



R 20 Regulations

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Computer Science & Engineering

Course Code	OPERATING SYSTEMS (Common to CSE, IT, CSE(DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)		L	T	P	C
20A05402T			3	0	0	3
Pre-requisite	Basics of CO and DBMS	Semester	IV			
Course Objectives:						
The course is designed to <ul style="list-style-type: none">• Understand basic concepts and functions of operating systems• Understand the processes, threads and scheduling algorithms.• Provide good insight on various memory management techniques• Expose the students with different techniques of handling deadlocks• Explore the concept of file-system and its implementation issues• Familiarize with the basics of the Linux operating system• Implement various schemes for achieving system protection and security						
Course Outcomes (CO):						
After completion of the course, students will be able to <ul style="list-style-type: none">• Realize how applications interact with the operating system• Analyze the functioning of a kernel in an Operating system.• Summarize resource management in operating systems• Analyze various scheduling algorithms• Examine concurrency mechanism in Operating Systems• Apply memory management techniques in the design of operating systems• Understand the functionality of the file system• Compare and contrast memory management techniques.• Understand deadlock prevention and avoidance.• Perform administrative tasks on Linux based systems.						
UNIT - I	Operating Systems Overview, System Structures		8Hrs			
Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Open-Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Operating system debugging, System Boot.						
UNIT - II	Process Concept, Multithreaded Programming, Process Scheduling, Inter-process Communication		10Hrs			
Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems. Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples. Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.						
UNIT - III	Memory-Management Strategies, Virtual Memory Management		Lecture 8Hrs			
Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples. Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.						
UNIT - IV	Deadlocks, File Systems		Lecture 9Hrs			



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Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection And recovery, Deadlock avoidance, Deadlock prevention. File Systems: Files, Directories, File system implementation, management and optimization. Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.		
UNIT - V	System Protection, System Security	Lecture 8Hrs
System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights. System Security: Introduction, Program threats, System and network threats, Cryptography as a security, User authentication, implementing security defenses, firewalling to protect systems and networks, Computer security classification. Case Studies: Linux, Microsoft Windows.		
Textbooks:		
<ol style="list-style-type: none">1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (Topics: Inter-process Communication and File systems.)		
Reference Books:		
<ol style="list-style-type: none">1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.2. Dhamdhare D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 20094. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004		
Online Learning Resources:		
https://nptel.ac.in/courses/106/106/106106144/ http://peterindia.net/OperatingSystems.html		