K.L.N.COLLEGE OF ENGINEERING

Pottapalayam–630612, Sivagangai District

(An Autonomous Institution, Affiliated to Anna University, Chennai)

Estd:1994

FOURTH SEMESTER

CURRICULUM & SYLLABUS

REGULATIONS 2024

For Under Graduate Program

B.TECH ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

CHOICE BASED CREDIT SYSTEM

(For the students admitted from the academic year 2024-2025 onwards)

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

(An Autonomous Institution, Affiliated to Anna University, Chennai)

VISION OF THE INSTITUTION

- To become a Centre of Excellence in Technical Education and Research in producing Competent and Ethical professionals to the society.

MISSION OF THE INSTITUTION

- To impart Value and Need based curriculum to the students with enriched skill development in the field of Engineering, Technology, Management and Entrepreneurship and to nurture their character with social concern and to pursue their career in the areas of Research and Industry.

VISION OF THE DEPARTMENT

- To become a centre of Excellence in producing competent and futuristic professionals in Artificial Intelligence and Data Science through quality Education and Research to the Society and Industry.

MISSIONOFTHEDEPARTMENT

- To produce intellectual, innovative and ethical professionals by imparting technical and industry oriented skills with ethical values in Artificial Intelligence and allied areas to pursue their career in Industry and Research.

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

(An Autonomous Institution, Affiliated to Anna University, Chennai)

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1: Ability to apply major key algorithms, techniques and theoretical findings in the field of Artificial Intelligence, Machine Learning and Deep Learning.

PSO 2: Ability to incorporate data science theories an methodologies into new research in data management, data visualization, and statistical analysis of data.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO 1: To excel in professional career and pursue higher education in the field of artificial intelligence and data science.

PEO 2: To apply their knowledge and skills to develop innovative solutions for real world problem through lifelong learning.

PEO 3: To excel as socially committed engineers or entrepreneurs with good communication and team work skills with high regard to ethical and moral values.

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Knowledge and Attitude Profile(WK)

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledgefortheacceptedpracticeareasintheengineeringdisciplinemuchisatthe forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re- use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice are as in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline,such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

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Program Outcomes(POs)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modeling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Teamwork: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineeringmanagementprinciplesandeconomicdecision-makingandapplytheseto one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life Long Learning: Recognize the need for, and have the preparation and ability for i)independent and life-long learning ii)adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

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REGULATIONS 2024

For Under Graduate Program

B. TECH. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

CHOICE BASED CREDIT SYSTEM

CATEGORY OF COURSES

i. **Humanities and Social Sciences (HS) Courses** include Technical English, Environmental Science and Engineering ,Engineering Ethics and human values, Communication Skills and Management courses.

ii. **Basic Sciences (BS)Courses** include Mathematics, Physics, and Chemistry.

iii. **Engineering Sciences (ES) Courses** include Engineering Practices, Engineering Graphics, Basics of Electrical / Electronics / Mechanical / Computer Engineering /Instrumentation etc.

iv. **Professional Core (PC) Courses** include the core courses relevant to the chosen programme of study.

v. **Professional Elective (PE) Courses** include the elective courses relevant to the chosen programme of study.

vi. **Open Elective(OE)Courses** include courses from other departments which a student can choose from the list specified in the curriculum of the students B.E. /B.Tech. Programmes.

vii. **Employability Enhancement Courses(EEC)**include Project Work and/or Internship, Seminar, Professional Practices, Case Study and Industrial/Practical Training.

viii. **Mandatory Courses (MC)** include Personality and Character development and the courses recommended by the regulatory bodies such as AICTE, UGC, etc

K.L.N. COLLEGE OF ENGINEERING, POTTAPALAYAM

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B.Tech ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

