Operating System
EG3103CT

Year: III **Total: 5 hours /week**
Part: I **Lecture: 3 hours/week**
Tutorial: hours/week
Practical: hours/week
Lab: 2 hours/week

Course description:
This course includes the basic concepts and core structure, functions and design principles of operating system. It consists of the various functions of operating system like process and memory management, file and I/O Management, Deadlock Management and Security. The course gives ideas in designing the operating system and its services.

Course objectives
After completion of this course students will be able to:
1. Describe the functions of operating system.
2. Explain design of the operating system and its components.
3. Demonstrate and simulate the algorithms used in operating system.

Course Contents:

Theory

Unit 1. Introduction **[6 Hrs.]**
- 1.1. Operating system and its functions
- 1.2. Evolution of Operating System
- 1.3. Types of Operating System
- 1.4. Operating System Components
- 1.5. Operating System Services: System Call, Shell
- 1.6. Example of Operating System: Unix, Linux, Windows, Handheld OS

Unit 2. Process Management **[10 Hrs.]**
- 2.1. Process Vs Program, Process States, Process Models, Process Control Box
- 2.2. Process Vs Thread, Thread Models, Multithreading
- 2.3. Process Scheduling Criteria, Algorithms and Goals
  - 2.3.1. Batch System: FIFO, SJF, SRTN
  - 2.3.2. Interactive System: RR, HRRN
- 2.4. Critical Section, Race Condition, Mutual Exclusion
- 2.5. Producer Consumer Problem

Unit 3. Memory Management **[10 Hrs.]**
- 3.1. Concept of Multiprogramming
- 3.2. Memory Management functions
- 3.3. Multiprogramming with fixed partition
- 3.4. Multiprogramming with variable partition
- 3.5. Internal Vs External fragmentation
- 3.6. Memory Allocation: First Fit, Worst Fit, Best Fit
- 3.7. Concept of Paging and Page fault

Unit 4. Deadlock Management **[8 Hrs.]**
- 4.1. Deadlock Concept
- 4.2. Deadlock Conditions

4.3. Deadlock Handling Strategies:
  4.3.1. Deadlock Prevention
  4.3.2. Deadlock Detection
  4.3.3. Deadlock Avoidance
  4.3.4. Recovery from Deadlock
4.4. Banker's Algorithm

Unit 5. File and Input/output Management [6 Hrs.]

5.1. File: Naming, Structure, Types, Access, Attributes, Operations, Directory Systems
5.2. File System Layout
5.3. Implementing Files: Contiguous allocation, Linked List Allocation, Linked List Allocation using Table in Memory, Inodes
5.4. Principle of I/O Hardware and Software
5.5. Disk Formatting, Disk Arm Scheduling, Stable Storage, Error Handling

Unit 6. Security [5 Hrs.]

6.1. Security Goals
6.2. Security Attacks
6.3. Active and Passive Attacks
6.4. Cryptography Basics
6.5. Access Control
6.6. Protection Mechanisms

Practical: [30 Hrs.]

1. Installation of Virtual Machine, Linux and Windows [4 Hrs.]
2. Linux Basic Commands [2 Hrs.]
3. Implementation of Process Scheduling Algorithms [8 Hrs.]
4. Process Creation, Termination [4 Hrs.]
5. Inter process communication [4 Hrs.]
6. Implementation of Banker's Algorithm [4 Hrs.]
7. Implement some Memory Management Schemes [4 Hrs.]

Final written exam evaluation scheme			
Unit	**Title**	**Hours**	**Marks Distribution***
1	Introduction	6	11
2	Process Management	10	18
3	Memory Management	10	18
4	Deadlock Management	8	13
5	File and I/O Management	6	11
6	Security	5	9
	Total	**45**	**80**

* There may be minor deviation in marks distribution.

References:

1. Andrew S. Tanenbaum, "Modern Operating Systems", 3rd Edition, PHI
2. Stalling William, "Operating Systems", 6th Edition, Pearson Education
3. Silbcrschatz A.,Galvin P., Gagne G., "Operating System Concepts", 8th Edition, John Wiley and Sons