

Subject Code: 01CE0401

Subject Name: Operating System

B.Tech. Year - II

Objective: Student will understand Modern Operating System and their principles. The course will cover theory as well as practice aspects of a subject through scheduled lectures and labs, course will cover details of processes, CPU scheduling, memory management, file system, storage subsystem, and input/output management.

Credits Earned: 5 Credits

Course Outcomes: After completion of this course, student will be able to

- Understanding the role of operating system with its function and services. (Understanding)
- Compare Various Algorithm used for CPU Scheduling, Memory management and Disk Scheduling Algorithm. (Evaluate)
- Apply various concepts related with Deadlock to solve Problems. (Apply)
- Analyse Protection and Security Mechanism in Operating System. (Analyse)

Pre-requisite: Data structures like stack, queue, linked list, tree, graph, hashing, file structures, any structured programming language (like C or python).

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term work (TW)	
4	0	2	5	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	Operating System: Operating Systems Overview- Overview and Functions of operating systems, protection and security, distributed systems, operating Systems structures, services, system calls and their working. History	4

	And generation of operating system.	
2	Process and Threads: Process and Threads - Process concepts, threads, scheduling-criteria, Algorithms, and their evaluation. Process Scheduling, Scheduling, case studies UNIX. Linux. Windows	8
3	Concurrency Control(IPC): Process synchronization, critical- section problem. classic problems of Synchronization, Software Solutions for synchronization problem. Hardware Solutions for synchronization problem. Synchronization and Their applications. [Understanding of Semaphore – Mutex – Monitor – Event Counters]	10
4	Memory Management: Memory: Swapping, contiguous memory allocation, paging, page table, segmentation, virtual memory, demand paging, page- replacement, Allocation of frames, Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies : Least Recently used (LRU) Optimal (OPT) , Second Chance (SC), First in First Out (FIFO), Not recently used (NRU).	15
5	Principles of Deadlock: Deadlock - system model, deadlock and its characterization with example, deadlock prevention techniques with example, detection and avoidance of a deadlock, methods to get recovery form deadlock	6
6	File System Interface: File system Interface- the concept of a file, Access Methods. Directory Structure. File system mounting, file protection and sharing mechanism. File System implementation- File system structure, file/directory implementation, efficiency and performance, file allocation methods, Free-space management.	4
7	Mass Storage Structure & I/O System: Mass-storage structure- RAID structure, Disk structure, disk Attachment, disk scheduling, swap-space management. stable-storage Implementation. Overview of Mass-storage structure. Tertiary storage Structure. I/O systems- Hardware, application I/o interface, kernel I/O subsystem, Transforming I/O requests to Hardware operations. STREAMS, performance	4

8	Protection & Security: Protection - Protection. Goals of Protection, Principles of Protection. Domain of protection Access Matrix, Implementation of Access Matrix. Access control, Revocation of Access Rights. Capability- Based systems, Language - Based Protection Security-Problems, Program Threats, System and Network Threats, cryptography as security tool, user authentication, implementing security defence, fire walling to protect system and networks, computer security classifications.	3
Total Hours		54

References:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 8th edition.
2. Operating Systems - Internals and Design Principles. Stallings, 6th Edition- 2009. Pearson education.
3. Operating systems- A Concept based Approach-D.M.Dhamdhere. 3rd Edition.TMH
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.
5. Principles of Operating Systems, B.L.Stuart. Cengage learning, India Edition.
6. Operating Systems. A.S. Godboie.2nd Edition, TMH

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
20%	25%	25%	15%	15%	-

Suggested List of Experiments:

1. Study of Different OS Installation and its working.
2. Study of Basic commands to understand the system and working of Linux.
3. Write a script to reverse a number and string given by user.



4. Write a script to find the smallest of three numbers as well as largest among three numbers.
5. Write script that prints names of all sub directories present in the current directory.
6. Write a script to reverse the contents of a file.
7. Write a script to check entered string or a number is palindrome or not
8. Write a menu driven shell script for Copy a file, remove a file, Move a file in Linux.
9. Shell Script to make a menu driven calculator using case in UNIX / Linux / Ubuntu.
10. Write a script to display the digits which are in odd position in a given 6 digit number in Linux
11. Write a script to translate the string from capital letters to small and small letters to capital using awk command.
12. Write a script to do the sorting of given numbers (use command line argument).
13. Write a program for process creation using C. (Use of gcc compiler).

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

1. <http://williamstallings.com/OS/Animation/Animations.html>
2. <http://nptel.ac.in/courses/106106144/>
3. <http://nptel.ac.in/courses/106108101/>
4. <http://codex.cs.yale.edu/avi/os-book/OS9/slide-dir>