

Sri Sathya Sai College for Women, Bhopal

(An Autonomous College affiliated to Barkatullah University, Bhopal)

(NAAC Accredited 'A' Grade)



SYLLABUS

SESSION: 2023-24

PROGRAM: Degree

YEAR: III Year

CLASS: B.Sc.

SUBJECT: Computer Science

Sri Sathya Sai College for Women, Bhopal
(An Autonomous College Affiliated to Barkatullah University Bhopal)
Department of Higher Education, Govt. of M.P.
Under Graduate Syllabus (Annual Pattern)

As recommended by Central Board of Studies and approved by the Governor of M. P.
wef 2023-2024
(Session 2023-24)
(NEP-2020)

Class	B.Sc.
Year	III Year
Subject	Computer Science
Course Title	Operating System (Group A – Paper I)
Course Type	Discipline Specific Elective
Credit Value	4
Max. Mark	30+70 (Minimum Marks 35)
<p>Course Outcome: After the completion of this course, a student shall be able to do the following:</p> <ul style="list-style-type: none"> • Describe the importance of computer system resources and the role of operating system in their management policies and algorithms. • Specify objectives of modern operating systems and describe how operating systems have evolved over time. • Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. • Describe the concepts of multithreading and memory management techniques. • Identify the best suited memory management technique for any process. • Describe various file operations, file allocation methods and disk space management. • To understand and identify potential threats to operating systems and the security features design to guard against them. • Learn to operate the Linux system, along with its administration and Shell programming. • Getting to know the Android OS and its application framework. 	

Particular

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. Deadlock Handling Approaches: Prevention, Avoidance, Detection and Recovery.
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.



	<p>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)</p>
Unit IV	<p>Disk Management: Structure, Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Swap Space Management, Disk Reliability, Recovery.</p> <p>Security: Security Threats, Security policy mechanism, Protection, Trusted Systems, Authentication and Internal Access Authorization, Windows Security.</p> <p>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.</p> <p>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.</p> <p>Difference between CLI OS & GUI OS, Windows v/s Linux, Importance of Linux Kernel, Files and Directories. Concept of Open Source Software.</p>
Unit V	<p>Linux Administration:</p> <p>Types of user-Root and normal user, Multiple logins at same time (Ctrl + Alt + F1,F2..F6), who command.</p> <p>Help: whatis, --help, man command.</p> <p>Basic Commands:</p> <p>For displaying current directory, files and directories of current/absolute/relative location(s), creating, removing, renaming, copying and moving files or directories.</p> <p>For comparing, and editing file content, displaying file content(s) with tr, head, tail, last, grep, sort, piping.</p> <p>Searching file content or searching file within different directories based on particular search criteria.</p> <p>For implementing general purpose utilities – calendar, date, calculator, basic arithmetic expressions, compression and extraction of file/directory.</p> <p>Text editors : vi, joe, vim, gedit, atom, nano etc. Command mode & Insert mode, cut, yank, undo.</p> <p>Managing multiple processes: connecting processes with pipes, tee, redirecting input output, changing process priority with nice, cron commands, kill, ps.</p> <p>Managing user accounts- Sudo, users: useradd, usermod, userdel, passwd.</p> <p>Group: Primary & Secondary Group, chgrp, chown, groupadd, groupdel</p> <p>Permissions: adding and removing permissions.</p> <p>Package installation through GUI/ apt-get/yum/dnf.</p>
Unit VI	<p>Shell Programming: Types of Shells, Shell Meta Characters - \$#, \$*, \$?, Shell Variables, Shell Scripts, Debugging scripts, echo, read, operators, keywords, Integer Arithmetic and String Manipulation, Functions, I/O Redirection and Piping.</p> <p>Decision Making: if-else-elif-fi, case-esac.</p> <p>Loop Control: while, for, until, break & continue.</p> <p>Automation and Exception Handling: Creating shell programs for automating tasks, file handling, trapping signals etc.</p> <p>Android Operating System: Introduction, Development Framework, Application Architecture, Process Management and File System, Small Application Development using Android Development Framework.</p> <p>Indian contribution to the field – the BOSS operating system, open source softwares, growth of LINUX, Aryabhata Linux, contributions of innovators – Rajen Sheth, Sunder Pichai etc.</p>

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Suggestion Books:

- A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications.
- A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education.
- Operating System by Peterson
- Linux by Sumitabh Das

Reference Books:

- G. Nutt, Operating Systems: A Modern Perspective, Pearson Education.
- W. Stallings, Operating Systems, Internals & Design Principles, Pearson Education.
- M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill.

Suggestive digital platform web links

- <https://web.iitd.ac.in/~minati/MTL458.html>
- <https://www.cse.iitb.ac.in/~mythili/os/>
- <https://www.youtube.com/watch?v=aCJ3YgoolHQ>

Suggested equivalent online courses

- <https://nptel.ac.in/courses/106/102/106102132/>

Scheme of Marks:

Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 30 marks, Term End Exam Theory: 70 marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE):	Class Test Assignment/ Presentation	30
External Assessment: University Exam Section Time:03.00 Hours	Section (A) Very Short questions Section (B) Short questions Section (C) Long questions	70
		Total 100

  
 


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Class	B.Sc.
Year	III Year
Subject	Computer Science
Course Title	Operating System Lab (Group A – Paper I)
Course Type	Discipline Specific Elective
Credit Value	2
Max. Mark	30+70 (Minimum Marks 35)
Course Outcome: After the completion of this course, a student shall be able to do the following:	
<ul style="list-style-type: none"> • Operate the Linux system, along with its administration and Shell Programming. • Understand and be familiar with the Linux environment. • Learn and run the various Linux commands. • Use vi editor for programming. • Learn and run the shell scripting programs. 	

Particular

List of Practicals:

I. Linux:

- a) Linux Directory Commands:** pwd, mkdir, rm -rf, ls, cd, cd / , cd ~
- b) Linux File Commands:** touch, cat, 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, bc, locate, date, cal, sleep, time, df, mount, exit, clear, gzip, gunzip.
- f) Linux Networking Commands:** ip, ssh, mail, ping, host
- g) 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.



II. Shell Scripting:

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

Suggestion Books:

- Richard Peterson, Linux: The Complete Reference, TMH
- Sumitabha Das, McGraw Hill Publication
- Jason Cannon, Linux for Beginners, Createspace Independent Publishing Platform
- William E. Shotts Jr., The Linux Command Line: A Complete Introduction, O'Reilly Media, Inc.

Suggested Digital Platforms Web links:

<https://web.iitd.ac.in/~minati/MTL458.html>

<https://www.cse.iitb.ac.in/~mythili/os/>

<https://www.youtube.com/watch?v=aCJ3YgoolHQ>

Suggested equivalent online courses:

<https://nptel.ac.in/courses/106/102/106102132/>

<https://www.youtube.com/watch?v=OHCMfsNpqCc>

Scheme of Marks:

Maximum Marks: 100		
Internal Assessment :	Class Interaction / Quiz Attendance Assignments (Charts / Model Seminar / Rural Service / Technology Dissemination / Report of Excursion / Lab Visits / Survey / Industrial visit)	30
External Assessment:	Viva Voce on Practical Practical Record File Table Work / Experiments	70
		Total 100

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