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20MC102 OPERATING SYSTEM

Course Description and Objectives:

This course aims at concepts and principles of Operating Systems, its overall responsibility in acting as an interface between the system's hardware components and the user. Further, it also helps students to understand the different scheduling policies, process synchronization mechanisms, deadlock handling mechanisms and memory management techniques.

Course Outcomes:

The student will be able to:

- Apply optimization techniques for the improvement of system performance.
- Design and solve synchronization problems.
- Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput by keeping CPU as busy as possible.
- Change access controls to protect files.
- Analyze the different operating systems.

Skills:

- Install / remove an Operating system in a Computer.
- Manage open source operating system like Ubuntu, Fedora etc.,
- Processes scheduling and execution.
- Analyze memory management techniques.

Activities:

- Identification and Installation of various operating systems.
- Simulation and comparison of process scheduling.
- Simulation of deadlock prevention and avoidance.
- Working on page replacement strategies.
- Analyze different kinds of disk scheduling methodologies.

Syllabus

UNIT – 1 **9 Hours**

COMPUTERS AND OPERATING SYSTEMS: Overview of computer operating systems, Operating systems functions, Protection and security, Distributed systems, Special purpose systems, Operating systems structures and systems calls, Operating systems generation.

UNIT – 2 **9 Hours**

PROCESS MANAGEMENT: Process concept - Process scheduling, Operations on process, Inter-process communication, Multi-threaded programming models, Process scheduling criteria, Process scheduling algorithms and evaluation.

UNIT – 3 **9 Hours**

CONCURRENCY: Process synchronization, The critical-section problem, Peterson's solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples.

UNIT – 4 **9 Hours**

PRINCIPLES OF DEADLOCK: Deadlocks - System model, Deadlock characterization, Deadlock prevention, Detection and avoidance, Recovery from deadlock.

MEMORY MANAGEMENT: Swapping, Contiguous memory allocation, Paging, Structure of the page table, Segmentation, Virtual Memory Management - Virtual memory, Demand paging, Page-Replacement algorithms, Page thrashing.

UNIT – 5 **9 Hours**

FILE SYSTEM INTERFACE - The concept of a file, Access Methods, Directory structure, File system mounting, File sharing, Protection, File system implementation, File system structure, File Allocation methods, Free-space management, Mass-storage structure, Disk structure, Disk attachment, Disk scheduling.

Text Book:

Abraham Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System Concepts", 7th Edition, John Wiley, 2005.

Reference Books:

1. William Stallings, "Operating Systems Internal and Design Principles", 6th Edition, Pearson Education, 2005.
2. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/ Operating%20Systems/ New_index1.html.