REGULATIONS 2024

SEMESTER IV

S. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1	24BS402	Probability and Statistics (Common to B.E.CSE,CSE(CS),CSE(IoT), B.Tech. IT & AI&DS Programmes)	BS	4	3	1	0	4
2	24AD401	Artificial Intelligence (Common to B.E CSE,B.Tech IT& AI&DS Programmes)	PC	3	3	0	0	3
3	24CS403	Computer Networks (Common to B.E CSE,CSE(CS), B.Tech IT & AI&DS Programmes)	PC	3	3	0	0	3
4	24CS401	Database Management Systems (Common to B.E.CSE,CSE(CS),CSE(IoT) , B.Tech. IT & AI&DS Programmes)	PC	3	3	0	0	3
5	24CS405	Concepts of Operating System	PC	3	3	0	0	3
THEORY CUM PRACTICAL								
6	24AD402	Data Exploration and Visualization	PC	5	3	0	2	4
PRACTICAL								
7	24AD4L1	Artificial Intelligence Laboratory	PC	3	0	0	3	1.5
8	24CS4L1	Database Management System Laboratory (Common to B.E.CSE, CSE(CS), CSE(IoT), B.Tech. IT & AI&DS Programmes)	PC	3	0	0	3	1.5
9	24HS4L1	Aptitude and Soft Skills –III (Common to all B.E./B.Tech programmes)	EEC	2	0	0	2	1*
TOTAL				**29**	**18**	**1**	**10**	**23**

* **The grades earned by the students will be recorded in the mark sheet, however the same shall not be considered for the computation of CGPA**

24BS402	PROBABILITY AND STATISTICS	L	T	P	C
		3	1	0	4

OBJECTIVES:

- This course aims at providing the required skill to apply the statistical tools in engineering problems.
- To introduce the basic concepts of probability and random variables of one and two dimensions.
- To acquaint the knowledge of testing of hypothesis for small and large samples and to introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

UNIT – I PROBABILITY AND RANDOM VARIABLES 9+3

Probability–Discrete and continuous random variables –Moments–Moment generating functions– Binomial, Poisson, Uniform, Exponential and Normal distributions (Except derivations).

UNIT – II TWO-DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression –Transformation of random variables–Central limit theorem (for independent and identically distributed random variables).

UNIT - III TESTING OF HYPOTHESIS 9+3

Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means-Tests based on t,Chi-square and F distributions for mean, variance and proportion-Contingency table (test for independence)-Goodness of fit.

UNIT - IV DESIGN OF EXPERIMENTS 9+3

One way and Two way classifications – Completely randomized design–Randomized block design–Latin square design-2^2 factorial design.

UNIT - V STATISTICAL QUALITY CONTROL 9+3

Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts)–Tolerance limits-Acceptance sampling.

TOTAL: 45+15 PERIODS

TEXT BOOKS:

1. Johnson.R.A.,Miller ,I and Freund J.,"Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia,8th Edition, 2015.
2. Veerarajan.T.,"Probability, Statistics and Random Processes", Tata Mc Graw Hill, New Delhi, 2006.

REFERENCES:

1. Papoulis.A. and Unnikrishnapillai.S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, New Delhi, 4thEdition, 2002.
2. Spiegel.M.R.,Schiller.J and Srinivasan.R.A.,"Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGrawHill,3rdEdition,2004.
3. Walpole.R.E.,Myers.R.H.,Myers.S.L. and Ye.K., "Probability and Statistics for Engineers and Scientists",Pearson Education,Asia,8thEdition,2011.
4. Gupta.S.C., Kapoor.V.K,, "Fundamental of Mathematical Statistics", Sultanch and & Sons Educational Publishers, New Delhi, Reprint 2013.
5. Kandasamy.P.,Thilagvathi. K.,Gunavathi.K., "Probability R and om Variables& Random Processes",S.Chand&Co.Ltd.,Reprint2008.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name : PROBABILITY AND STATISTICS		**Course Code : 24BS402**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C209.1	Build the parameters of statistical distributions using basic probability theory concepts.	I	K3
C209.2	Calculate the statistical measures for two dimensional random variables.	II	K3
C209.3	Apply the concepts of testing of hypothesis for large and small samples.	III	K3
C209.4	Apply the basic concepts of design of experiments in the field of agriculture.	IV	K3
C209.5	Use control charts for quality control problems.	V	K3

