3.2 OPERATING SYSTEMS

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RATIONALE

This course will the students in understanding the computer interface existing in computer system and the basic concepts of operating system and its working. The students will also get hands-on experience and good working knowledge to work in windows and Linux environments. The aim is to gain proficiency in using various operating systems after undergoing this course.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:
CO1: Explain various types and services of operating system
CO2: Categorize different types of schedulers and scheduling algorithms.
CO4: Define deadlock and the various ways to recover from deadlock
CO5: Describe memory management and virtual memory.
CO6: Practice general commands, filters, shell scripts in Linux

DETAILED CONTENTS

UNIT I

Overview of Operating Systems

Definition of Operating Systems, Types of Operating Systems, Operating System Services, User operating system interface, System Calls, Types of System Calls, System Programs, Operating System Structure, Virtual Machine, Benefits of Virtual Machine

UNIT II

Process Management and Deadlocks

Process concept, Process State, Process Control Block, Scheduling Queues, Scheduler, Job Scheduler, Process Scheduler, Context Switch, Operations on Processes, Interprocess Communication, Shared Memory Systems, Message-Passing Systems, CPU Scheduler, Scheduling Criteria, Scheduling Algorithms, Preemptive and Non Preemptive, First come first serve (FCFS),

Shortest Job first (SJF), Round Robin (RR), Multiprocessor scheduling, Process Synchronization. Deadlock, Conditions for Dead lock, Methods for handling deadlocks, D e a d Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock.

UNIT III

Memory Management Function

Definition – Logical and Physical address Space, Swapping, Memory allocation, Contiguous Memory allocation, Fixed and variable partition, Internal and External fragmentation and Compaction, Paging – Principle of operation, Page allocation, Hardware support for paging, Protection and sharing, Disadvantages of paging, Segmentation, Virtual Memory.

UNIT IV

I/O Management Functions and File Management

Dedicated Devices, Shared Devices, I/O Devices, Storage Devices, Buffering, Spooling.
Types of File System; Simple file system, Basic file system, Logical file system, Physical file system, Various Methods of Allocating Disk Space

UNIT V

Linux Operating System

History of Linux and Unix, Linux Overview, Structure of Linux, Linux releases, Open Linux, Linux System Requirements, Linux Commands and Filters: mkdir, cd, rmdir, pwd, ls, who, whoami, date, cat, chmod, cp, mv, rm, pg, more, pr, tail, head, cut, paste, nl, grep, wc, sort, kill, write, talk, mseg, wall, merge, mail, news Shell: concepts of command options, input, output, redirection, pipes, redirecting and piping with standard errors, Shell scripts, vi editing commands

PRACTICAL EXERCISES

1. Demonstration of all the controls provided in windows control panel.
2. Exercise on Basics of windows.
3. Installation of Linux Operating System.
4. Usage of directory management commands of Linux: ls, cd, pwd, mkdir, rmdir.
5. Usage of File Management commands of Linux: cat, chmod, cp, mv, rm, pg, more, find.
6. Use the general purpose commands of Linux: wc, od, lp, cal , date, who, whoami.
7. Using the simple filters: pr, head, tail, cut, paste, nl, sort.
8. Communication Commands: news, write, talk, mseg, mail, wall.
9. Write a shell program that finds the factorial of a number.

10. Write a shell program that finds whether a given number is prime or not.
11. Write a shell program to find the average of three numbers.
12. Write a shell program that will convert all the text of the file from lowercase to uppercase.

RECOMMENDED BOOKS

1. Silberschatz, Galvin, "Operating System Concepts", Wiley Publication.
2. Stallings, "Operating Systems", Tata McGraw Hill.
3. Dham Dhare, "Operating Systems- A Concept Based Approach", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. Achyut S Godbole and Atul Kahate, "Operating Systems", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
5. "Unleashed Linux", Tech Media Publishers, New Delhi.
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

SUGGESTED WEBSITES

1. http://swayam.gov.in

INSTRUCTIONAL STRATEGY

This is hands on practice based subject and topics taught in the class should be practiced in the Lab regularly for development of required skills in the students. This subject contains five units of equal weight age. Laboratory must have windows as well as Linux operating system. Concepts of O.S. must be taught practically. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.