Prasad V. Potluri Siddhartha Institute of Technology, Kanuru, Vijayawada.

1/2 M.Tech. FIRST SEMESTER

CSCS1T5 **OPERATING SYSTEMS** **Credits: 4**

Lecture: 4 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Objectives:

1. An operating system is an essential part of any computer system. The purpose of this course is providing a clear understanding of the concepts that underlie operating systems.
2. Fundamental concepts and algorithms that will be covered are based on those used in existing commercial operating systems.
3. The aim is to present these topics in a general setting that is not tied to one particular operating system.
4. Throughout the course, practical aspects that pertain to the most popular operating systems

Learning Outcomes:

Students who complete this course successfully are expected to:

1. Gain extensive knowledge on principles and modules of operating systems.
2. Understanding key mechanisms in design of operating systems modules.
3. Understand process management, concurrent processes and threads, memory management, virtual memory management concepts, and deadlocks.
4. Compare performance of CPU Scheduling algorithms.
5. Produce algorithmic solutions to process synchronization problems.

UNIT - I

Introduction to Operating Systems: Operating System Overview: Operating System Objectives and Functions, The Evolution of Operating Systems, Major Achievements, Modern Operating Systems, Microsoft Windows Overview, UNIX Systems and Linux.

UNIT - II

Processes and Threads: Process Description and Control: Process, Process States, Process Description, Process Control, and Execution of the OS, Security Issues and Process Management in UNIX SVR4. Processes and Threads, Symmetric Multiprocessing (SMP), Microkernel, Windows Vista Thread and SMP Management, Solaris Thread & SMP Management and Linux Process and Thread Management.

UNIT - III

Concurrency: Principles of Concurrency, Mutual Exclusion, Semaphores, Monitors, Message Passing, Readers/Writers Problem.

UNIT - IV

Deadlocks: Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, An Integrated Deadlock Strategy, Dining Philosophers Problem, Concurrency Mechanisms in UNIX, Linux, Solaris and Windows Vista.

UNIT - V

Memory Management: Memory Management Requirements, Memory Partitioning, Paging, Segmentation, Security Issues, Virtual Memory: Hardware and Control Structures, OS Software, Memory Management in UNIX, Solaris, Linux and Windows Vista.

UNIT - VI

Scheduling: Types of Scheduling, Scheduling Algorithms, Traditional UNIX Scheduling, Multiprocessor Scheduling, Real Time Scheduling, Scheduling in Linux, UNIX Free BSD and Windows Vista.

UNIT - VII

Input/Output and Files: I/O Management and Disk Scheduling – I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling, RAID, Disk Cache, I/O in UNIX Free BSD, Linux and Windows Vista. File Management: Overview, File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management, File System Security, File Management in UNIX, Linux and Windows Vista.

UNIT - VIII

Security: Computer Security Concepts, Threats, Attacks and Assets, Intruders, Malicious Software, Viruses, Worms, Bots, Rootkits. Computer Security Techniques: Authentication, Access Control, Intrusion Detection, Malware Defense, Dealing with Buffer Overflow Attacks, and Windows Vista Security.

Learning Resources

Text Book:

1. Operating Systems-Internals and Design Principles, William Stallings, 6th Edition, Pearson.

Reference Book:

1. Operating Systems Concepts, 5/e, Abraham Silberschatz, Galvin, John Wiley & Sons, Inc.