SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

FALL SEMESTER 2025-2026

Digital Assessment No. 1

Course Code	BCSE303L	Class Number	VL2025260101320/21
Course Name	Operating System	Total Marks	20
SLOT	C1+TC1/C2+TC2	**Submission Date**	**03-11-2025**

Project DA 1

Develop a web-based interactive animation and simulation tool that visualizes core operating system concepts through step-by-step animated demonstrations. The tool should allow users to input parameters and observe real-time algorithmic behavior without server dependencies.

Platform Specifications

- Technology Stack: HTML5, CSS3, JavaScript (ES6+), and Canvas API for animations
- Deployment: Standalone web application that runs locally in any modern browser
- Dependencies: Zero server-side dependencies; completely client-side implementation
- Compatibility: Cross-platform support (Windows, macOS, Linux) through web browsers

Core Functionality

- Interactive parameter input interface for algorithm customization
- Step-by-step animation with play, pause, step-forward, step-backward controls
- Real-time visualization of data structures, queues, and process states
- Configurable animation speed and detailed execution statistics
- Export functionality for screenshots and execution traces

Operating System Concepts to Choose From

Students must select ONE UNIQUE concept or algorithm from the following categories but not limited to these:

Process Management

- CPU Scheduling Algorithms (FCFS, SJF, Round Robin, Priority, Multilevel Queue)
- Process Synchronization (Semaphores, Monitors, Producer-Consumer Problem)
- Deadlock Detection and Avoidance (Banker's Algorithm, Resource Allocation Graph)

Memory Management

- Page Replacement Policies (FIFO, LRU, Optimal, Clock Algorithm)
- Memory Allocation Strategies (First Fit, Best Fit, Worst Fit)
- Virtual Memory Management and Address Translation

File Systems

- File Allocation Methods (Contiguous, Linked, Indexed)
- Directory Structures and File Organization
- Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK)

Inter-Process Communication

- Message Passing Systems and Shared Memory
- Pipe Communication and FIFO Implementation
- Thread Synchronization Mechanisms

Deliverables for VTOP Submission

1. Complete Source Code Package

- All HTML, CSS, and JavaScript files with comprehensive comments
- Modular code architecture with separate files for UI, animation logic, and algorithms
- README.md with project description and feature overview

2. One-Page Execution Guide

- Document must include:
- Setup Instructions: How to open and run the application locally
- User Interface Guide: Description of input parameters and controls
- Animation Features: Explanation of visualization elements and color coding
- Browser Requirements: Minimum browser versions and compatibility notes

Animation Demonstration Requirements

- Smooth frame-by-frame transitions showing algorithmic steps
- Color-coded visual elements to highlight active processes/memory/resources
- Interactive timeline allowing users to jump to specific execution points
- Real-time statistics display (completion time, waiting time, efficiency metrics)

Evaluation Criteria

- Technical Implementation (40%): Code quality, modularity, and error handling
- User Interface Design (25%): Intuitive controls and responsive layout

- Animation Quality (25%): Smooth transitions, clear visualizations, educational value
- Documentation (10%): Code comments and execution guide clarity