HOD/AI&DS

24AD401	ARTIFICIAL INTELLIGENCE	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To know about the various applications of AI

UNIT - I INTRODUCTION 9

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents– Typical Intelligent Agents – Problem Solving Approach to Typical AI problems

UNIT - II PROBLEM SOLVING METHODS 9

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search

UNIT - III KNOWLEDGE REPRESENTATION 9

First Order Predicate Logic –Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information.

UNIT - IV PROBABILISTIC REASONING 9

Acting under uncertainty – Bayesian inference – naïve Bayes models. Probabilistic reasoning – Bayesian networks – exact inference in BN – approximate inference in BN – causal networks.

UNIT - V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approachǁ, Prentice Hall, Fourth Edition, 2021.

REFERENCES:

1. M. Tim Jones, —Artificial Intelligence: A Systems Approach(Computer Science)‖, Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, —The Quest for Artificial Intelligence‖, Cambridge University Press,2009.
3. David L. Poole and Alan K. Mackworth, —Artificial Intelligence: Foundations of Computational Agents‖, Cambridge University Press, 2010.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :ARTIFICIAL INTELLIGENCE		**Course Code : 24AD401**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C210.1	Explain the apt agent strategy for solving Typical AI problems	I	K2
C210.2	Apply appropriate search algorithms for any AI problem	II	K3
C210.3	Apply knowledge representation and logic for problem solving	III	K3
C210.4	Understand the probabilistic reasoning under uncertainty	IV	K2
C210.5	Categorize various applications of Artificial Intelligence.	V	K2

HOD/AI&DS

24CS403	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

OBJECTIVES

- To understand the concept of layering and functions of each layers of the protocol suits
- To be familiar with the components required to build different types of networks
- To learn concepts related to network addressing and routing
- To familiarize the functions and protocols of the layer of Transport layer
- To understand the working of various application layer protocols

UNIT – I INTRODUCTION TO NETWORKS 8

Network Introduction: Evolution of Computer Networks, Classification of computer Networks LAN, WAN, MAN, Software Defined Networks (SDN), Network Topology: BUS, STAR, RING, MESH, OSI Layered Architecture, TCP/IP Protocol Suite.

UNIT – II MEDIA ACCESS & INTER NETWORKING 12

Medium Access Control Techniques: Random, Round Robin, Reservation: ALOHA Pure and Slotted, CSMA/CD-CSMA/CA- Ethernet-Token Ring-Token Bus-ARQ 3 Types, Data Link Layer design issues: Error Detection Codes, Parity Check, Checksum Error Correction Codes, Hamming codes, IEEE Standards: Bluetooth (802.15), Basic Internetworking: IP - CIDR - ARP -DHCP - ICMP.

UNIT – III NETWORK DEVICES AND NETWORK LAYER 8

Network Devices: Router, Switch, HUB, Bridge, Routing: Static Routing, Dynamic Routing, Categories of Routing – RIP v1 and RIP v2- IPV4 Addressing - IPV6 Addressing

UNIT – IV TRANSPORT LAYER 9

Overview of Transport layer: UDP - Reliable byte stream (TCP), Connection Management: Flow control – Retransmission – TCP Congestion control, Congestion avoidance:

UNIT – V APPLICATION LAYER 8

Traditional applications: SSH – HTTP – FTP –DNS – SNMP - Telnet

TOTAL: 45 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.

