1. Core Operating System Concepts
- Understanding the role of an Operating System
- Linux architecture and kernel basics
- File system hierarchy and directory structure
- Process management and multitasking
- User and group management
- Memory management concepts (RAM, swap, virtual memory)
- Basic shell scripting and automation

2. Linux File System Management
- Understanding filesystem types and structures
- Common file system commands:
  - `mkfs` – Create a filesystem
  - `fsck` – Check and repair a filesystem
  - `lsof` – List open files
  - `df` – Show disk space usage
  - `du` – Show directory size
  - `find` – Search files
  - `diff` – Compare files
  - `locate` – Quickly find files
  - `ln` – Create hard and symbolic links
- File permissions and ownership:
  - `chmod` – Modify file permissions
  - `chown` – Change file owner
  - `lsattr` – List file attributes
  - `chattr` – Modify file attributes
- Special file permissions:
    - SetUID, SetGID, Sticky Bit
    - Access Control Lists - setfacl, getfacl
    - Filesystem attributes - chattr, lsattr

3. User and Group Management
- User account creation and modification:
  - `useradd`, `usermod`, `userdel`, `passwd`
- Group management:
  - `groupadd`, `groupdel`, `groupmod`
- Assigning and managing user privileges:
  - `su`, `sudo`, `/etc/sudoers`
- Understanding login shells and user profiles:
  - `/etc/passwd`, `/etc/group`, `/etc/shadow`
- Setting environment variables and managing user settings

4. Process Management & System Performance
- Viewing and managing processes:

  - `ps`, `top`, `htop`, `fg`, `bg`, `kill`, `pkill`, `pgrep`
- Debugging and tracing processes:
  - `strace`, `lsof`, `nohup`
- Scheduling tasks:
  - `cron`, `at`, `systemd timers`
- Performance monitoring:
  - `vmstat`, `iostat`, `sar`, `netstat`

5. Disk Storage and Partition Management
- Understanding disk partitions and filesystems
- Key commands:
  - `fdisk`, `parted`, `mkfs`, `mount`, `umount`, `blkid`, `tune2fs`
- Checking and repairing filesystems:
  - `fsck`, `resize2fs`, `df`, `du`
- Managing swap space:
  - `mkswap`, `swapon`, `swapoff`

6. Linux Networking and System Administration
- Configuring network interfaces:
  - `ifconfig`, `ip`, `ethtool`, `nmcli`
- Troubleshooting network connectivity:
  - `ping`, `traceroute`, `telnet`, `nc`
- Managing routes and gateways:
  - `route`, `ip route`, `netstat`
- DNS and name resolution:
  - `dig`, `nslookup`
- File transfer and remote access:
  - `scp`, `rsync`, `wget`, `curl`
- Packet analysis and security monitoring:
  - `tcpdump`, `iptables`, `fail2ban`

7. System Monitoring & Performance Tuning
- Resource monitoring tools:
  - `top`, `htop`, `free`, `iostat`
- Checking system logs:
  - `/var/log/syslog`, `/var/log/messages`
- CPU and memory profiling:
  - `vmstat`, `mpstat`, `dstat`

Reference Materials
- [GeeksforGeeks: Introduction to Linux](https://www.geeksforgeeks.org/introduction-to-linux-operating-system/)

- [TutorialsPoint: Operating Systems](https://www.tutorialspoint.com/operating_system/index.htm)
- [Linux Training Handbook](http://linux-training.be/linuxfun.pdf)
- [60 Essential Linux Commands](https://www.tecmint.com/60-commands-of-linux-a-guide-from-newbies-to-system-administrator/)
- [Linux System Administration Guide](http://linux-training.be/linuxsys.pdf)
- [Unix/Linux Tutorial](https://www.tutorialspoint.com/unix/index.htm)