

UNIVERSITY OF MADRAS
MASTER OF COMPUTER APPLICATIONS (MCA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

| Title of the Paper | Operating Systems and UNIX | | |
|---------------------|-----------------------------------|----------|--------|
| Elective - I Theory | I Year & I Semester | Credit:3 | 435E1C |

Course Objectives:

- To understand the basic concepts and functions of operating systems
- To understand Processes and Threads
- To analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.
- To provide a comprehensive introduction to UNIX operating system and shell programming.

OUTCOMES

At the end of the course, the students should be able to:

- Analyze various scheduling algorithms.
- Understand deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Understand the functionality of file systems.

Unit 1: Defining a Operating System - Clustered Systems - Operating-System Structure - Operating-System Operations - Process Management - Memory Management - Storage Management - Protection and Security- Computing Environments - Open-Source Operating Systems - Operating system services - System Calls- Types of System Calls - System Programs - Operating-System Structure - System Boot.

Unit-2: Process Management: Process concept – Process Scheduling - Operations on Processes -Interprocess Communication - Communication in Client – Server Systems - Threads – Multithreading Models - Basic Concepts – Scheduling Criteria – Scheduling Algorithms - Process Synchronization -Critical section Problem - Peterson s Solution - Synchronization hardware – Semaphores, classical problem of synchronization – System model - Deadlock Characterization - Methods for Handling Deadlocks -Prevention, Avoidance, and Detection – Recovery.

Unit 3: Storage management – Background- Swapping - Contiguous Memory Allocation - Paging -Structure of the Page Table - Segmentation - virtual memory background - demand paging - Copy-on-Write- page replacement and algorithms

Unit 4: Storage management – File system - File concept - access methods - directory and directory structure - protection - File-System Structure - File-System Implementation - Directory Implementation -Allocation Methods - Free-Space Management - Secondary Storage structure - disk structure – disk attachment - Disk scheduling

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Unit 5: Introduction to Unix and Unix commands. Introduction of sed, awk and grep family
Shell Scripting: Introduction to Shell, Types of Shell, C shell features, writing first script
writing script, Executing & Debugging script.
Shell Programming: Shell variables, Output, Input, exit Status of a Command, Branching
Control Structures, Loop-Control Structure, and Continue and break Statements, Expressions,
Command Substitution, Command Line Arguments and Functions.

TEXT BOOK:

1. Operating System Concepts – Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 8th edition, Wiley-India, 2009.
2. Modern Operating Systems – Andrew S. Tanenbaum, 3rd Edition, PHI
3. Operating Systems: A Spiral Approach – Elmasri, Carrick, Levine, TMH Edition
4. Unix Shell Programming :Yashavant P. Kanetkar, BPB Publications.

REFERENCE BOOK:

1. Operating Systems – Flynn, McHoes, Cengage Learning
2. Operating Systems – Pabitra Pal Choudhury, PHI
3. Operating Systems – William Stallings, Prentice Hall
4. Operating Systems – H.M. Deitel, P. J. Deitel, D. R. Choffnes, 3rd Edition, Pearson
5. Introduction to Unix & Shell -Venkatesh Murthy, Pearson Edu.
6. Unix & Shell Programming - Forouzan, Cengage Learning.

E-Resources:

<https://applied-programming.github.io/Operating-Systems-Notes/>

<https://ecomputernotes.com/fundamental/disk-operating-system/what-is-operating-system>

Course Outcomes

On the successful completion of the course, students will be able

| | | |
|-----|---|-------|
| CO1 | Analyze various scheduling algorithms. | K1-K6 |
| CO2 | Understand deadlock, prevention and avoidance algorithms. | K1-K6 |
| CO3 | Compare and contrast various memory management schemes. | K1-K6 |
| CO4 | Understand the functionality of file systems. | K1-K6 |
| CO5 | To comprehend, use and illustrate the advance concepts such as alternate shell script, data connectivity and bash scripting | K1-K6 |

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

Mapping with Programme Outcome:

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| CO1 | M | S | M | L | S | M | L | M | S | L |
| CO2 | S | M | S | M | S | M | M | L | M | L |
| CO3 | M | S | M | S | M | S | L | L | L | M |
| CO4 | S | L | M | M | S | L | L | M | M | S |
| CO5 | S | S | M | S | L | S | M | L | M | L |

S-Strong M-Medium L-Low