements of Structured Data ,Further Reading ,Rectangular Data ,Data Frames and Indexes ,Nonrectangular Data Structures , Estimates of Location ,Mean ,Median and Robust Estimates , Estimates of Variability, Standard Deviation and Related Estimates, Estimates Based on Percentiles , Exploring the Data Distribution ,Percentiles and Boxplots ,Frequency Tables and Histograms ,Density Plots and Estimates. 1.2 Exploring Binary and Categorical Data,Mode, Expected Value, Probability, Correlation, Scatte rplots ,Exploring Two or More Variables ,Hexagonal Binning andContours (Plotting Numeric Versus Numerical Data) ,Two Categorical Variables, Categorical and Numeric Data Visualizing Multiple Variables. **Data and Sampling Distributions** 2.1 Random Sampling and Sample Bias ,Bias ,Random Selection ,Size Versus Quality, Sample Mean Versus Population Mean ,Selection Bias ,Regression to the Mean, Sampling Distribution of a Statistic ,Central Limit Theorem ,Standard Error ,TheBootstrap ,Resampling Versus Bootstrapping 2.2 Confidence Intervals, Normal Distribution, Standard Normal and QQ-Plots, Long-Tailed Distributions ,Student's t-Distribution ,Binomial Distribution ,Chi-SquareDistribution ,F-Distribution, Poisson Distributions. **Linear Least Squares** 6.1 Simple Linear Regression, Statistical Properties of the Estimated Slope and Intercept , Assessing the Fit , Correlation and Regression , The Matrix Approach to Linear LeastSquares , Statistical Properties of Least Squares Estimates , Vector-Valued Random Variables , Mean and Covariance of Least Squares Estimates , Estimation of $\sigma 2$, Residuals and Standardized Residuals , Inference about β , Multiple Linear Regression—An Example

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