16IT309   UNIX PROGRAMMING

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	5	40	5	6	4	5

Course Description and Objectives :

This course introduces the basic programming concepts, usage of tools and utilities of Unix environment. It also offers the skills of shell scripting and programming with Unix internals. The objective of this course is to impart skills is to work in Unix environment using shell scripting and system calls.

Course Outcomes :

The student will be able to:

- use Unix system as a programmer and developer.
- understand Unix file structure, commands and utilities.
- get expertise with regular expressions and shell programming.

SKILLS:

✓ *Implement open source operating systems such as Ubuntu and Fedora.*

✓ *Simulate and compare basic algorithms used in process scheduling.*

✓ *Design chat box applications in client server environment.*

✓ *Manage user privileges in Unix server.*

✓ *Explore the Pipes, FIFOs, message queues mechanisms of IPC.*

UNIT - 1   **L-9**

INTRODUCTION TO UNIX: Introduction to UNIX, Unix structure, Unix features; Common commands - date, time, calender, who, password, echo and man; Basic vi editor - modes, commands related to modes, inserting, deleting text and moving cursor, filesystems, filenames, file types, directories, file permissions; Commands to be covered here are - cp, mv, ln, rm, unlink, mkdir, rmdir, du, df, mount, umount, find, umask, ulimit, ps, who, finger, arp, ftp, telnet and rlogin, process utilities; Disk and network utilities.

UNIT - 2   **L-9**

UNIX UTILITIES: What is a shell, Shell relationships, standard streams, redirection, pipes, tee command, command substitution, shell variables, conditions, history and control structures and shell programming; Filters, text processing utilities and backup utilities; Detailed commands to be covered are- cat, tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, more, pg, comm, cmp, diff, tr, awk and tar.

UNIT - 3   **L-9**

FILE I/O AND FILE DIRECTORIES: File descriptor, open function, close function, create function, lseek, read, write, filesharing, dup and dup2 functions, fcntl, Ioctl functions; File status, stat, fstat, istat functions, file types, permission, ownership of new files and directories, file system, links, file times, directory related functions; The system calls to be covered are -access, umask, chmod, fchmod, chown, link, unlink, symlink, mkdir, rmdir, chdir, fchdir, getcwd and utime.

UNIT - 4   **L-9**

ENVIRONMENT OF UNIX PROCESS AND PROCESS CONTROL: Process identifiers, fork, vfork, exit, wait, waitpid, wait3, exec functions; Race conditions, zombie process, signal concepts, signal handling; Important signals - kill, raise, alarm, pause, and abort.

UNIT - 5   **L-9**

INTER PROCESS COMMUNICATION: Pipes and FIFO; System V IPC – message queue, semaphore and shared memory.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS: Total hours: 30

1. Usage of basic UNIX commands.

2. Implementation of system calls: create, open, read, write, close, stat, fstat, lseek.

3. Develop inter process communication using pipes.

4. Perform inter process communication using message queues.

5. Develop inter process communication using shared memory.

6. Perform synchronization using semaphores.

7. Implement packet capturing activity: sniffer.

8. Write a chat application using TCP sockets (Client and Server).

9. Design FTP application using UDP sockets (Client and Server).

10. Program using URL class to download webpages.

TEXT BOOKS :

1. B. A. Forouzan and R. F. Gilberg, "Unix and shell Programming", 1st edition, Thomson, 2005.

2. W.R. Stevens, "Advanced Programming in the UNIX environment", 1st edition, Pearson Education, 2006.

ACTIVITIES:

o *Applying Unix commands for various file and user management activities.*

o *Design Page replacement algorithms in memory management.*

o *Implementation of process scheduling algorithms.*

o *Implement chat applications for local communications.*