IT-503 System and Network Administration

Here's the revised 16-week plan with **practical** tasks instead of the term "task":

Week 15: Virtualization and Containers

Week 1: Introduction to Linux Systems

1. **Practical 1: Setting Up a Virtual Machine with VirtualBox/VMware**
    - Install and configure a virtual machine.
2. **Practical 2: Linux Installation and Setup**
    - Install a Linux distribution (Ubuntu, Fedora, etc.) in a virtual machine.
    - Explore basic Linux commands (`ls`, `cd`, `pwd`, `cp`, `mv`, etc.). **Navigating the File System**
    - Learn about file system hierarchy and permissions.
    - Practice file and directory management (`mkdir`, `rm`, `chmod`, `chown`).

Week 2: User and Group Management

3. **Practical 1: User Management**
    - Add, delete, and modify user accounts (`useradd`, `usermod`, `passwd`, `userdel`).
4. **Practical 2: Group Management**
    - Add, delete, and modify groups.
    - Assign users to groups and explore `/etc/passwd` and `/etc/group`.

Week 3: File Permissions and Ownership

5. **Practical 1: Understanding File Permissions**
    - Explore file permissions (`rwx`) and ownership.
    - Change permissions and ownership using `chmod` and `chown`.
6. **Practical 2: Special Permissions**
    - Learn about special permissions (SUID, SGID, sticky bit) and configure them.

Week 4: System Monitoring and Logs

7. **Practical 1: System Monitoring Basics**
    - Use commands like `top`, `htop`, `free`, `df`, `du`, and `uptime` to monitor system performance.
8. **Practical 2: Analyzing System Logs**
    - Explore log files in `/var/log` (e.g., `syslog`, `auth.log`, `dmesg`).
    - Use `journalctl` to view systemd logs.

Week 5: Package Management

9. **Practical 1: Package Managers (apt, yum, etc.)**
    - Install, update, and remove packages using `apt` (Debian-based) or `yum`/`dnf` (RedHat-based).
10. **Practical 2: Working with Repositories**
    - Add and remove software repositories.
    - Install software from third-party sources.

Week 6: Process and Job Management

11. **Practical 1: Managing Processes**
    - Explore process management using `ps`, `kill`, `nice`, `renice`, and `killall`.
12. **Practical 2: Scheduling Jobs**
    - Automate tasks using `cron` jobs and `at` commands.

Week 7: Disk Management and Partitioning

13. **Practical 1: Disk Partitioning**
    - Create and manage partitions using `fdisk` or `parted`.
    - Format partitions using `mkfs` (ext4, NTFS, etc.).
14. **Practical 2: Mounting and Unmounting File Systems**
    - Manually mount and unmount partitions.
    - Explore `/etc/fstab` for automatic mounting.

Week 8: Backup and Restore

15. **Practical 1: Basic Backup Tools**
    - Use `tar` and `rsync` for file backups.
    - Compress backups using `gzip` and `bzip2`.
16. **Practical 2: Restoring Files**
    - Restore from `tar` archives and synchronize data using `rsync`.

Week 9: Networking Fundamentals

17. **Practical 1: Basic Network Commands**
    - Use commands like `ifconfig`, `ip addr`, `ping`, `netstat`, and `traceroute` to explore network configurations.
18. **Practical 2: Configuring Network Interfaces**
    - Configure static and dynamic (DHCP) IP addresses.

Week 10: DNS and DHCP

19. **Practical 1: Understanding DNS**
    - Explore how DNS works using tools like `dig`, `nslookup`, and `host`.
20. **Practical 2: Configuring DHCP**
    - Install and configure a DHCP server, assign dynamic IPs.

Week 11: Firewalls and Security

21. **Practical 1: Configuring iptables or firewalld**
    - Set up basic firewall rules using `iptables` or `firewalld`.
22. **Practical 2: Managing Open Ports**
    - Explore open ports using `netstat` and close unnecessary ones.

Week 12: SSH and Remote Access

23. **Practical 1: Configuring SSH Access**
    - Set up SSH server and client.
    - Configure SSH key-based authentication.
24. **Practical 2: Secure Remote Administration**
    - Secure SSH access by changing default port and using fail2ban to prevent brute-force attacks.

Week 13: Web and File Servers

25. **Practical 1: Setting Up a Web Server (Apache/Nginx)**
    - Install and configure a web server.
    - Host a simple HTML website.
26. **Practical 2: Setting Up a File Server (Samba/NFS)**
    - Install and configure Samba or NFS to share files across the network.

Week 14: Network Troubleshooting

27. **Practical 1: Troubleshooting with ping, traceroute, and netcat**
    - Use `ping`, `traceroute`, and `nc` (netcat) to diagnose network issues.
28. **Practical 2: Monitoring Network Traffic with tcpdump**
    - Capture and analyze network packets using `tcpdump`.

Week 15: Virtualization and Containers

29. **Practical 1: Setting Up a Virtual Machine with VirtualBox/VMware**

- Install and configure a virtual machine.

30. **Practical 2: Introduction to Containers (Docker)**
    - Set up and run a simple container using Docker.

Week 16: Final Projects

31. **Practical 1: Build a Secure Web Server Environment**
    - Secure a web server by setting up HTTPS, firewall rules, and monitoring tools.

32. **Practical 2: Networking Project**
    - Set up a small local network, configure DNS, DHCP, and file sharing services.