REFERENCES

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
3. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An OpenSource Approach, McGraw Hill Publisher, 2011.
4. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :COMPUTER NETWORKS		**Course Code : 24CS403**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C211.1	Identify the different types of computer networks and their layered architectures to determine suitable networking solutions.	I	K3
C211.2	Analyze various MAC techniques and apply link-layer error-handling methods in communication scenarios.	II	K4
C211.3	Apply routing concepts to evaluate the functioning of network devices and analyze IPv4/IPv6 addressing schemes	III	K4
C211.4	Generalize the transport-layer mechanisms by applying TCP/UDP concepts to real-time data transmission problems	IV	K4
C211.5	Illustrate application-layer protocols to analyze how common network services enable end-to-end communication.	V	K4

HOD/AI&DS

24CS401	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To learn the fundamentals of data models and to depict a database system using ER Diagrams
- To study relational database model and to write SQL queries for store/retrieve database
- To understand Normalization technique to improve the performance data base design
- To understand the concepts of Transaction processing, concurrency control techniques and recovery procedures for real time applications.
- To understand working procedures of query processing and internal storage structures using different file and indexing techniques which will help in physical DB design

UNIT – I DATABASE FUNDAMENTALS 9

Purpose of Database System – Views of data – Data abstraction and data independence-Instances and schemas- Database System Architecture – Difference between File system and DBMS, Compare Centralized vs Distributed database, Data Models –Constraints- Keys with its types, Entity Relationship Model: Entity Sets – Relationship sets-Types of mapping constraints-Attributes–Relationships in ER diagram- E-R design issues– Extended ER features: Generalization, Specialization and Aggregation in ER model

UNIT – II RELATIONAL DATABASE 9

Relational Algebra: Relational operators- Joins - Relational Calculus: Tuple relational calculus and Domain relational calculus, SQL: Types of commands- set operations, Constraints- Aggregate Functions- Clauses-– operators, Subqueries: Correlated and Nested Subqueries – Joins – Views – Authorization – Advanced SQL – Triggers – Cursors – Procedure – Functions – Embedded SQL – Dynamic SQL

UNIT – III RELATIONAL DATABASE DESIGN 9

Need for Database Design – Functional Dependencies – Closure of Functional Dependencies – Canonical Cover – Armstrong Axioms - Problem of Redundancy in database-Lossless join and Dependency Preserving decomposition, Normalization: First Normal Form– Second Normal Form – Third Normal Form –Boyce Code Normal Form – Fourth Normal Form – Fifth Normal Form

UNIT – IV TRANSACTIONS AND CONCURRENCY CONTROL 9

Transaction: ACID properties and their necessity – Transaction States – Schedule and conflict: Types of schedules–Conflict Serializable schedule–View Serializable schedule-Conflict equivalent schedule-Recoverability in DBMS: Recoverable and Irrecoverable Schedule- Cascading rollback, Cascade less and strict schedule, Equivalence of schedule, Concurrency Control: Lock Based Protocols–Time stamp based Protocols –Validation Based Protocols - Deadlock handling

UNIT – V STORAGE AND QUERY PROCESSING 9

File Organization – RAID- Indexing and Hashing: Ordered Indices – Static Hashing – Dynamic Hashing, Comparison of Ordered indexing and Hashing, B+ tree Index Files, Query Processing – Measures of Query cost, Algorithms for SELECT and JOIN operations – Evaluation of expressions.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan — Database System Concepts, Seventh Edition, Tata McGraw Hill, 2019.
2. Ramez Elmasri, Shamkant B. Navathe —Fundamentals of Database Systems, Seventh Edition, Pearson Education, 2016.

REFERENCES:

1. Raghu Ramakrishnan —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
2. C.J.Date, A.Kannan, S.Swamynathan -An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :DATABASE MANAGEMENT SYSTEMS		**Course Code : 24CS401**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C212.1	Illustrate the fundamental elements of relational database management systems and also ability to design the database using ER modeling.	I	K3
C212.2	Apply SQL queries to interact with database.	II	K3
C212.3	Apply normalization to design the database efficiently through elimination of anomalies	III	K3
C212.4	Analyze database transactions and can control them by applying ACID properties and also Summarize concurrency control protocols.	IV	K4
C212.5	Illustrate database storage structures and access techniques: file organization, indexing methods including B+ tree and hashing.	V	K3

HOD/AI&DS

24CS405	CONCEPTS OF OPERATING SYSTEM	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads.
- To apply various Scheduling algorithms.
- To understand the concept of Deadlocks and memory management schemes.
- To understand I/O management and File systems.
- To study various operating systems like Distributed OS, Real-Time OS, Virtual machine and basic concepts of virtualization.

