



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

COURSE CONTENT

LINUX PROGRAMMING

VII Semester: CSE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
2476704	PE	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisites: operating systems and computer organization								

Course Overview:

This course introduces the fundamentals of Linux operating system and programming utilities, enabling students to acquire practical skills in Linux commands, shell programming, file management, process handling, signals, and inter-process communication. Students will learn to build Linux-based applications by leveraging system calls, process synchronization, and network communication primitives. By the end, learners will gain proficiency in Linux programming for real-world problem-solving in system-level and application-level development.

Course Objectives:

1. To teach principles of operating system including File handling utilities, Security by file permissions.
2. To identify Process utilities, Disk utilities, Networking Commands, Basic Linux commands, Scripts and filters.
3. 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.
4. To facilitate students in understanding Inter process communication.
5. To facilitate students in understanding semaphore, shared memory and process.

Course Outcomes: After Completion of the Course, Students should be 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. Apply Network Programming that allows applications to make efficient use of resources available on different machines in a network.

UNIT-I

[10 Periods]

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

[09 Periods]

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

[09 Periods]

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

[10 Periods]

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

[10 Periods]

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. UNIX for Programmers and Users, 3rd Edition, Graham Glass, King Ables, Pearson Education

ELECTRONIC RESOURCES:

1. https://archive.org/details/linuxsystemprogr0000love_h9n0
2. <http://www.apuebook.com>
3. <https://archive.org/details/advancedprogrammingintheunixenvironment>
4. <https://archive.org/details/unixnetworkprogr0000stev>
5. <https://archive.org/details/unixforprogramme0000glas>

MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. E-Learning Readiness Videos (ELRV)