G H RAISONI INSTITUTE OF ENGINEERING & TECHNOLOGY
(Approved by AICTE, New Delhi and Recognized by DTE, Maharashtra)
An Autonomous Institute Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Accredited by NAAC with A+ Grade
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Department of Science & Technology
Syllabus

MCA Semester-I

MCAL101: Operating System Concepts										
Teaching Scheme				Credits	Continuous Evaluation Scheme					
					Theory			Practical		
Th.	Tu.	Pr.	Total Hours		TAE	CAE	ESE	Int	Ext	Total
3	-	-	3	3	20	30	50	-	-	100

Course Objectives	1. To understand the concepts and functions of operating systems.
	2. To understand Processes and Threads and various scheduling algorithms
	3. To analyze various memory management schemes.
	4. To understand I/O management and File systems.
	5. To be familiar with the basics of Linux system
Course Outcomes	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. Describe and analyze the memory management and its allocation policies
	4. Identify use and evaluate the storage management policies with respect to different storage management technologies.

Course Contents:

Unit	Content	Hours
I	**OPERATING SYSTEM OVERVIEW :** Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.	10
II	**PROCESSMANAGEMENT :** Processes – Process Concept, Process Scheduling, Operations on Processes, Implementation Of Processes Inter-process Communication; CPU Scheduling – Scheduling criteria, Scheduling algorithms, Threads- Overview, Multithreading models, Implementing Threads In User Space & Kernel, Hybrid Implementation ,Threading issues; Process Synchronization – The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.	10
III	**FILE MANAGEMENT :** File System Interface and Implementation: Concept of a File- Attributes of a File, Operations on Files, Types of Files; Structure of File; File Access Methods-Sequential Access, Direct Access, Indexed Sequential Access; Directory Structure: Single Level Directory, Two Level Directory; Tree Structured Directories; Allocation Methods-Contiguous allocation, Linked allocation, Indexed allocation, Performance comparison; Free Space Management, Directory Implementation.	10
IV	**MEMORY MANAGEMENT:** Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Fragmentation, Swapping, and Paging. Segmentation, Demand paging Virtual Memory: Concepts, management of VM, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing	10
V	**UNIX/LINUX OPERATING SYSTEM :** Development Of Unix/Linux, Role & Function Of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration Case study: Linux, Windows Operating System. Security & Protection Security Environment, Design Principles of Security, User Authentication, Protection Mechanism: Protection Domain, Access Control List	10

Text Books	1. Operating System Concepts (8th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley Indian Edition (2010).
	2. Modern Operating Systems (Third Edition) by Andrew S Tanenbaum, Prentice Hall India (2008).
Reference Books	1. Kernighan & Pike: "UNIX programming Environment", 2/E, PHI-EEE, 2001.
	2. W Richard Stevens, Stephen A Rago, "Advanced Programming in the UNIX Environment"; 3/E, Addison Wesley Professional, 2013.
	3. W. Stallings: "Operating Systems: Internals and Design Principles", 7/E, Pearson Pub., 2014.
On-line TL Material	