UNIT-I OPERATING SYSTEM OVERVIEW 9

Operating System Overview - Objectives and Functions, Evolution of Operating Systems, Operating System Structure and Operations- System Calls, System Programs, Operating Systems Generation and System Boot.

UNIT-II PROCESS MANAGEMENT AND CONCURRENCY CONTROL 9

Processes - Process Concept and Scheduling, Operations on Processes, Inter Process Communication - CPU Scheduling - Scheduling criteria, Scheduling algorithms; Threads-Overview, Multithreading models, Threading issues - Process Synchronization - The critical-section problem, Mutex locks,Semaphores, Classic problems of synchronization, critical region, Monitors.

UNIT - III DEADLOCK AND STORAGE MANAGEMENT 9

Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock;Main Memory - Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation; Virtual Memory - Background, Demand Paging, Page Replacement, Allocation, Thrashing - Allocating Kernel Memory.

UNIT - IV MASS STORAGE AND FILE SYSTEMS 9

Overview of Mass Storage System and Structure- Disk Structure, Disk Scheduling and Management Swap space management; File-System-Interface- File concept, Access methods, File Sharing and Protection, Allocation Methods, Free Space Management; Directory- Structure, organization, implementation.

UNIT - V ADVANCED OPERATING SYSTEMS AND VIRTUALIZATION 9

Basics of Network Operating System, Server Operating System, Real Time Operating System and Distributed Operating Systems - Virtual Machines - Types and Structure - virtualization - Types, Techniques and Application - supporting multiple operating systems simultaneously on a single hardware platform; Running one operating system on top of another.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, - Operating System Concepts, 10th Edition, John Wiley and Sons Inc., 2018.
2. William Stallings, “Operating Systems - Internals and Design Principles”, 9th Edition, Prentice Hall, 2018.

REFERENCES:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Fifth Edition, Pearson Publications, 2022.
2. AchyutS.Godbole, AtulKahate, - Operating Systemsll, McGraw Hill Education, 2016.
3. RamazElmasri, A. Gil Carrick, David Levine, - Operating Systems - A Spiral Approach, Tata McGraw Hill Edition, 2010.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :CONCEPTS OF OPERATING SYSTEM		**Course Code : 24CS405**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C213.1	Understand basics and functions of operating systems.	I	K2
C213.2	Apply various scheduling algorithms and threads.	II	K3
C213.3	Apply process synchronization and deadlock, prevention, avoidance algorithms.	III	K3
C213.4	Construct various memory management schemes	IV	K3
C213.5	Apply the functionality of advanced operating systems and virtualization	V	K3

HOD/AI&DS

24AD402	DATA EXPLORATION AND VISUALIZATION	L	T	P	C
		3	0	2	4

OBJECTIVES:

- To outline an overview of exploratory data analysis
- To perform univariate data exploration and analysis.
- To apply bivariate data exploration and analysis.
- To use Data exploration and visualization techniques for multivariate and time series data

UNIT-I EXPLORATORY DATA ANALYSIS 9

EDA fundamentals – Understanding data science – Significance of EDA – Making sense of data –Comparing EDA with classical and Bayesian analysis – Software tools for EDA - Visual Aids for EDA- Data transformation techniques-merging database, reshaping and pivoting, Transformation techniques - Grouping Datasets - data aggregation

UNIT-II UNIVARIATE ANALYSIS 9

Introduction to Single variable: Distributions and Variables - Numerical Summaries of Level and Spread - Scaling and Standardizing – Inequality - Smoothing Time Series.

