

Operating System

BEG 373CO

Year III

Semester I

Teaching Schedule			Examination Scheme				
Hours/Week			Internal		Final		Total
Theory	Tutorial	Practical	Theory	Practical	Theory	Practical	
3	1	2	20	50	80	-	150

Course Objective:

To provide the concepts of Operating systems Design and Implementation

1. Operating System Overview 3 Hours

- 1.1 OS objectives and functions
 - 1.1.1 OS as a user/computer interface
 - 1.1.2 OS as Resource Manager
- 1.2 Evolution of Operating Systems
 - 1.2.1 Serial Processing
 - 1.2.2 Simple Batch Systems
 - 1.2.3 Multi-programmed Batch Systems
 - 1.2.4 Time-Sharing Systems

2. Process 17 Hours

- 2.1 Introduction to Process
 - 2.1.1 The process Model
 - 2.1.2 Implementation of Process
 - 2.1.3 Threads
- 2.2. Inter Process Communication (IPC)
 - 2.2.1 Race Conditions
 - 2.2.2 Critical Sections
 - 2.2.3 Mutual Exclusion with Busy Waiting
 - 2.2.4 Sleep and Wakeup

- 2.2.5 Semaphores
- 2.2.6 Monitors
- 2.2.7 Message Passing

2.3 Classical IPC problems

2.4 Process scheduling

- 2.4.1 Preemptive Vs. Non Preemptive Scheduling
- 2.4.2 Round Robin Scheduling
- 2.4.3 Priority Scheduling
- 2.4.4 Multiple Queues
- 2.4.5 Shortest Job First
- 2.4.6 Real time Scheduling
- 2.4.7 Two-Level Scheduling

3. Input/Output 3 Hours

- 3.1 Principles of I/O Hardware
- 3.2 Principles of I/O Software
- 3.3 Disks
- 3.4 Clocks
- 3.5 Terminals

4. Deadlocks 4 Hours

- 4.1 Resources of Deadlock
- 4.2 Principles of Deadlock
- 4.3 Deadlock Detection and algorithm
- 4.4 Deadlock Avoidance

5. Memory Management 5 Hours

- 5.1 Fixed and Variable partition systems
- 5.2 Bit maps
- 5.3 Memory management with linked list (First fit, best fit, next fit, quick fit and buddy system)
- 5.4 Multiprogramming memory management techniques
- 5.5 Virtual Memory
 - 5.5.1 Paging and Segmentation

5.5.2 Swapping and page replacement

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| 6. | Real Time Operating System | 2 Hours |
| 6.1 | Introduction and Example | |
| 6.2 | Real Time Terminologies | |
| 6.2.1 | Soft Real Time | |
| 6.2.2 | Hard Real Time | |
| 6.2.3 | Real Real Time | |
| 6.2.4 | Firm Real Time | |
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| 7. | Distributed Operating System | 3 Hours |
| 7.1 | Introduction | |
| 7.2 | Communication and Synchronization | |
| 7.3 | Process and Processor in Distributed OS | |
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| 8. | File Systems | 3 Hours |
| 8.1 | Files and Directories | |
| 8.2 | File System Implementation | |
| 8.3 | File Sharing and Locking | |
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| 9. | Case Studies: Aspect of Different OS | 5 Hours |
| | (Linux, Windows, Mac, iOS, Android OS) | |

Laboratory:

There shall be laboratories exercises covering following topics.

- i. Implementation of Process (Creation of process, Parent process, Child Process)
- ii. Interprocess Communication(Race Condition, Mutual Exclusion, Semaphores, Monitors, Message Passing)
- iii. Process Scheduling(Round Robin, Priority, Shortest Job first)
- iv. Implementation of Deadlocks
- v. Memory Management

Reference:

1. Operating Systems: Design and Implementation
- Tanenbaum A.S. , Woodhull A.S. (Prentice-Hall)

2. Operating System: Internals and Design Principles

- Stallings, William (prentice-Hall)
- 3. Operating System Concepts
 - Silberschatz A., Galvin P.B. (Addison- Wesley)
- 4. Mark Donovan: System Programming.

Marks Distribution

Chapter	Marks
1	6
2	26
3	6
4	8
5	10
6,7	8
8,9	16
Total	80