D. Syllabus Detailing and Learning objectives

Module	Chapter	Detailed Content	Syllabus Detailing	Learning Objectives
Module1	Overview of operating system (4 Hours)	Operating system objectives and functions, Evolution of OS, Characteristics of modern OS, Basic concepts: Processes, Files, System calls, Shell, Kernel architectures: Monolithic, Micro-kernel, Layered, Kernel mode of operations.	**Purpose**: To make students familiar with operating system & its functions, basic concepts like processes, files, system calls, kernel & shell. **Scope –** **1. Academic Aspects-** Understanding operating system with its objectives & functions & also basic concepts like processes, files, kernel architecture & shell. **2. Technology Aspect- Programing u**sing C,C++ & Java **3. Application Aspect-** Understanding the architecture of different OS like windows, Mac, Android. Students Evaluation – Theory Questions to be asked on 1. Functions of operating system. 2. Explain different kernel architecture. 3. Difference between monolithic kernel & microkernel.	1. To **describe** operating system & its functions, basic concepts like processes, files, system calls, kernel & shell.(**U**) 2. To **Distinguish** between monolithic kernel & microkernel.(AN) 3. To Compare tightly coupled & loosely coupled system.**(E)**
Module 2	**Process Management** (10Hours)	Process description: Process, Process States, Process Control Block (PCB), Threads, Thread management. Process Scheduling: Types, Comparison of	**Purpose-** This chapter is focused on process, process control block, Process state diagram, Thread, Thread management & process scheduling Scope – 1. Academic Aspects- understanding process & context switching using PCB & scheduling 2. Technology Aspect- Using C,C++ & Java 3. Application Aspect- Developing scheduling	1.**Define** process & Thread.**(R)** **2**. **Explain** PCB (R) 3. **Sketch & Describe** Process state diagram.**(U)** 3. **Distinguish between process & Thread(A)** 4. **Calculate** Average waiting time and average turnaround time using FCFS, SJF, RR scheduling algorithm **(AN)**

		different scheduling policies.	algorithm and use in any application	
			Students Evaluation –1. Define Process and Process State diagram **2. Define context switching?** **3. Draw and explain PCB diagram?** **4. What is scheduling criteria?** **5.Calculate average waiting time & average Turnaround time for given scheduling algorithm**	
Module 3	**Process Co-ordination (10 Hr)**	Principles of concurrency, Race condition and critical section, mutual exclusion- hardware and software approaches, semaphores, monitors, message passing, producer consumer problem. Deadlock: principles of deadlock, deadlock detection, deadlock avoidance, deadlock prevention	**Purpose** – To make students familiar about concurrency, race conditions, mutual exclusion and deadlocks. **Scope** – **1. Academic Aspects-** Understanding concurrency in operating systems, problem of race conditions and need of mutual exclusion. 2. Technology Aspect- Using C,C++ & Java **3. Application Aspect-** Development of deadlock preventing and mutually exclusive applications. **Student Evaluation -** 1. What is mutual exclusion? Explain Peterson's approach to solve mutual exclusion? 2. What are semaphores? State solution of producer-consumer problem using Semaphores. 3. What is deadlock? Explain deadlock prevention methods.	1. To **characterize** concurrency and race condition.**(R)** 2. To **describe** methods for providing mutual exclusion.**(U)** 3. To **apply** the concept of semaphores for solving various problems. **(A)** 4. To **analyze** ways to detect, avoid and prevent deadlock. **(AN)**

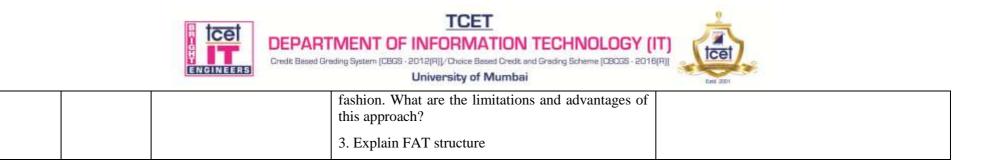|				
			4. Explain deadlock avoidance methods.	
Module 4	Memory Management (10 Hours)		**Purpose-** This chapter is focused on management requirement, Partition, Paging, segmentation, Page replacement algorithm	1. D**efine** paging & segmentation **(R)** **2. Define fragmentation(U)** **3. Explain Compaction (U)** 4. D**escribe memory mapping with paging**.**(A)** **5. Compare First fit, Best fit & Worst fit Algorithm (E)** **5.Calculate page fault using FIFO &LRU page replacement algorithm and specify which algorithm is best & Why (AN)**
			Scope – 1. Academic Aspects- understanding Memory management techniques 2. Technology Aspect- Using C,C++ & Java 3. Application Aspect- management of memory using paging and segmentation. Use different technique to manage memory.	
			Student Evaluation - **Student Evaluation -** 1. What is partition? Explain contiguous & noncontiguous memory management techniques 2. What is paging? 3. What is segmentation 4. Explain virtual memory 5.Explain page fault 6. Explain page replacement algorithm	
Module 5	**Input Output**	I/O Devices, Organization of the I/O Function,	**Purpose –** To make students familiar with I/O functions and disk scheduling algorithms	1. Define **recall** different aspects of I/O and its functions. **(R)**

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	Managem ent	Operating System Design Issues, I/O Buffering, Disk Scheduling and disk scheduling algorithms, Disk cache	**Scope –** **1. Academic Aspects-** Learning of I/O functions & different disk scheduling algorithms. **2. Technology Aspect-** Java (NetBeans or Eclipse), JDK **3. Application Aspect-** Development of improved disk scheduling algorithms	2. To **analyze** different operating system issues. **(AN)** 3. To **describe** various buffering techniques. **(U)** 4. To **compare** different disk scheduling algorithms. **(E)**
			Student Evaluation – 1. Explain various disk scheduling algorithms. 2. How does DMA increase system concurrency? How does it complete hardware design? 3. How do cache help improve performance? Why do systems not use more or larger cache if they are so useful? 4. What are various buffering techniques? Explain in detail.	
Module 6	**File Manageme nt**	Overview, File Organization, File Sharing; Record Blocking; Secondary Storage Management	**Purpose –** To make students learn file organization, file management techniques	1. To **characterize** various file organization methods **(R)** 2. To **distinguish** between various organizations **(U)** 3. To **specify** usage of different file organizations under different cases **(C)** 4. To **examine** record blocking **(A)**
			Scope – **1. Academic Aspects-** Understanding file organization and secondary storage management **2. Application Aspect-**	
			Student Evaluation – 1. Explain various file allocation methods 2. How file-systems store files in a linked-list	

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			fashion. What are the limitations and advantages of this approach? 3. Explain FAT structure	