Course Code	Course Name	Theory	Practical	Tutorial	Theory	Oral & Practical	Tutorial	Total
ITC403	Operating System	04	--	--	04	--	--	04

Course Code	Course Name	Examination Scheme							
		Theory Marks				Term Work	Oral & Practical	Oral	Total
		Internal assessment			End Sem. Exam				
		Test1	Test 2	Avg. of two Tests					
ITC403	Operating System	20	20	20	80	--	--	--	100

Course Objectives: Students will try:

1. To understand the main components of an OS & their functions.
2. To study the process management and scheduling.
3. To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4. To understand the concepts and implementation Memory management policies and virtual memory.
5. To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS
6. To study the need for special purpose operating system with the advent of new emerging technologies

Course Outcomes: Student will be able to

1. Describe the important computer system resources and the role of operating system in their management policies and algorithms.
2. Understand the process management policies and scheduling of processes by CPU
3. Evaluate the requirement for process synchronization and coordination handled by operating system
4. Describe and analyze the memory management and its allocation policies.
5. Identify use and evaluate the storage management policies with respect to different storage management technologies.
6. Identify the need to create the special purpose operating system.

Prerequisite: Programming Language C

Detailed syllabus:

Sr. No.	Module	Detailed Content	Hours	CO Mapping
0	Prerequisite	Programming Language C. Basic of Hardware i.e. ALU,RAM,ROM, HDD etc.	02	
I	Overview of Operating System	Introduction: Operating System Structure and operations, Process management, Memory management, storage management, Protection and security, Distributed and special purpose Systems; System Structure: Operating system services and interface, System calls and its types, System programs, Operating System Design and implementation, OS structure, Virtual machines, OS debugging and generation, System boot.	07	C01
II	Process Management	Process concept: Process Scheduling, Operation on process and Interprocess communication;, Multithreading, Process: Multithreading models and thread libraries, threading issues; Process Scheduling: Basic concepts, Scheduling algorithms and Criteria, Thread Scheduling and Multiple Processor Scheduling;	09	C02
III	Process coordination	Synchronization: The critical Section Problem, Peterson's Solution, synchronization Hardware and semaphores, Classic problems of synchronization, monitors, Atomic transactions; Deadlocks: System Model, Deadlock Characterization , Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance , Deadlock Detection, Recovery from Deadlock.	09	CO3
IV	Memory Management	Memory Management strategies: Background, Swapping, Contiguous Memory Allocation, Paging , Structure of the Page Table, Segmentation; Virtual Memory Management: Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory, Other Considerations.	10	C04
V	Storage Management	File system: File Concept , Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection; Implementing file System: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery, NFS; Secondary Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, RAID Structure, Stable-Storage Implementation, Tertiary-Storage Structure, Swap-Space Management; I/O systems: Overview I/0 Hardware, Application I/0 Interface, Kernel I/0 Subsystem, Transforming I/0 Requests to	09	C05

VI	Distributed Systems	Distributed operating System: Network based OS, Network Structure and Topology, Communication Structure and Protocols; Distributed File system: Naming and transparency, Remote file access, Stateful Versus Stateless Service, File Replication; Distributed Synchronization: Mutual Exclusion, Concurrency Control and Deadlock Handling,	06	C06

Hardware Operations, STREAMS, Performance (continued from previous cell)

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Greg Gagne, Peter Baer Galvin, 8th edition Wiley.
2. Modern Operating System, Tanenbaum, Pearson Education.
3. Operating Systems: Internal and Design Principles: William Stallings, PHI

Reference Books:

1. Operating System Design and Implementation, A Tanenbaum, Pearson
2. Real Time Systems Design and Analysis, Wiley, IEEE Press
3. Principles of Operating Systems: Naresh Chauhan, Oxford Higher Education

Assessment:

Internal Assessment for 20 marks:
Consisting of **Two Compulsory Class Tests**
Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.

End Semester Examination: Some guidelines for setting the question papers are as:
- Weightage of each module in end semester examination is expected to be/will be proportional to number of respective lecture hours mentioned in the syllabus.
- Question paper will comprise of total **six questions**, **each carrying 20 marks.**
- **Q.1** will be **compulsory** and should **cover maximum contents of the syllabus**.
- **Remaining question will be mixed in nature** (for example if Q.2 has part (a) from module 3 then part (b) will be from any other module. (Randomly selected from all the modules.)
- Total **four questions** need to be solved.