4.4   OPERATING SYSTEMS

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RATIONALE

The course provides the students with an understanding of human 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. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- describe various types and services of operating system
- identify the concept of process, various states in the process and their scheduling.
- classify different types of schedulers and scheduling algorithms.
- identify the significance of inter-process communication and synchronization.
- describe deadlock and the various ways to recover from deadlock
- identify memory management techniques
- describe virtual memory and its underlying concepts.
- describe the features and brief history of Linux
- use General purpose commands and filters of Linux
- use of shell scripts in Linux

DETAILED CONTENTS

1.   Overview of Operating Systems   (10 Periods)

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

2.	Process Management (Principles and Brief Concept)		(10 Periods)

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.

3.	Deadlocks (Principles and Brief Concept)			(06 periods)

Deadlock, Conditions for Dead lock, Methods for handling deadlocks,	Dead Prevention, Deadlock Avoidance, Deadlock detection, Recovery from deadlock.

4.	Memory Management Function (Principles and Brief Concept)	(10 periods)

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.

5.	I/O Management Functions (Principles and Brief Concept)	(04 periods)

Dedicated Devices, Shared Devices, I/O Devices, Storage Devices, Buffering, Spooling.

6.	File Management (Principles and Brief Concept)			(06 periods)

Types of File System; Simple file system, Basic file system, Logical file system, Physical file system, Various Methods of Allocating Disk Space

7.	Linux Operating System						(10 Periods)

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

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.

INSTRUCTIONAL STRATEGY

This subject is both theory and practical oriental. Therefore, stress must be given on particulars along with theory. Laboratory must have windows as well as Linux operating system. Concepts of O.S. must be taught practically.

MEANS OF ASSESSMENT

–   Assignments and quiz/class tests, mid-term and end-term written tests
–   Actual laboratory and practical work exercises and viva-voce
–   Software installation, operation, development and viva-voce

RECOMMENDED BOOKS

1.   Operating System Concepts by Silberschatz, Galvin; Wiley Publication
2.   Operating Systems by Stallings; Tata McGraw Hill.
3.   Operating Systems- A Concept Based Approach by DhamDhare; Tata McGraw Hill Education Pvt Ltd , New Delhi

4. Operating Systems by Achyut S Godbole and AtulKahate; Tata McGraw Hill Education Pvt Ltd , New Delhi
5. Unleashed Linux by Tech Media Publishers, New Delhi
6. e-books/e-tools/relevant software to be used as recommended by AICTE/NITTTR, Chandigarh.

Websites for Reference:http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1.	10	18
2.	10	18
3.	06	10
4	10	18
5	04	8
6	06	10
7	10	18
Total	**56**	**100**