

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**INNOVATIVE ASSIGNMENTS**

**ACADEMIC YEAR: 2022-2023 SEM-I**

**OPERATING SYSTEMS II YEAR I SEM**

1. **Analyze** the performance trade-offs between preemptive and non-preemptive scheduling using real or simulated workloads. **(CO2)**

2. **Design** and **implement** a virtual memory simulator. **Create** various workload patterns and **analyze** **how** the system handles thrashing, swapping, and page replacement. **(CO4)**

**OOPS THROUGH JAVA II YEAR I SEM**

1. **Design** and **implement** a Smart ATM system in Java that can: **(CO5)**

* Authenticate users using a PIN
* Allow balance inquiry,withdrawl,deposit
* Send a warning if the balance is low
* Maintain transaction history

2. **Create** a java quiz application that: **(CO5)**

* Loads questions from a file or database
* Supports multiple choice questions
* Tracks time and scores
* Generates a performance report at the end

**DATABASE MANAGEMENT SYSTEMS II YEAR I SEM**

1. **Create** a small web-based application(e.g., **Book Store,Event Management**) backed by a MySQL database.**(CO1)**

* **Design** the ER diagram and implement the database.
* Integrate the CRUD operations in the web app using PHP/Python/Java
* **Implement** basic reports using SQL queries.

2.**Create** a database schema for an Online Food Delivery System including entities like users,restaurants,menus,orders, and delivery staff.Then **analyze** the schema for redundancy and performance issues.Normalize the schema up to 3NF.**(CO3)**

**FORMAL LANGUAGES AND AUTOMATA THEORY III YEAR I SEM**

1. **Design** a finite automaton (DFA/NFA) to model a basic traffic light controller, then extend it with error detection (e.g., two greens at once). **(CO1)**

2. **Create** a context-free grammar (CFG) for a language that validates syntactically correct arithmetic expressions with nested parentheses and operator precedence.

**(CO3)**

**COMPUTER NETWORKS III YEAR I SEM**

1. **Create** a simulation of a small-scale computer network (LAN) with multiple nodes, switches, and a router using tools like Cisco Packet Tracer or GNS3. **(CO1)**
2. **Design** a subnetting strategy for a university campus that includes departments, labs, and administrative offices, ensuring scalability and efficient IP usage. **(CO1)**

**ARTIFICIAL INTELLIGENCE III YEAR I SEM**

1. **Design** an intelligent agent for a real-world task (e.g., a robotic vacuum cleaner or a smart traffic controller) using PEAS (Performance, Environment, Actuators, Sensors) analysis. **(CO1)**

2. **Implement** a mini-expert system using forward or backward chaining to diagnose basic technical issues (e.g., in a printer or computer system). **(CO2)**

**CLOUD COMPUTING IV YEAR I SEM**

1. **Analyze** the security implications of using public cloud services for sensitive data storage. Recommend mitigation strategies like encryption, IAM policies, and compliance controls. **(CO2)**

2. **Design** a scalable architecture for a video streaming platform using microservices and cloud-native tools (e.g., Kubernetes, Docker, CDN). **(CO3)**

**SOFTWARE PROCESS AND PROJECT MANAGEMENT IV YEAR I SEM**

1. **Create** a project charter and scope statement for a real-world software project(e.g., Online food delivery system,e-learning portal).**Design** the high-level deliverables,stakeholder matrix, and project goals.**(CO5)**
2. **Design** and **implement** a detailed work breakdown structure for a chosen development project.Include task dependencies,estimated effort, and role allocation.**(CO4)**

**CRYPTOGRAPHY AND NETWORK SECURITY IV YEAR I SEM**

**1. Implement a secure messaging application** using end-to-end encryption, including key generation, exchange, and message encryption/decryption.**(CO1)**

2. **Analyse the security vulnerabilities** of the TLS handshake process and propose cryptographic improvements to mitigate them. **(CO5)**

**DATA MINING IV YEAR I SEM**

1. **Create a novel data preprocessing technique** that improves the quality of input data for mining in noisy and incomplete datasets. Demonstrate its effectiveness on a sample dataset.**(CO1)**
2. **Implement a text mining system** that performs sentiment analysis on social media posts using natural language processing and machine learning. **(CO5)**

**REAL TIME SYSTEMS IV YEAR I SEM**

1. **Implement a real-time task scheduler** that supports dynamic priority adjustments based on task deadlines and resource availability. **(CO2)**

2. **Implement a prototype of a real-time data acquisition system** for environmental monitoring with guaranteed response times.**(CO2)**