Course Code	**18CIPC405**				
Category	Engineering Science Courses: Professional Core				
Course title	**OPERATING SYSTEMS - THEORY**				
Scheme and Credits	No. of Hours/Week				Semester - IV CSE/ISE
	L	T	P	SS	Credits	
	2	2	0	0	3	
CIE Marks: 50	SEE Marks: 50	Total Max. Marks: 100			Duration of SEE: 03 Hours
Prerequisites (if any): NIL					

COURSE OBJECTIVES:
The course will enable the students to
1. Understand the Operating System Structure, System Call, Virtual Machines.
2. Demonstrate the process inter process communication and process states.
3. Analyze the various process synchronization algorithms and solve classical problems.
4. Identify presence of deadlock in the system and recover from deadlock.
5. Design File System and Evaluate the various secondary device and scheduling algorithm for secondary devices.

UNIT I: INTRODUCTION TO OPERATING SYSTEMS   10 Hours
System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Virtual machines; Operating System generation; System boot. Process Management Process concept; Process scheduling; Operations on processes; Inter process communication.

UNIT II: MULTI-THREADED PROGRAMMING   09 Hours
Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling. Process Synchronization: Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors

UNIT III: DEADLOCKS   10 Hours
Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. Memory Management: Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.

UNIT IV: VIRTUAL MEMORY MANAGEMENT   09 Hours

Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. File System, Implementation of File System: File system: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection: Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.

UNIT V: SECONDARY STORAGE STRUCTURES, PROTECTION   10 Hours

Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability- Based systems. Case Study: The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Concepts"9th edition, Wiley Global Education, 2012.

REFERENCE BOOKS:

1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition.
2. D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGraw Hill, 2013.
3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI (EEE), 2014.
4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson. 2014.

e-BOOKS/ONLINE RESOURCES:

1. Operating Systems Study Guide by Tim Bower
2. Lecture Notes on Operating Systems by Mythili Vutukuru
3. Schaum's Outline of Operating Systems (Schaum's Outline Series) by J. Archer Harris.

MOOCs:

1. http://onlinevideolecture.com/?course=computer-science&subject=operating-systems.
2. http://www.nptel.ac.in/courses/106108101/.

COURSE OUTCOMES:

The students at the end of the course, will be able to

CO1: Describe features, types and design considerations of modern operating system.

CO2: Analyze & Apply the various process scheduling algorithms.

CO3: Illustrate the concepts of synchronization and handle Deadlocks.
CO4: Explain memory management strategies and analyze various page replacement Algorithms.
CO5: Describe the design considerations of file system and compare various disk scheduling algorithms.

SCHEME OF EXAMINATION:

CIE – 50 Marks	Test I (Any Three Units) - 20 Marks	Quiz I – 5 Marks	25 Marks	Total: 50 Marks
	Test II (Remaining Two Units) - 20 Marks	Quiz II – 5 Marks	25 Marks	
SEE – 100 Marks	**Q1 (Compulsory):** MCQs or Short answer type questions for 15 Marks covering entire syllabus.		15 Marks	Total: 100 Marks
	Q2 & Q3 from Units which have 09 Hours are compulsory.		17 * 2 = 34 Marks	
	Q4 or Q5, Q6 or Q7 and Q8 or Q9 from Units which have 10 Hours shall have Internal Choice.		17 * 3 = 51 Marks	

Note: SEE shall be conducted for 100 Marks and the Marks obtained is scaled down to 50 Marks.

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