



**TCET**  
**DEPARTMENT OF COMPUTER ENGINEERING (CMPN)**  
 Credit Based Grading Scheme(Revised - 2012) - University of Mumbai  
**CBGS-2012(R)**



**C. Syllabus Detailing and Learning objectives**

Module	Chapter	Detailed Content	Syllabus Detailing	Learning Objectives
Module 1	CH 1 Introduction to Operating System, Objectives and Functions (4-Hours)	I1 Introduction to Operating System, Objectives and Functions of O.S., OS Services, Special purpose systems, Types Of OS, System Calls, types of system calls, Operating system structure, System Boot	<b>Purpose:</b> To make students understand basic functioning of operating System. Also to make students understand types of operating system its services, structure & booting system.	1. To <b>describe</b> the basic function & services of operating systems( <b>R</b> )
			<b>Scope –</b> <b>1. Academic Aspects-</b> Understanding Operating system and its types and services. <b>2. Technology Aspect-</b> Understand basics of Operating system and its types and services. <b>3. Application Aspect-</b> Application of performance measure in computer organization.	2. To <b>explain</b> the block level description of functional units of Operating system( <b>U</b> )  3. To <b>Differentiate</b> Between working of various types of operating systems( <b>A</b> )
			<b>Students Evaluation –</b> 1. Theory Questions to be asked on functions and types of OS. 2. Real World Examples can be given to study different types of OS.	4. To <b>identify</b> different types of services and system calls.( <b>AN</b> )

<b>Module 2</b>	<b>CH 2</b> Process Management & Synchronization (10-Hours)	Process concept, operations on process Process scheduling: basic concepts, scheduling criteria, scheduling algorithms, Preemptive, Non-preemptive, FCFS, SJF, SRTN, Priority based, Round Robin, Multilevel Queue scheduling, Operating System Examples. 2.2 Synchronization: Background, the critical section problem, Peterson's Solution, Synchronization Hardware Semaphores, classic problems of <b>Synchronization:</b>	<p><b>Purpose</b> – This chapter gives detailed insight of process management, process scheduling, Synchronization among processes.</p> <p><b>Scope</b> –</p> <p><b>1. Academic Aspects-</b> Learning the insights of process management, process scheduling, and process synchronization.</p> <p><b>2. Technology Aspect-</b> Implement various process scheduling algorithm using various programming languages.</p> <p><b>3. Application Aspect-</b> Application of scheduling algorithm to calculate efficiency of operating system.</p> <p><b>Students Evaluation</b></p> <ol style="list-style-type: none"> <li>1. Questions on data Process scheduling and synchronization can be asked.</li> <li>2. Implementation of scheduling algorithm &amp; critical section can be evaluated in lab.</li> <li>3. Students can apply Algorithms to solve dynamic problems of processes.</li> </ol>	<ol style="list-style-type: none"> <li>1. To <b>analyze</b> various scheduling algorithms. [AN]</li> <li>2. To <b>apply</b> operations on process. [A]</li> <li>3. <b>Draw</b> and <b>explain</b> the Gantt charts for Process scheduling. [R]</li> <li>4. <b>Examine</b> different process synchronization techniques [A]</li> </ol>
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		The Producer Consumer Problem: Readers writers problem, Semaphores, Dinning Philosopher Problem		
<b>Module 3</b>	<b>Chapter 3 DEADLOCK</b> (Hours -4)	Deadlock Problem, Deadlock Characterization, Deadlock Prevention. Deadlock avoidance Banker's algorithm for single & multiple resources , Deadlock recovery , Deadlock Detection	<b>Purpose-</b> This chapter is focuses on deadlock and its resolution.	1. Examine RAG to indentify deadlock. <b>(R)</b>
			<b>Scope –</b> <b>1. Academic Aspects-</b> Understanding the cause ,detection, prevention & resolution of deadlock . <b>2. Technology Aspect-</b> Design an algorithm for deadlock resolution. <b>3. Application Aspect-</b> Students should understand how deadlock can be avoided.	2. <b>List</b> the Causes of deadlock and explainhow they can be avoided. <b>(U)</b> 3. <b>Evaluate</b> safe condition for processes. <b>(E)</b>
			<b>Students Evaluation –</b> 1. Theory Questions to be asked on deadlock cause & recovery. 2. Lab experiments for design of algorithm for deadlock avoidance. 3. Corresponding viva questions can be asked for detection, recovery, avoidance.	4. <b>Summarize</b> recovery methods from deadlock. <b>(U)</b>

