

**Gujarat University**  
**K. S. School of Business Management and Information Technology**  
**[Five Years' (Full – Time) M.Sc. (CA&IT) Integrated Degree Course]**  
**Second Year M.Sc. (CA&IT) (Semester - III)**

---

**Course Name: Operating System Concepts-Theory**

**Course Code: DSC-C- IMSCIT-232T**

**Course Credit: 4**

**Objective:**

This course enables to understand importance of Operating System, its functionalities to manage resources of Computer and Peripherals, program development and its execution. Student will be made aware of Process Management, Memory Management, File Management and I/O Management in detail, which will be useful to them for Large Application Development.

**Course Outcomes:**

- Students will demonstrate a comprehensive understanding of operating system fundamentals, including the definition, generations, types, and basic elements of operating systems.
- Students will understand the concepts of processor registers, instruction execution, interrupts, and memory hierarchy, including cache and I/O communications.
- Students will be proficient in describing and controlling processes, including understanding process states, transitions, and process scheduling algorithms and the principles of concurrency, mutual exclusion, and synchronization mechanisms such as semaphores, monitors, and message passing.
- Students will understand the principles of deadlock prevention, avoidance, detection, and resolution, as well as strategies for handling starvation.
- Students will understand different types of processor scheduling algorithms, including their criteria and evaluation based on CPU utilization, throughput, turnaround time, waiting time, and response time.
- Students will understand the development, role, and function of Unix/Linux operating systems, including system calls, elementary Linux commands, shell programming, directory structure, and system administration.

**Gujarat University**  
**K. S. School of Business Management and Information Technology**  
**[Five Years' (Full – Time) M.Sc. (CA&IT) Integrated Degree Course]**  
**Second Year M.Sc. (CA&IT) (Semester - III)**

**Contents:**

Unit No.	Course Content	Hours	Credits
1	<b>Operating System Overview:</b> Definition – Generations of Operating systems – Types of Operating Systems, Basic Elements, Processor Register, Instruction execution, Interrupts Memory hierarchy, Cache, I/O communications, Operating system functions, Evolution of OS-Serial, Batch, Multiprogramming, and Time-sharing Systems Process Description and Control: Process States, Transitions, Description, Process Control Process Description and Control: Process States, Transitions, Description, Process Control, Threads: Processes and Threads.	15	1
2	<b>Task Coordination in Ancient Systems(IKS):</b> Coordination of large-scale projects and community tasks. Methods of synchronization and task allocation in ancient texts. Concurrency: Principles of Concurrency, Mutual Exclusion–Hardware Support, Semaphores, Monitors, Message Passing, Reader/Writer Problem. Deadlock and Starvation: Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, an Integrated Deadlock Strategy, Dining Philosophers Problem. Memory Management Basic Memory Management: Definition, Logical and Physical address map Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction , Paging : Principle of operation – Page allocation – Hardware support for paging – ,Protection and sharing – Disadvantages of paging.	15	1
3	<b>Virtual Memory:</b> Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set Processor Scheduling: Types of Scheduling, Scheduling, Types of Schedulers , Algorithms ,Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) , Scheduling algorithms : Pre emptive and Non , pre emptive , FCFS – SJF – RR , Multiprocessor scheduling : Types, Performance evaluation of the scheduling.	15	1
4	<b>I/O Management:-</b> I/O Devices, I/O Function, OS Design Issues, I/O Buffering, Disk Scheduling, RAID, Disk cache. File Management: Overview, File Organization, B-Trees, File Directories, File Sharing, Record Blocking, Secondary Storage Management. Unix/Linux Operating System:- Development Of Unix/Linux, Role & Function Of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration Case study: Linux, Windows Operating System.	15	1

**Gujarat University**  
**K. S. School of Business Management and Information Technology**  
**[Five Years' (Full – Time) M.Sc. (CA&IT) Integrated Degree Course]**  
**Second Year M.Sc. (CA&IT) (Semester - III)**

---

**Reference Books:**

1. Operating Systems (7th Ed) – Internals and Design Principles by William Stallings, Prentice Hall India, 2013
2. Operating System Concepts (8th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley Indian Edition (2010).
3. Modern Operating Systems (Third Edition) by Andrew S Tanenbaum, Prentice Hall India (2008).
4. Principles of Operating Systems by Naresh chauhan, Oxford Press (2014).
5. Operating Systems by D.M. Dhamdhere, Tata McGraw Hill 2nd edition.

**Accomplishments of the student after completing the Course :-**

- Students will gain a deep understanding of operating system fundamentals, including its definition, types, and basic elements.
- Students will become proficient in describing and controlling processes, understanding their states, transitions, and scheduling mechanisms.
- Students will develop skills in managing concurrency and implementing synchronization mechanisms, ensuring efficient resource utilization.
- Students will acquire knowledge of various memory management techniques, including memory allocation, paging, and virtual memory.
- Students will gain expertise in managing files and performing I/O operations efficiently, ensuring smooth data processing.