

Operating System

Semester VI

Subject Code: BS61701

Lectures: 60

Objectives:

The syllabus aims in equipping students,

- To understand design issues related to process management and various related algorithms
- To understand design issues related to memory management and various related algorithms
- To understand design issues related to File management and various related algorithms

Unit 1 : Introduction to Operating services and Operating system structure

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Ch 1: Introduction

- Operating System Services
- User Operating-System Interface – Command interpreter, GUI
- System Calls
- Types of System Calls – Process control, File management, Device management, Information maintenance, Communication, Protection
- Operating System Structure – Simple structure, Layered approach, Micro kernels, Modules .
- System Boot

Unit 2: Process Management and Process Scheduling

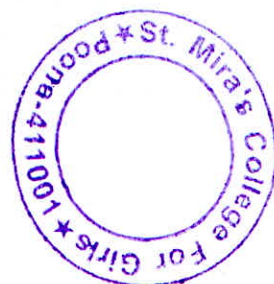
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Ch 2. Process Management

- Process Concept – The process, Process states, Process control block.
- Process Scheduling – Scheduling queues, Schedulers, context switch
- Operations on Process – Process creation with program using fork(), Process termination .
- Concept of multithreading and multithreading models
- Inter-process Communication – Shared memory system, Message passing systems.

Ch 3 .Process Scheduling

- Basic Concept – CPU-I/O burst cycle, CPU scheduler, Preemptive scheduling, Dispatcher
- Scheduling Criteria
- Scheduling Algorithms – FCFS, Shortest Job First, Priority scheduling, Round-robin scheduling, Multiple queue scheduling, Multilevel feedback queue scheduling .
- Thread Scheduling.



Unit 3: Process Synchronization and Deadlocks

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Ch 4: Process Synchronization

- Background
- Critical Section Problem
- Semaphores: Usage, Implementation
- Classic Problems of Synchronization –
 - The bounded buffer problem,
 - The bakery algorithm
 - The reader writer problem
 - The dining philosopher problem
 - The Barber shop problems

Ch 5. Deadlocks

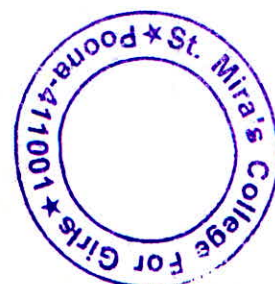
- System model
- Deadlock Characterization – Necessary conditions, Resource allocation graph
- Deadlock Prevention
- Deadlock Avoidance - Safe state, Resource allocation graph algorithm, Banker's Algorithm
- Deadlock Detection
- Recovery from Deadlock – Process termination, Resource preemption

Unit 4: Memory Management

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Ch 6: Memory Management

- Background – Basic hardware, Address binding, Logical versus physical address space, Dynamic loading, Dynamic linking and shared libraries.
- Swapping
- Contiguous Memory Allocation – Memory mapping and protection, Memory allocation, Fragmentation
- Paging – Basic Method, Hardware support, Protection, Shared Pages
- Segmentation – Basic concept, Hardware
- Virtual Memory Management – Background, Demand paging, Performance of demand paging, Page replacement algorithms – First in First out, Optimal, Least recently used, Most recently used, Most frequently used, Least Frequently used page replacement



Unit 5: File System Management

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Chapter 7 : File System

- File concept
- Access Methods – Sequential, Direct, Other access methods
- Directory and Disk Structure – Storage structure, Directory overview, Single level directory, Two level directory, Tree structure directory, Acyclic graph directory, General graph directory
- Allocation Methods – Contiguous allocation, Linked allocation, Indexed allocation
- Free Space Management – Bit vector, Linked list, Grouping, Counting, Space maps

***Contact hours – 12 hours**

Reference Books:

1. Silberchatz, Galvin, Gagne, *Operating System Concepts*.
2. Maurice Bach, *Design of unix operating system*, chapter -7.

