GANPAT UNIVERSITY

FACULTY OF COMPUTER APPLICATIONS

Programme	Master of Computer Applications	**Branch/Spec.**	Computer Application
Semester	I	**Version**	1.0.0.0
Effective from Academic Year	2024-25	**Effective for the batch Admitted in**	June 2024
Subject Code	P11A5LFN	**Subject Name**	Linux Fundamental with Networking

Teaching scheme						**Examination scheme (Marks)**			
(Per week)	**Lecture (DT)**		**Practical (Lab.)**		**Total**		**CE**	**SEE**	**Total**
	L	TU	P	TW					
Credit	2	1	1	-	4	Theory	40	60	100
Hours	2	1	2	-	5	Practical	20	30	50

Objective:

- ✔ To become aware about the fundamental concepts of linux, Networking Commands, Basic Linux commands, Scripts and filters.
- ✔ To familiarize fundamentals of the shell, shell programming, pipes, input and output redirection.
- ✔ To impart fundamentals of file management system.
- ✔ To Develop the skills required to write network programs using sockets

Pre-requisites:

- ✔ Basic knowledge of Operating Systems,
- ✔ Computer Organization, Computer Networks,
- ✔ C Programming, Data Structures, etc

Course Outcomes :

Name of CO	Description
CO1	Apply essential Linux commands and utilities to manage files, directories, permissions, and system operations at a basic administrator level.
CO2	Develop shell scripts using filters, pipelines, redirection, and regular expressions to automate routine system tasks and manage Unix/Linux environments effectively.
CO3	Analyze and manage Linux processes, process scheduling, signals, and system calls to handle background/foreground operations and troubleshoot system behavior.
CO4	Implement inter-process communication (IPC) methods and build basic network programs using sockets to facilitate data communication across processes and networked systems.

Mapping of CO and PO								
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO↵

CO1	3	2	2	3	2	1	1	2
CO2	3	3	2	3	2	1	1	2
CO3	2	3	2	3	2	2	1	2
CO4	2	3	3	3	2	2	1	2

Content:

Unit	SECTION – I	Hrs
1	**Introduction to Linux and its Utilities:** A brief history of LINUX, Linux Architecture Features of Linux, Understanding Linux File system, Linux Distributions, The Linux Console, Linux Desktop, Types of Desktop - X-Windows, KDE, GNOME. Linux Commands: General Purpose Utilities, File Handling Utilities, Process Management, Simple Filters, Filters using Regular Expressions - grep. Filter Command & Editors Using Advanced Filters: AWK working with various editors: sed, vi/vim Editor, Gedit, Nano, GNU Emacs, Kwrite, gVim, Bluefish etc.	10
2	**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. **Grep:** Operation, grep Family, Searching for File Content. Sed : Scripts, Operation, Addresses, commands, Applications, grep and sed. **Unix File Structure and File Management:** Introduction to 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.	12
	SECTION – II	
3	**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.	9
4	**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:** IPC over a network, client – server model, Socket address structures, Socket system calls for connection oriented protocol and connectionless protocol, example-client/server programs- single server- client connection, multiple simultaneous clients, socket options- setsockopt and fcntl system calls, comparison of IPC mechanisms.	14

Practical Content:

List of programs specified by the subject teacher based on above mentioned topics

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
3	Sumitabha, Das, Unix Concepts And Applications, Tata McGraw-Hill Education, 2006
4	Linux Command Line and Shell Scripting, Richard Blum, Christine Bresnahan, 2nd Edition, Wiley India.

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	Linux Command Line and Shell Scripting Bible: Richard Blum, Christine Bresnahan
4	UNIX Shell Scripting by Randal Michael covers Bash, Bourne, and Korn shell scripting

Web References / MOOC / Certification Course

Linux Programming & Scripting – NPTEL
https://nptel.ac.in/courses/117/106/117106113/
Linux Fundamentals | Coursera
https://www.coursera.org/learn/linux-fundamentals
The Linux Documentation Project: http://www.tldp.org/
Linux kernel Home: http://kernel.org
The Linux Foundation: http://www.linuxfoundation.org/
Open Source Database Technologies: http://blog.capterra.com/free-database-software/

Question Paper Scheme:

University Examination Duration: 3 Hours

Note for Examiner: -

(I) Questions 1 and 4 are compulsory with no options.

(II) Internal options should be given in questions 2, 3, 5 and 6.

SECTION - I

Q.1 –8 Marks

Q.2 –11 Marks

Q.3 –11 Marks

SECTION - II

Q.4 –8 Marks

Q.5 –11 Marks

Q.6 –11 Marks