UNIT-III BIVARIATE ANALYSIS 9

Relationships between Two Variables - Percentage Tables - Analyzing Contingency Tables - Handling Several Batches - Scatterplots and Resistant Lines – Transformations.

UNIT- IV MULTIVARIATE AND TIME SERIES ANALYSIS 9

Introducing a Third Variable - Causal Explanations - Three-Variable Contingency Tables and Beyond - Longitudinal Data – Fundamentals of TSA – Characteristics of time series data – Data Cleaning – Time-based indexing – Visualizing – Grouping – Resampling.

UNIT-V DATA VISUALIZATION 9

Loading Data into R -Transforming Data - Creating Tidy Data - Basic Data Exploration Techniques -Data Visualization Techniques – Visualizing Geographic Data with ggmap - R Markdown.

TOTAL: 45 PERIODS

LAB COMPONENT: 30 PERIODS

1.Execute various commands in R for descriptive data analytics using bench mark datasets

2.Use R tool to explore various variable and row filters for cleaning data.

3. Use R commands for probability distributions and probability statistics.

4.Show various plot features in R on sample data sets and visualize

5.Install the data Analysis and Visualization tool:Python/TableauPublic/ PowerBI Desktop.

6.Prepare & Load data

7.Develop the data model

8.Perform DAX calculations

9.Design a report

10.Create a dashboard and perform data analysis

SOFTWARE:R studio**/** RTool / TableauPublic/ PowerBI Desktop.

TEXT BOOKS:

1. Suresh Kumar Mukhiya, Usman Ahmed, “Hands-On Exploratory Data Analysis with Python”, Packt Publishing, 2020.
2. Catherine Marsh, Jane Elliott, “Exploring Data: An Introduction to Data Analysis for Social Scientists”, Wiley Publications, 2nd Edition, 2008.

REFERENCES:

1. Eric Pimpler, “Data Visualization and Exploration with R”, Geo Spatial Training service, 2017
2. Claus.O.Wlike, Fundamentals of Data Visualization, A primer on making informative and compelling Figures, O’Reily Publications, 2019.

OUTCOMES:

AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :DATA EXPLORATION AND VISUALIZATION		**Course Code : 24AD402**	
CO	**Course Outcomes**	**Unit**	**K –CO**
C214.1	Demonstrate various data transformation techniques in data analysis	I	K3
C214.2	Apply univariate data exploration and analysis for dataset.	II	K3
C214.3	Apply bivariate data exploration and analysis for given data.	III	K3
C214.4	Apply multivariate and time series analysis.	IV	K3
C214.5	Apply data analysis and visualization techniques.	V	K3

HOD/AI&DS

24AD4L1	ARTIFICIAL INTELLIGENCE LABORATORY	L	T	P	C
		0	0	3	1.5

OBJECTIVES:

- To design and implement search strategies
- To implement CSP techniques
- To develop systems with logical reasoning
- To develop systems with probabilistic reasoning

LIST OF EXPERIMENTS:

1. Implement basic search strategies – 8-Puzzle, 8 - Queens problem, Cryptarithmetic.
2. Implement A* and memory bounded A* algorithms
3.Travelling Salesperson Problem using Heuristic approach
4. Solve constraint satisfaction problems
5. Implement propositional model checking algorithms
6. Implement forward chaining and backward chaining
7. Implement resolution strategies
8. Build naïve Bayes models
9. Implement Bayesian networks and perform inferences
10.Create a chatbot application using AI.

