



SEMESTER – V

BRANCH	Subject	Subject Code
B.Sc. (Computer Science-Major)	Operating System	CSM1-151

Course learning outcomes (CLO):-

1. After the completion of this course, a student shall be able to do the following
2. Describe the importance of computer system resources and the role of operating system in their management policies and algorithms
3. Specify objectives of modern operating systems and describe how operating systems have evolved over time.
4. Understand various process management concepts and can
5. compare various scheduling techniques, synchronization, and deadlocks.
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7. Describe the concepts of multithreading and memory management techniques.
8. Identify the best suited memory management technique for any process.
9. Describe various file operations, file allocation methods and disk space management.
10. To understand and identify potential threats to operating systems and the security features design to guard against them.
11. Learn to operate the Linux system, along with its administration and Shell programming
12. Getting to know the Android OS and its application framework.

Unit – I

Introduction to Operating System: What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems Multiprogramming Systems, Batch Systems, Time Sharing Systems, Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.



Unit – II

Process Management Process Concepts, Process states & Process Control Block Process Scheduling Scheduling Criteria, Scheduling Algorithms (Preemptive & Non-Preemptive) FCFS, SJF, SRTN, RR. Priority, Multiple-Processor, Real-Time, Multilevel Queue and Multilevel Feedback Queue Scheduling Deadlock Definition, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock

Unit – III

Memory Management: Introduction, Address Binding. Logical versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms. File Management: Concept of File System (File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods), Directory Structure (Single-Level, Two-Level, Tree-Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed).

Unit – IV

Disk Management Structure, Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C- SCAN, LOOK), Swap Space Management, Disk Reliability, Recovery Security: Security Threats, Security policy mechanism, Protection, Trusted Systems, Authentication and Internal Access Authorization, Windows Security LINUX Introduction, History and features of Linux, advantages, hardware requirements for installation, Linux architecture, file system of Linux boot block, super block, inode table, data blocks Linux standard directories, Linux kernel, Partitioning the hard drive for Linux, installing the Linux system, system-startup and shut-down process, init and run levels Process, Swap, Partition, fdisk, checking disk free spaces. Difference between CLI OS & GUI OS, Windows v/s Linux, Importance of Linux Kernel, Files and Directories. Concept of Open Source Software

Unit – V

Linux Administration:

Types of user-Root and normal user, Multiple logins at same time (Ctrl + Alt + F1, F2..F6), who command.

Help: whatis, -help, man command.

Basic Commands:For displaying current directory, files and directories of current/absolute/relative location(s), creating, removing, renaming, copying and moving files or directories.

For comparing, and editing file content, displaying file content(s) with tr, head, tail, last, grep, sort, piping. Searching file content or searching file within different directories based on particular search criteria.For implementing general purpose utilities calendar, date, calculator, basic arithmetic expressions, compression and extraction of file/directory.Text editors: vi, jco, vim, gedit, atom, nano etc. Command mode & Insert mode, cut, yank, undo.Managing multiple processes: connecting processes with pipes, tee, redirecting input output, changing process priority with nice, cron commands, kill, ps.

Managing user accounts- Sudo, users: useradd, usermod, userdel, passwd. Group: Primary & Secondary Group, chgrp, chown, groupadd, groupdel,Permissions: adding and removing permissions. Package installation through GUI/apt-get/yum/dnf.

Practical's

Linux:

a) Linux Directory Commands: pwd, mkdir, rm -rf, ls, cd, cd/ .cd-

b) Linux File Commands: touch, cat, cat >>, rm, cp, mv, rename



- c) Linux Permission Commands: su, id, useradd, passwd, groupadd, chmod, groupdel, chown, chgrp
- d) Linux File Content & Filter Commands: head, tail, tac, more, less, grep, cat, cut, grep, comm, sed, tee, tr, uniq, wc, od, sort, diff
- e) Linux Utility Commands: find, be, locate, date, cal, sleep,
time, df, mount, exit, clear, gzip, gunzip 1) Linux Networking Commands: ip, ssh, mail, ping, host
- 2) Edit Crontab file: to wall message on system on particular time automatically
- h) Vi editor: Create file, edit, save and quit. Highlighting the searched term within a file, cut, yank, undo

Shell Scripting:

- a) Write a shell script to print a message.
- b) Write a shell script to access arguments passed on command line.
- c) Write a shell script to create files with the names passed on command line.
- d) Write a shell script to input number from user and display its factorial.
- e) Write a shell script to input file name and create multiple directories individually for the name in the file given.
- f) Write a shell script to input number from user and display whether it is prime number or not.
- g) Write a shell script to list all the files in any directory given by the user
- h) Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory