**18XW44 OPERATING SYSTEMS**

**3 2 0 4**

**INTRODUCTION**: Abstract view of an operating system - Operating Systems Objectives and Functions – Evolution of Operating Systems - Dual-mode operation - System calls- Structure of Operating System. (3)

**PROCESS DESCRIPTION AND CONTROL**: Process concepts - Process Creation – Process Termination - Process states - Process Description – Process Control. (3)

**PROCESS AND THREADS**: Relationship between process and threads – Thread States – Thread Synchronization – Types of Thread – Multithreading model. (4)

**PROCESS SCHEDULING**: Scheduling basics - CPU-I/O interleaving- (non-) pre-emption - context switching- Types of Scheduling – Scheduling Criteria - Scheduling Algorithms – Algorithm evaluation – Real-time scheduling. (4)

**PROCESS SYNCHRONIZATION**: Concurrent Process – Principles of Concurrency – Race Condition - Mutual Exclusion – Critical section problems – Software support – Hardware Support – Operating System Support: Semaphore, Monitor – Classical problems of synchronization – Synchronization examples. (6)

**DEADLOCK**: Principles- Characterization – Methods for handling deadlock - Deadlock Prevention, Avoidance, Detection, and recovery. (3)

**MEMORY MANAGEMENT**: Memory hierarchy – Memory Management requirements - Memory partitioning: Fixed partitioning, Dynamic partitioning, Buddy systems – Simple paging – Page table structures – Simple Segmentation – segmentation and paging. (5)

**VIRTUAL MEMORY MANAGEMENT:** Need for Virtual Memory management – Demand Paging – Copy on write - Page Fault handling - Page replacement - Frame allocation- Thrashing - working set model. (4)

**I/O MANAGEMENT AND DISK SCHEDULING:** Organization of I/O function – Evolution of I/O function – Types of I/O devices – Logical Structure of I/O functions – I/O Buffering – Disk I/O – Disk Scheduling algorithms – RAID - Disk Cache. (4)

**FILE SYSTEM MANAGEMENT**: Files – Access methods - File system architecture – Functions of file management –Directory and disk structure - Mounting - File sharing –File system implementation – Directory implementation - File Allocation – Free space management. (5)

**VIRTUALIZATION**: Requirements for Virtualization - Type 1, Type 2 Hypervisors – Paravirtualization- Memory Virtualization - I/O Virtualization - Virtual machines on Multicore CPUs – Virtualization in Multiprocessor environment. (4)

**TUTORIAL PRACTICE:**

1. Practicing UNIX Commands
2. Writing SHELL Scripts
3. Writing programs using UNIX System Calls
4. Process Creation and Execution
5. Thread Creation and Execution
6. Process / Thread Synchronization using semaphore
7. Developing Application using Inter Process communication (using sharedmemory, pipes or message queues)
8. Implementation of Memory Management Schemes
9. Implementation of file allocation technique (Linked, Indexed, Contiguous)

**Total L: 45+T: 30=75**

**TEXT BOOKS:**

1. Silberschatz A, Galvin, PB. and Gagne, G. “Operating System Concepts Essentials”, John Wiley,2016.
2. William Stallings, “Operating Systems”, Pearson Education, 2015.
3. Andrew S Tanenbaum, "Modern Operating System", Prentice Hall, 2015.

**REFERENCES:**

1. Elmasri, E., Carrick A.G. and Levine, D. “Operating Systems: A Spiral Approach”, McGraw Hill, 2012.
2. McHoes, A M and Flynn, I.M. “Understanding Operating Systems”, Cengage Learning, 2013.
3. Dhamdhere D M, “Operating Systems: A Concept-based Approach”, McGraw-Hill, 2012.