TOTAL: 45 PERIODS

SOFTWARE: Python 3.0 above

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :ARTIFICIAL INTELLIGENCE LABORATORY		**Course Code : 24AD4L1**	
CO	**Course Outcomes**	**Exp.No**	**K –CO**
C215.1	Apply and implement search strategies	1,2,3	K3
C215.2	Implement various CSP techniques	4	K3
C215.3	Develop logical reasoning systems	5,6	K3
C215.4	Develop probabilistic reasoning systems	7,8,9	K3
C215.5	Develop a chatbot application using AI	10	K3

HOD/AI&DS

		L	T	P	C
24CS4L1	DATABASE MANAGEMENT SYSTEMS LABORATORY	0	0	3	1.5

OBJECTIVES:

- To write and debug Database commands.
- To implement advanced query in Database tool.
- To use functions and procedures for implementing simple logic in Database.
- To design real time applications using front end tool and Database.
- To implement Database connectivity for real time applications.

LIST OF EXPERIMENTS

1. Implementation of Data Definition and Data Manipulation Language Commands of SQL with suitable examples.
2. Implementation of Data Control and Transaction Control Language Commands of SQL with suitable examples.
3. Implementation of Aggregate Functions and Set Operations with suitable examples.
4. Implementation of different types of constraints and Group by, Order by, Having clause with suitable examples
5. Implementation of different types of Joins with suitable examples.
6. Implementation of Nested Sub queries and Views.
7. Study of PL/SQL programs
8. PL/SQL - procedures
9. PL/SQL - Functions
10. PL/SQL – Triggers and Cursor
11. Front end application development – Create Forms, Menu and Reports.
12. Implementation of Database Connectivity

TOTAL: 45 PERIODS

PLATFORM NEEDED: Oracle/Mysql/Visual Basics/Netbeans IDE

OUTCOMES:
AT THE END OF THE COURSE, LEARNERS WILL BE ABLE TO:

Course Name :DATABASE MANAGEMENT SYSTEMS LABORATORY		Course Code : 24CS4L1	
CO	**Course Outcomes**	**Exp.No**	**K –CO**
C216.1	Develop simple Database using DDL, DML and TCL commands.	1,2	K3
C216.2	Create Relational Database for real time application through Database constraints.	3,4	K3
C216.3	Write and execute nested sub queries and join queries with privileges.	5,6	K3
C216.4	Develop PL/SQL programs using Procedure, Functions, Triggers and Cursor.	7-10	K3
C216.5	Design real time applications with Database Connectivity.	11,12	K3

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24HS4L1	APTITUDE AND SOFT SKILLS - III	L	T	P	C
		0	0	2	1

Module I LOGICAL REASONING SKILLS 10

Logical Reasoning, Letter and Symbol series, Number series, Analyzing arguments, Making judgments, Logical Reasoning, Direction Sense test, Venn diagrams, Seating arrangements, Cause and effect, Blood relation test, Dice Logical, verbal puzzles, Analytical puzzles and sudoku.

Module II BEHAVIOURAL SKILLS 5

Interview Etiquettes - Body language, Dress code, Eye contacts, Handshakes for Interview - Interview handling – Mock Interview Videos - High Frequency words in resume and interviews - Visual Interpretation – HR Interview question – Sell yourself - Interpersonal and intrapersonal communication

Module III VERBAL SKILLS 15

Vocabulary basics, Grammar basics, Critical Reasoning, Reading comprehension, Synonyms, Antonyms, Idioms and phrases - sentence completion, Spotting errors, Error correction, Sentence correction, Writing Resume, Letter writing, Official mail correspondence - Ways to communicate in different scenarios-job interview, business meeting, project proposal submission, informal gathering, speech for a large audience and debate.

TOTAL: 30 PERIODS

REFERENCES:

1. Quantitative aptitude for competitive examinations , R.S.Agarwal, S.Chand publications
2. Quantitative Aptitude – AbijithGuha, TMH
3. Quantitative Aptitude for Cat – ArunSharma,TMH
4. Gulati. S., (2006) “Corporate Soft Skills”, New Delhi, India: Rupa& Co.
5. Prasad, HariMohan,A Handbook of Spotting Errors, Mcgraw Hill Education, 2010

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