

**RAMAKRISHNA MISSION VIDYAMANDIRA**  
**CBCS Syllabus B.Sc. Computer Science Honours**

**Semester-III**

**Course Code: CMSA CC 6 Credit: 6**

**Course Type: Core Course**

**Course Outcome:**

- i) To understand the theory behind operating systems.
- ii) To be able to understand various process activities in system through system software.
- iii) To understand the correlation between software and hardware resource of a computer.
- iv) To be able to write system program in UNIX platform.

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**CMSA CC 6 T: Operating System and System Software**

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**Credit: 4**

**Marks: 50**

**System Software:** Introduction: Different System Software; Introduction to Assemblers, Loaders, Linkers, Interpreters, Compilers; various phases of compilation. [6 L]

**Operating Systems:** Introduction to OS; User mode, Kernel mode, Mode Switching, Multiprogramming, Multitasking OS, Concepts of processes, Files, Shell, System Calls; Structures: Monolithic, Layered, Virtual, Client Server and Distributed Model. [8 L]

**Process Management:** Basic Concepts; Preemptive And Non-Preemptive Scheduling; Scheduling Criteria; FCFS, SJF, SRTF, Priority, Round Robin, Multilevel Feedback Queue Scheduling Algorithms; Gantt Chart Representation of Scheduling, Calculation of Waiting and Turnaround Time. [8 L]

**Concepts of Synchronization:** Inter Process Communication Mechanism; Concurrent Processing; Critical Section Problem and Solution; Semaphores; Monitors; Classical Problem of Synchronization (Bounded Buffer, Reader Writer, Dining Philosopher) and Semaphore Solution; Monitors. [8 L]

**Deadlock:** System Model, Necessary Conditions; Resource Allocation Graph; Deadlock Prevention; Deadlock Avoidance, Safe State, Resource Allocation Graph Algorithm, Banker's Algorithm; Deadlock Detection; Recovery from Deadlock. [8 L]

**Memory Management:** Concepts Address Binding; Logical and Physical Address Space; Overlays, Swapping; Contiguous Memory Allocation Concepts, Fragmentation and Compaction; Basic Method of Paging and H/W Support, Memory Protection, Structure of Page Table, Shared Pages; Segmentation, Segmentation with Paging. [8 L]

**Virtual Memory:** Concepts of Virtual Memory; Demand Paging; Page Replacement Basic Schemes: FIFO, Optimal, LRU Page Replacement Techniques, Belady's Anomaly; LRU Approximation, Global and Local Allocation of Frames; Thrashing; [8 L]

**I/O Management:** Device and Device Controllers, Interrupt Handlers and Device drivers, Disk scheduling strategies; Concept of RAID [4 L]

**File Systems:** Files and Directories, File Servers, Security and Protection. [2 L]

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## CMSA CC 6 P: Operating System Laboratory

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**Credit: 2**

**Marks: 25**

**Basics of System Administration using Linux:** Installation, User management, Repository, Package installation and un-installation; [4 L]

Introduction to UNIX Shells, commands, shell programming, shell variables, pipes and filters; UNIX Shell Programming [28 L]

System programming using basic systems calls, Interrupt handling. [6 L]

Implementation of Operating System algorithms using C. [2 L]

### Recommended Books:

1. Operating System Concepts by A.Silberschatz, Peter B. Galvin, G. Gagne; 7<sup>th</sup> Edition; John Wiley & Sons.
  2. Modern Operating System by Andrew S. Tanenbaum; 3<sup>rd</sup> Edition; Pearson.
  3. Operating System by Deitel, Deitel, Choffnes; 3<sup>rd</sup> Edition; Pearson.
  4. Operating Systems-Internals and Design Principles by Stallings; 9th Edition; Pearson.
  5. System Programming by John J. Donovan; TMH.
  6. Systems Programming & Operating Systems by Dhamdhare; 2<sup>nd</sup> Edition; TMH.
  7. Compilers: Principles Techniques and Tools by Aho, Ullman, Lam, Sethi; 2<sup>nd</sup> Edition; Pearson.
  8. Unix concepts and Applications by Sumitava Das, 4th Edition, Mcgraw Hill.
  9. The Design of the UNIX Operating System by Maurice J. Bach, 1st Edition, PHI Learning.
  10. Linux System Programming by Robert Love, 2<sup>nd</sup> Edition, O'Reilly.
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