INTRODUCTION TO LINUX PROGRAMMING

VI SEMESTER - OPEN ELECTIVE – II

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
A4CS47	OEC	3	-	-	3	30	70	100

COURSE OBJECTIVES:

1. To understand principles of operating system including File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking Commands, Basic Linux commands, Scripts and filters.
2. To familiarize fundamentals of the Bourne again shell (bash), shell programming, pipes, input and output redirection Control structures, arithmetic in shell interrupt processing, functions, debugging shell scripts.
3. To impart fundamentals of file concepts kernel support for file, File structure related system calls (file API's).
4. To facilitate students in understanding Inter process communication.
5. To facilitate students in understanding semaphore and shared memory.

COURSE OUTCOMES:

At the end of the course students are able to

1. Use various Linux commands that are used to manipulate system operations at admin level and a prerequisite to pursue job as a Network administrator.
2. Write Shell Programming using Linux commands.
3. Design and write application to manipulate internal kernel level Linux File System.
4. Develop IPC-API's that can be used to control various processes for synchronization.
5. Develop Network Programming that allows applications to make efficient use of resources available on different machines in a network.

UNIT-I	INTRODUCTION TO LINUX AND LINUX UTILITIES	

INTRODUCTION TO LINUX AND LINUX UTILITIES: A brief history of LINUX, architecture of LINUX, features of LINUX, introduction to vi editor.
Linux commands- PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text Processing utilities and backup utilities , tail, head , sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio

UNIT-II	INTRODUCTION TO SHELLS AND FILTERS	

Introduction to Shells: Linux Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.
Filters: Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count Characters, Words or Lines, Comparing Files

UNIT-III	GREP, SED, UNIX FILE STRUCTURE AND FILE MANAGEMENT	

GREP: Operation, grep Family, Searching for File Content.
Sed : Scripts, Operation, Addresses, commands, Applications, grep and sed.
UNIX FILE STRUCTURE: Introduction to UNIX file system, inode (Index Node), file descriptors, system calls and device drivers.
FILE MANAGEMENT : File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

UNIT-IV	PROCESS AND SIGNALS	

PROCESS AND SIGNALS: Process, process identifiers, process structure: process table, viewing processes, system processes, process scheduling, starting new processes: waiting for a process, zombie processes, orphan process, fork, vfork, exit, wait, waitpid, exec, signals functions, unreliable signals, interrupted system calls, kill, raise, alarm, pause, abort, system, sleep functions, signal sets. File locking: creating lock files, locking regions, use of read and write with locking, competing locks, other lock commands, deadlocks.

UNIT-V	INTER PROCESS COMMUNICATION AND SOCKETS	

INTER PROCESS COMMUNICATION: Pipe, process pipes, the pipe call, parent and child processes, and named pipes: fifos, semaphores: semget, semop, semctl, message queues: msgget, msgsnd, msgrcv, msgctl, shared memory: shmget, shmat, shmdt, shmctl, ipc status commands.
INTRODUCTION TO SOCKETS: Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications.

TEXT BOOKS:

1. W. Richard. Stevens (2005), Advanced Programming in the UNIX Environment, 3rd edition, Pearson Education, New Delhi, India.
2. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson

REFERENCE BOOKS:

1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. UNIX Network Programming, W.R. Stevens, PHI.
4. UNIX for Programmers and Users, 3rd Edition, Graham Glass, King Ables, Pearson Education

WEB REFERENCES:

1. https://www.smartzworld.com/notes/linux-programming-pdf-notes-lp-pdf-notes/
2. https://lecturenotes.in/subject/455/linux-programming-lp

E-TEXTBOOKS:

1. https://books.google.co.in/books?id=vvuzDziOMeMC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
2. https://books.google.co.in/books?id=TKjATVAxNIwC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

MOOC COURSE

1. https://www.classcentral.com/course/edx-c-programming-using-linux-tools-and-libraries-11538
2. https://www.udacity.com/course/linux-command-line-basics--ud595