<b>Module 4</b>	<b>Chapter 4</b> Memory Management (Hours -5)	Memory management strategies: background , swapping , contiguous memory allocation, paging , structure of page tables , segmentation 4.2 Virtual memory management: Demand paging , copy on write, Page replacement, FIFO, Optimal, LRU, LRU Approximation, Counting Based, , Allocation of frames , Thrashing	<p><b>Purpose-</b> This chapter gives the overview of computer memory characteristics, types of memory, details of cache memory and virtual memory concept.</p> <p><b>Scope -</b></p> <p><b>1. Academic Aspects-</b> Understanding the memory characteristics, different types of memories, virtual memory concept and page replacement policies.</p> <p><b>2. Technology Aspect-</b> Design of algorithms for virtual memory using any programming language.</p> <p><b>3. Application Aspect-</b> Students should understand how memory unit actually works by using the concept of virtual memory.</p> <p><b>Students Evaluation –</b></p> <p>1. Theory Questions to be asked on memory characteristics, hierarchy, types of memory, cache memory, virtual memory-paging and segmentation, page replacement algorithms.</p> <p>2. Lab experiments for implementation of virtual memory using C/JAVA.</p> <p>3. Corresponding viva questions can be asked for characteristics of memory, hierarchy, cache memory, virtual memory concepts.</p>	<p>1. Name the parameters of memory and describe. (R)</p> <p>2. Classify the memories and show their usage in computer. (A)</p> <p>3. Draw the memory hierarchy and determine the role of each type of memory in the hierarchy. (AN)</p> <p>4. Describe cache memory and classify their levels. (U)</p> <p>5. Estimate the role of thrashing and its effects on CPU efficiency. (E)</p> <p>6. Explain the concept of virtual memory and show how it is implemented practically. (A)</p> <p>7. Compare different page replacement algorithms and summarize their performance. (AN)</p>
<b>Module 5</b>	<b>Chapter 5–</b> File Management (Hours -6)	File System Structure, File System implementation,	<p><b>Purpose –</b> To make students understand basics about File system. Also to make students understand concept of file allocation, file structure.</p>	<p>1. To describe the fundamentals and technological aspects of File Management (R)</p>

		<p>Directory implementation , All location Methods contiguous allocation, linked list allocation, indexed allocations, Free space management. Secondary storage : structures: Disks Scheduling Algorithm: FCFS, SSTF, SCAN, CSCAN, LOOK, Disk Management</p>	<p><b>Scope –</b>  <b>1. Academic Aspects-</b>                      Understand file structure, allocation &amp; Disk scheduling.  <b>2. Technology Aspect-</b>                      Understand the basics of File management and disk scheduling.  <b>3. Application Aspect-</b>                      Students can implement various disk scheduling algorithm.</p>	<p>2. To list and explain different types of disk scheduling algorithms.(U)                      3. To describe the File structure(R)                      4. Compare various file allocation techniques[AN].</p>
	<p><b>Chapter 6</b>                      –                      Input Output Management                      (Hours -2)</p>	<p>Overview , I/O Hardware , Application I/O Interface</p>	<p><b>Purpose –</b>                      To make students understand basics I/O hardware.</p> <p><b>Scope –</b>  <b>1. Academic Aspects-</b>                      Understanding I/O hardware with its application.  <b>2. Application Aspect-</b>                      Device scheduling.</p> <p><b>Student Evaluation -</b>                      1. Theory Questions to be asked on I/O hardware and interface application.</p>	<p>1. To describe and identify the working of I/O hardware. (AN )                      2 Describe and summarize their functionality (AN)                      3. List the application of I/O interface. (R)</p>





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<b>Module 6</b>	Chapter 7 Case Study of UNIX (Hours 8)	History of UNIX, Overview of UNIX, UNIX File System, Data structures for process/memory management, Process states and State Transitions, Using the System(Booting and login), Process scheduling, Memory management, Shell programming	<b>Purpose –</b> To make students understand basics of UNIX.  <b>Scope –</b> <b>1. Academic Aspects-</b> Understanding Unix file system, UNIX Process management. <b>2. Application Aspect-</b> Apply shell programming..  <b>Student Evaluation -</b> 1. Theory Questions to be asked on working of Unix.	1. Summarize the features of Unix. (R)  2. Analyze directory system in Unix.[U] 3. Assess shell Programming(A)
	Chapter 8 Case Study of Linux (Hours 5)	History, Design Principles, Kernel Modules, Process management, Scheduling, Memory management, File Systems, Input and Output, Inter process communication,	<b>Purpose –</b> To make students understand basics of LINUX.  <b>Scope –</b> <b>1. Academic Aspects-</b> Understanding LINUX file system, LINUX Process management. Inter process communication. <b>2. Application Aspect-</b> Implement scheduling techniques.	1. Summarize the features of LINUX. (U)  2. Analyze directory system in LINUX.[U]



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		Network structure, security	<b>Student Evaluation -</b> 1. Theory Questions to be asked on working of LINUX.	
	Chapter 9  Case study: Windows 7 (Hours 4)	History, Design Principles , System components , environmental subsystems , File System, Networking, Programmer Interface	<b>Purpose –</b> To make students understand basics of WINDOWS 7.  <b>Scope –</b> <b>1. Academic Aspects-</b> Understanding WINDOWS7 file system, WINDOWS7 Process management, network programming. <b>2. Application Aspect-</b> Application of network programming.  <b>Student Evaluation -</b> 1. Theory Questions to be asked on working of WINDOWS 7.	1. Summarize the features of WINDOWS 7. (R)  2. Analyze directory system, Process management in windows 7.[U]