Code No.: MCA 106
Paper: Operating Systems

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INSTRUCTIONS TO PAPER SETTERS:
1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks including subparts, if any.

OBJECTIVE: *The objectives of this course are to:*
- *Help students become familiar with the fundamental concepts of operating system.*
- *Help students become competent in recognizing operating systems features and issues.*
- *Provide students with sufficient understanding of operating system design and how it impacts application systems design and performance.*

Upon successful completion of this course, the student shall be able to:
- *Exhibit familiarity with the fundamental concepts of operating systems.*
- *Exhibit competence in recognizing operating systems features and issues.*
- *Apply a mature understanding of operating system design and how it impacts application systems design and performance.*

PRE-REQUISTES:
- Basics of Computer System Architecture
- C/C++ Programming Skills

UNIT – I

Operating System: Introduction, Role, Types of OS; Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls.

Processes: Process Concept, Process Scheduling, Operation on Processes, Cooperating Processes, Threads.
CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Algorithm Evaluation.   **[No. of Hrs.:10]**

UNIT – II

Interprocess Communication and Synchronization: Background, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Message Passing.
Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock Handling.
Memory Management: Background, Logical vs. Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Segmentation with Paging.
Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations, Demand Segmentation.   **[No. of Hrs: 11]**

UNIT – III

Device Management: Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Device Characteristics-Hardware Consideration, Channels and Control Units,

Independent Device Operation, Buffering, Multiple Paths, Block Multiplexing, Device Allocation Consideration

Secondary-Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Reliability.   **[No. of Hrs.: 12]**

UNIT – IV

File-System Interface: File Concept, Access Methods, Directory Structure.

File-System Implementation: Introduction, File-System Structure, Basic File System, Allocation Methods, Free-Space Management, Directory Implementation.

Security : The Security problem, Goals of protection, Access matrix, Authentication, Program threats, System threats, Intrusion detection , Cryptography.

Case Study: Linux Operating System and Windows XP.   **[No. of Hrs.: 10]**

TEXT BOOKS:
1. Silbersachatz and Galvin, "Operating System Concepts", John Wiley, 8th Ed., 2009.
2. Milan Kovic., "Operating Systems", Tata McGraw Hill, 2001
3. Deitel, Deitel and Choffnes, "Operating Systems", Pearson ,3rd Edition

REFERENCES:
1. Tannenbaum, "Operating Systems", PHI, 4th Ed., 2000.
2. Madnick E. and Donovan J., "Operating Systems", Tata McGraw Hill, 2001.
3. Flynn McHoes, "Operating System", Cengage Learning, 2006.
4. Pbitra Pal Choudhury, "Operating System Principles and Design", PHI, 2009.
5. Sibsankar Halder and Alex A. Aravind, "Operating System", Pearson, 2009.
6. William Stallings, "Operating Systems Internals & Design Principles", Pearson Education, 6th Ed., 2009.