**Course Name: Operating System and System Software**

Course Type: Core                                      Course Credits: (3+1 credits)

**Objectives:**
The objective of this course is to understand the fundamental concepts and role of Operating System, Process Management, Scheduling Algorithms, Memory Management policies and to gain insight into I/O and File management techniques.

**Learning Outcomes:**
At the end of this course, students will be able to:
1. Understand the structure and functions of the Operating System.
2. Compare various operating systems with respect to characteristics and features.
3. Implement algorithms of CPU Scheduling, Memory Scheduling, and disk scheduling.
4. Understand the use of different process scheduling algorithms and synchronization techniques to avoid deadlock.
5. Learn different memory management techniques like paging, segmentation, and demand paging.

**Unit I**
Operating system overview-objectives and functions, Evolution of Operating System, Types of Operating Systems. Operating system structure.
Process Management and Coordination: Process concept, Process States, Process Description and Process Control, Interrupts, Process Scheduling, - Types of Scheduling – Scheduling algorithms.

**Unit II**
Inter-process Communication, Processes and Threads, Types of Threads, Multicore and Multithreading, Concurrency: Principles of Concurrency - Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks – basic concepts, necessary conditions for deadlock, resource allocation graph, wait-for graph, Banker's algorithm, Safety algorithm, ostrich algorithm (prevention- avoidance – detection). Recovery from Deadlock.

**Unit III**
Memory management requirements, Memory Hierarchy, Cache Memory, Direct Memory Access Partitioning, Paging and Segmentation, Demand Paging, Virtual memory - Hardware and control structures, operating system software, Linux memory management, Windows memory management. Virtual memory management.

**Unit IV**
I/O management and disk scheduling – I/O devices, organization of I/O functions; OS design issues, I/O buffering, disk scheduling, Disk cache. File management – Organization, Directories, File sharing, and Record blocking, secondary storage management.

**Recommended Books**
1) Operating system concepts, Abraham Silberchatz, Galvin,Wiley Publications
2) Modern operating systems,Andrew Tannenbaum,Pearson Education
3) Operating system,Internals and Design principles ,W Stallings, Pearson Education