CS-24: Operating Systems Concepts with Unix / Linux

Objectives:

- To provide the basic feature, function and interface with the hardware and application software to run the computer smoothly.

Prerequisites:

- Basic knowledge of operating system and it's functionality along with its types

Unit No.	Topic	Detail
1	**Introduction, Process and Thread, Process Scheduling**	• Meaning of OS • Functions of OS • Features of OS • OS Types (User Point of View) • OS Types (Features Point of View)

		• Process Definition
		• Process States
		• Process State Transitions
		• Process Control Block
		• Context Switching
		• Threads
		  ○ Concept of multithreads
		  ○ Benefits of threads
		  ○ Types of threads

		• Types of Schedulers • CPU Scheduling Algorithms • FCFS • SJN • Round Robin • Priority Base Non-Preemptive • Priority Base Preemptive
2	**Deadlocks, Memory Management**	• Deadlocks: Definition • Deadlock Prevention • Deadlock Avoidance • Deadlock Detection • Physical Memory and Virtual Memory • Memory Allocation • Internal and External fragmentation • Contiguous Memory Allocation • Noncontiguous Memory Allocation • Virtual Memory Using Paging • Virtual Memory Using Segmentation

3	**Getting Started with Unix, Unix Shell Command**	• Unix Architecture
		• Unix Features
		• Types Of Shell (C, Bourn, Korn)
		• Unix File System
		• Types Of Files
		  ○ Ordinary Files
		  ○ Directory Files
		  ○ Device Files
		• Unix File & Directory Permissions

		• Connecting Unix Shell : Telnet • Login Commands passwd, logout, who, who am i, clear,uname • File / Directory Related Command ls, cat, cd, pwd, mv, cp, ln, rm, rmdir, mkdir, chmod, chown, chgrp, find, more, less, head, tail, wc, touch, stat, alias, type • Operators in Redirection & Piping <, >, <<, >>, | • Finding Patterns in Files grep, fgrep, egrep • Working with columns and fields cut, paste, join • Tools for sorting :sort, uniq • Comparing files : cmp, comm, diff • Changing Information in Files: tr, sed • Examining File Contents : od • Tools for mathematical calculations: bc, factor • Monitoring Input and Output :tee, script • Tools For Displaying Date and Time: cal, date • Communications : telnet, ping • Process Related Commands: ps, sleep
4	**Text Editing with vi and nano Editor, Shell Programming**	• Introduction of vi editor • Modes in vi • Switching mode in vi • Cursor movement • Screen control commands • Entering text, cut, copy, paste in vi editor • Introduction of nano editor
		• Shell Keywords • Shell Variables • System variables PS2, PATH, HOME,LOGNAME, MAIL, IFS, SHELL, TERM, MAILCHECK

		• User variables set, unset and echo command with shell variables • Positional Parameters • Interactive shell script using read and echo • Decision Statements o if then fi o if then else fi o if then elif else fi o case esac • test command • Logical Operators • Looping statements o for loop o while loop o until loop o break, continue command • Array • Function • Various shell script examples
5	**Getting Started with Linux, Linux Booting, Linux Admin (Ubuntu)**	• History of Linux • GNU, GPL Concept • Open Source & Freeware • Structure and Features of Linux • Installation and Configuration of Linux o Using with Ubuntu • Startup, Shutdown and boot loaders of Linux
		• Linux Booting Process o LILO Configuration o GRUB Configuration
		• Creating Linux User Account and Password • Installing and Managing Samba Server • Installing and Managing Apache Server • Configure Ubuntu's Built-In Firewall • Working with WINE

Seminar	-	5 Lectures
Expert Talk	-	5 Lectures
Test	-	5 Lectures

Total Lectures 60 + 15 = 75

Reference Books:

- Operating System Concept, Abraham Silberschatz, Peter B. Galvineg Gagne, Wiley-Indian Edition, 9th Edition

- Operating Systems, Internals and Design Principles, William Stallings, Seventh Edition
- Unix Shell Programming – Y. Kanetkar – Bpb Publications
- Unix Concepts and Applications – Sumitabha Das
- The complete reference Linux, Richard Petersen, McGraw Hill, Sixth Edition

Course outcomes:

- Understand design and implementation aspects of modern operating system
- Acquire knowledge of four major OS components: process management, memory management, file systems, and input/output mechanisms
- Analyze and compare various process scheduling algorithms
- Learn the concepts, design, and structure of the UNIX operating system
- Design shell scripts using various UNIX utilities

Hands-On (Not to be asked in the examination):

- Installation of Unix / Linux
- User and Group Creation
- Demo of Various Applications available in Unix / Linux like Star Office, Games and other productivity tools
- Demo of GNOME, KDE Desktops in Linux