# GANPAT UNIVERSITY

## FACULTY OF COMPUTER APPLICATIONS

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|---|---|---|---|
| **Programme** | Master of Computer Applications | **Branch/Spec.** | Computer Application |
| **Semester** | I | **Version** | 1.0.0.0 |
| **Effective from Academic Year** | 2022-23 | **Effective for the batch Admitted in** | June 2022 |
| **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 | PO8 |
|---|---|---|---|---|---|---|---|---|
| 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.<br>**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:**


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|---|---|
| 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 |

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|---|---|
| 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**<br>https://nptel.ac.in/courses/117/106/117106113/<br>**Linux Fundamentals \| Coursera**<br>https://www.coursera.org/learn/linux-fundamentals<br>**The Linux Documentation Project:** http://www.tldp.org/<br>**Linux kernel Home:** http://kernel.org<br>**The Linux Foundation:** http://www.linuxfoundation.org/<br>**Open Source Database Technologies:** http://blog.capterra.com/free-database-software/ | |
| **Question Paper Scheme:** | |
| | **University Examination Duration: 3 Hours**<br>Note for Examiner: -<br>(I) Questions 1 and 4 are compulsory with no options.<br>(II) Internal options should be given in questions 2, 3, 5 and 6.<br>**SECTION - I**<br>Q.1 –8 Marks<br>Q.2 –11 Marks<br>Q.3 –11 Marks<br>**SECTION - II**<br>Q.4 –8 Marks<br>Q.5 –11 Marks<br>Q.6 –11 Marks |