**MCA Semester-III**

**Introduction to Systems Programming**

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| **TEACHING SCHEME** | | | **EXAM SCHEME (Marks)** | | | | | **CREDIT STRUCTURE** | | |
| **Lecture** | **Tutorial** | **Practical** | **Theory (3 hrs)** | **Sessional**  **(1.15hrs)** | **Practical**  **/Viva** | **Termwork** | **Total** | **L** | **P** | **Total** |
| 4 | 0 | 2 | 60 | 40 | 25 | 25 | 150 | 4 | 1 | 5 |

**Prerequisites**

Basic knowledge of computer hardware and software, Knowledge of C programming

**Course Learning Outcomes**

After successful completion of the course, student will be able to:

* explain role of various system software such as operating system, assembler, compiler, linker and loader
* describe process concept, thread concept, process scheduling and deadlock management
* explain memory partitioning techniques and virtual memory techniques
* summarize file organization and input/output techniques
* demonstrate process management, inter-process communication and file management using system calls

**Syllabus**

**Computer System Overview, Operating System Overview**

Basic Elements, Processor Registers, Instruction Execution,Interrupts, Memory Hierarchy,

Cache Memory

Operating System: Introduction, Objectives, Functions, Evolution, Major Achievements, Characteristics of Modern Operating System

**Process and threads, Concurrency, Deadlock and Scheduling**

Process Concept, Process States, Process Control, System Calls for Process Management (fork, waitpid, exec Family),Process Scheduling: Types and Algorithms,Introduction to Threads

Principles of Concurrency, Semaphores, Monitors, Reader/Writer Problem, System Calls for Semaphore Management( semget, semctl, semop, fsync )

Deadlock: Introduction, Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection

**Memory Management**

Memory Management Requirements, Memory Partitioning, Paging, Segmentation, System Calls for Memory Management(shmget, shmat, shmdt, shmctl), Hardware and Control Structures, Operating System Software

**Input/Output and File Management**

Overview, Disk Scheduling, Redundant Array of Independent Disks

File Management Overview, File Organization and Access, System Callsfor File Management (open, close, read, write, lseek, stat, mkdir, rmdir, link, unlink, dup, dup2, pipe)

**Introduction to System Software**

Language Processor, Assembler, Compiler, Linker and Loaders

**Text Books:**

1. “Operating Systems: Internals and Design Principles”, William Stalling,6th Edition,

Prentice Hall India

1. “System Programming and Operating System”, D M Dhamdhere, 2nd Edition, Tata McGraw Hill Education PrivateLimited

**References:**

1. “Operating System Principles”, Abraham Silberschatz, Peter B. Galvin and Greg Gagne, 9th Edition, Wiley-Indian
2. “Modern Operating Systems”, A. S. Tanenbaum, 4th Edition, PHI
3. “System Software – An Introduction to System Programming”, Leland L. Back, 3rdEdition, Pearson Education Asia
4. “System Programming”, Srimanta Pal, Oxford University Press